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MASSACHUSETTS
FRUIT GROWERS'
ASSOCIATION INC.



REPORT OF THE
21st Annual Convention
HELD IN
HORTICULTURAL HALL
WORCESTER
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POMOLOGY

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Twenty-First Annual Convention

OF THE

Massachusetts Fruit Growers' Association Inc.

Horticultural Hall, Worcester, Mass.
January 13 and 14, 1915.

First Day, Wednesday, January 13, 1915.

MORNING SESSION

President F. C. Sears presiding.

Meeting called to order at 10.40 a. m., by the President.

THE PRESIDENT: Fellow members of the Massachusetts Fruit Growers' Association: It is regrettable that we haven't a larger audience, but, on the other hand, we are very glad to see so many of you here, and we think that we can always feel that at a time like this, with a storm raging, that people who do come out are really interested. I feel something like the old preacher did. They were taking up a special collection for the church debt. It had been very freely advertised, and they tried to get out a big attendance, and when the day came they struck just such weather as today, and one of the deacons went to the preacher and said, "Don't you think, Brother, we had better delay the meeting until some other time, it is such a snowy day?" and he said, "Oh, no. We have got the cream and we had better churn." So that is the way we feel this morning.

I believe we are going to give you one of the best pro-

grams that has ever been pulled off at a meeting of this kind. Perhaps the management ought not to start out by bragging that way, but I think that after looking over the program you will see that it is made up of good, live subjects, presented by good, live men, and we certainly feel like congratulating ourselves on the list of speakers we are going to present. The first discussion is going to be on the matter of cooperation. If any of you should ever be fortunate enough to visit the Hudson River Valley—which, by the way, isn't a valley at all, but a magnificent river among the beautiful hills of that region—and should be fortunate enough to walk along up among the hills to a certain farm, you would come first on a very homelike house among some fine old trees, where the first generation lives; and then, if you should ramble along the hill a little further you would come to a charming little bungalow where the second and third generations are now living. I had the pleasure of that experience last autumn, and I was lucky enough to be there at dinner-time, and I remember that dinner as one of the most delightful occasions I have ever known, not only because we had so many good things to eat, but because everybody there seemed to be interested in the fruit business, the ladies of the family just as much as the men.

Now, we frequently hear the criticism that you can't do much in cooperation at this end of the country, but that you have got to get out West where the people are forced into it in order to get interested in cooperation, but I think the experience of the people in the neighborhood I have just been describing goes a long way to prove the contrary, and I am very glad indeed to introduce one of my own students, Mr. Walter R. Clarke of Milton, New York, who is going to talk to us on "The Incomes and Outcomes of the Hudson River Fruit Exchange." Mr. Clarke, Ladies and Gentlemen. (Applause).

THE INCOMES AND OUTCOMES OF THE HUDSON RIVER FRUIT EXCHANGE

Walter R. Clarke, Milton, N. Y.

In this talk on our experiment in cooperation, I do not wish to give you the idea that we have discovered a Utopia for all the ills of the fruit grower. It is juust to be the story of the failures and successes of an association starting under difficulties with just as much of the conservative to break down as you have here in good old New England.

Somehow the idea of getting together had been preached at us and to us so long that it seemed as if it had fallen on deaf ears, but it all happened when we least expected it. Charles E. Thurston of the Thurston Fruit Auction Company of New York came to see one or two of our growers in relation to the forming of an association to sell produce on New York docks. While this was not found feasible it was through him that our Exchange was founded and it was surely no easy task to obtain enough growers to make even a start. Several meetings were held and a Constitution and By-Laws were adopted.

On April 20, 1912, the Hudson River Fruit Exchange was incorporated with a capital stock of \$2000 divided into 100 shares at \$20 each and a member must own at least one share of stock and not more than four, the stock itself carrying no voting power.

The members themselves must be growers of fruit and accepted by the Executive Committee, which consists of seven members elected by the Exchange, and this Committee elects the President, Vice President, and Secretary-Treasurer; has general oversight and control of the business of the organization and the hiring of the Manager and his assistants. Meetings of the Executive Committee are held monthly. At these meetings Financial Report is read and so the

standing of the Exchange is carefully watched. New applicants for membership are accepted or rejected. The manager outlines his plan for the next month and the Committee advises before new lines of work are attempted.

The manager is the keynote of success or failure in any cooperative undertaking and I think it has been so in our Exchange. For the first two years George Hildebrande of Wisconsin held the position and right here let me say that I believe it was his enthusiasm and optimism that put the Hudson River Fruit Exchange on the map. During this season of 1914, Mr. R. B. Crowell has been our manager and we all feel that we owe to his careful work the margin of profit that we will have for this year.

Now to come to just how we do business. In New York, Boston, Philadelphia and all the principal large cities, we have our own Exchange Commission men and members are allowed to ship to these parties only. To quote from the By-Laws:

“Members of this Exchange bind themselves when consigning fruit to ship only to commission houses or auctions duly designated by the Exchange. They also agree to ship all fruit up to grade under the label of the Exchange and fruit not up to grade without label.”

These commission houses rebate back to the Exchange 3% out of the 10% charged for selling. This is the main source of income to meet expenses of the Exchange. You ask, “Why the rebate?” Most firms are glad to get the extra business of the Exchange and it also saves the salary of a representative in the field to drum business. Commission firms must find it profitable for we are still receiving application to sell for us. In the season of 1913 our rebate on Commission Sales alone was over \$4000.

Our next income is obtained from commissions on F. O. B. sales. The By-Laws read:

“Fruit sold through the Exchange f. o. b. shipping or track shall pay to the Exchange 3% of the gross price. In

such cases the Exchange stands behind such sales and guarantees the price to the grower.”

It is this sale-on-track business that we wish to build up. Each morning in the small fruit season, the manager wires his buyers a quotation on strawberries, raspberries, currants or whatever it may be. Sometime he is offered their price, which is lower of course. He telephones each grower and finds whether they will sell or not, which depends on the commission market. After the first sale, the manager often has demand for special grower's mark and in this way competition is keen among the growers to keep their fruit up to quality.

In our section there are a number of fruit buyers or brokers and of course the Exchange broke in more or less on their business. It is a well known fact that it is the practice of buyers to start the season at high prices and after they get the growers in the selling habit they quickly drop the price regardless of market conditions. The Exchange simply put a stop to that by buying at prices as they should be. This was a benefit to the whole community as well as members. Thus it became a well worn slogan among the buyers, “Kill the Exchange.”

Our third source of income is derived from buying, 3% being charged on all goods except fertilizers, where the distributing costs are less. Our members at present can buy anything from quart baskets to automobiles. All goods are bought wholesale and in car lots when possible, thus giving members the benefit of savings on prices. Oats are bought at an average saving of from 5 to 8 cents per bushel, feed \$5 per ton, fertilizers from \$4 to \$6 per ton, and countless other things, which aside from the selling end of the Exchange, makes it worth while.

Let us go back again to our organization. In banding together our members, as you see, have given up their special agencies and side interests, turning them over to the Exchange, and by so doing everybody is benefitted as well as the individual.

Members are required to obey all laws and regulations of the Exchange. To quote By-Laws:

“The Executive Committee shall have power to suspend from the Exchange any member who does not comply with all the laws, usages and regulations now in force, or which may be hereafter adopted by the Exchange or its Executive Committee.”

As to territory, we are taking members from New York to Albany, although the heart of the Exchange is centered about half way between on the west bank of the river in a district 20 miles long by 5 miles wide. Long distance members cannot obtain as yet quite the service those nearer the home office receive. When the Exchange grows into a larger territory, branch offices will of course be opened.

Speaking of the many advantages the Exchange has to offer its members: One of the most important is the daily market report. For instance, a grower shipping fruit to-night will be informed tomorrow at 9 A. M. just what his goods sold for. If the market is overloaded, the manager advises where to ship, thus saving the grower from sacrificing his fruit. In fact, every morning a member can telephone the office and get quotations from all the principal cities.

The telephone report also saves the Commission house from sending wires to each individual grower by telephoning each man's report to the central office.

To really give you the Incomes and Outcomes of our Exchange it will be necessary for me to give the work of each year.

In 1912, we started with about fifty members; just a bunch of men, hardly two with the same idea. Also, it was a very poor season, both in prices and crops. I believe to this day if that first August and September the manager had not run in a few cars of 37 cent oats when we had been paying 50 and 52 cents, the Exchange would now be a thing of the past. But that started the buying and gradually all sorts of merchandise were added to our list. Expenses were

heavy, incomes small, and to make a long story short, we ran behind the sum of \$182.52. But the Exchange stuck together and that above all things was most to be desired.

On May 1, 113, we started with 68 members and closed the year with 108. It was during this year that the capital stock was increased to \$4000, giving 200 shares. Our business that year, consisting of commission sales, F. O. B. sales, and merchandise bought and sold, amounted to \$250,108.42.

Without reckoning the produce consigned to commission houses, we sold 3000 lb. for Export; bought

600 tons of Fertilizers and Chemicals

1,000,000 quart Cups

350,000 pints

6,000 Gift Crates

21 cars of Feed and Oats.

Bought oats delivered, as low as 36 cents.

27 cars Manure

2 cars Baskets.

Sold 100 cars of Strawberries, Raspberries and Currants

10 cars Pears and Apples for U. S. A.

Fruit sold F. O. B. to points as far south as Tampa, Fla. and as far west as Cincinnati.

Also bought 6 cars Agric. Lime

150 lb. Lime-Sulfur Solution

5 tons Arsenate of Lead Paste and Powder

The members became very enthusiastic over the prospects for future business. Claims for lost fruit were taken up by the manager with the express companies and settled within a few weeks, while before, the individual grower often had to wait a year or more for his claim to be paid.

Of course difficulties came up, such as different methods of grading, packing and marking, which of course made it hard to send car lots. This difficulty has not yet been adjusted satisfactorily.

This past season we started with 108 members and now have 119. The small gain is due to the extremely poor year. We suffered an entire loss of the peach crop and had, gener-

ally speaking, very poor prices. Our business up to date, including commission sales, F. O. B. sales, merchandise bought and sold, has been \$125,000.

The Exchange had sale for 9000 barrels of pears for Export but owing to the European War could only ship 1200. The fruit sold was

25 cars of Currants
10 cars of Raspberries
50 cars of Grapes

and numerous amounts of Strawberries and Cherries. We sold cider apples for 22½ cents per 100 pounds when the same firm was buying from non-members for 15 cents.

We bought

45 cars Manure
12 cars Feed and Oats
4 cars Baskets

Also, we are taking the entire output of a veneer and crate factory.

During this winter our manager is introducing home mixing of fertilizers for every member.

The manager has also started a nice export trade in apples and despite War scares the members are satisfied.

We are learning efficiency and economy in the office management, in the meanwhile giving better service to the members. At the beginning of the season the Exchange purchased one of the many renowned Fords for the manager's use. This enables him to cover the territory quickly, bringing buyers to see the fruit and also advising members of any new outlooks that may come up.

As to the ultimate outcome, we can only be optimistic. Of course things go wrong at times but there is not always smooth sailing in every sea. We have weathered two very hard years out of three and they have only tended to weld us closer together. The manager is out to get every reliable grower in this section as a member and he'll do it. Plans are on foot to erect a new office and store house, packing sheds, where the Exchange may receive fruit and grade and

send it out under their own name. This of course will lead to cold storage houses. In the near future we expect to own and operate our own fertilizer plant and do all the mixing for our members.

Then, to dream further, we would like to establish and operate our own commission house in New York, having all Exchange goods sold from that one stand.

Before closing, the question has probably come to your minds, "How much actual money does the individual grower save in a year?" I can only answer that one of our largest growers who kept accurate accounts of his sales and purchases, and knowing general prices of the same goods, figures that he saved \$1500 in 1913 by being a member of the Hudson River Fruit Exchange.

THE PRESIDENT: Now, friends, we are going to have just a few minutes discussion, and if you have any questions you want to ask, let's have them and get all we can out of Mr. Clarke.

MR. HITTINGER: I would like to ask Mr. Clarke what they do with the number 2 grade?

MR. CLARKE. All of that grade, practically, is shipped to New York to a commission house. We have one house especially in New York that has a trade among the pie people, and they take a lot of that stuff. Right here, however, in connection with that, I want to say that we sell a good many of the eider apples, and this year the Exchange sold the apples at contract with a firm for 22½ cents a hundred, and that firm was paying, outside of the Exchange, only 15 cents. But the Exchange try to take care of their seconds mostly by consignment, and not by selling.

DR. WHITTIER: I would like to ask the gentleman what experience he has had in the export trade in selling by auction, that is, the whole bulk of any one shipment direct to one party. In other words, I mean a contract of the whole of it to one party by auction.

MR. CLARKE: If I understand the question, you

mean that the buyer comes there and it is sold right in Milton or do you mean at the Exchange office by auction?

DR. WHITTIER: I mean the way the Northwestern Fruit Exchange do with their product in the Northwestern States. For instance, they contract to sell the whole fall crop to one party, and let different parties bid on it, and that closes the thing up.

MR. CLARKE: I am afraid we will never be able to do that. We haven't done it yet as an association, because we are not growing enough of any one kind. You see, we wouldn't have, for instance, very many carloads of Greening; there isn't enough there to attract the buyer. I don't believe we will ever be able to sell just the way they do in the Northwestern States.

THE PRESIDENT: You haven't been running long enough, you mean?

MR. CLARKE: Some of our growers have shipped under the Exchange mark to some of these auction rooms in New York, but that isn't the way Dr. Whittier means. I hope that some day we can sell all our pears that way, and I wouldn't be surprised, from the way buyers come now, that we will one day simply get bids and sell them to the highest bidder.

MR. MUNSON: I would like to inquire how you make arrangements to get cash from the members for materials sold them. I wondered whether they advanced the cash before the order was given, or whether your manager took a chance on getting his pay within a reasonable time. Everybody knows that in all farming communities cash is sometimes a little bit difficult to get.

MR. CLARKE: Well, for instance, take a car of oats. The manager will not order a car of oats until he has enough orders on his book so as to make up pretty near a carload, but any time any one gets out he telephones the manager that the next time a car comes in he wants to get, say, one hundred bushels. We will send a bill within ten days, and

he is supposed in ten days, or at least inside a month, to pay that bill.

MR. MUNSON: After they get the goods?

MR. CLARKE: Oh, yes, after they get the goods. We have enough in our capital stock; and last year we had quite a little profit, and turned that into the bank and had that surplus there instead of dividing it up among the growers, so that by using that surplus at the bank it was made very convenient. We also borrow on a note, and that helps us along. All these cars come with sight draft on the bill of lading.

MR. MUNSON: Do you experience any difficulty in that respect with your members?

MR. CLARKE: We have a little, yes, but not so very much. On the whole, it doesn't take very much jacking up. This year we are taking the entire output of a quart-cup factory, and since it is a poor year, when members buy cups, after we receive a list of their fruit packages, we are allowing the members to send in their notes, properly endorsed, drawn in favor of the Hudson River Fruit Exchange, payable in four months with the privilege of renewal in four months. Of course, that is just as good as cash, because it is put in the bank for collection.

MR. MUNSON: Well, don't you consider your community a rather remarkable community in that respect?

MR. CLARKE: No, I don't. Far from it.

MR. MUNSON: I should.

MR. CLARKE: It, of course, depends a great deal on the spirit of the thing, but I don't believe we have any more trouble collecting our bills than the average merchant does, and they seem to collect most of them after all.

DR. WHITTIER: I would like to ask the speaker whether their ambition is to act as a local unit, or eventually to act as a marketing organization for different local units organized in the state.

MR. CLARKE: We are entirely to act as a local unit,—entirely. We are not to act for the rest of the state, or any

other amount of units. There are several in New York State. Governor Glynn, a year ago, gave us a very extended puff. He said it was the ideal cooperative society, because it was run entirely by the people. I don't believe we have had any man from the State come and try to organize us in that way. As I said, Mr. Thurston, who is a commission man himself, came and organized us at first, and we are to act entirely as a local unit. And I hope we will not get very far out of that territory I mention, because I believe the real power of our Exchange will come by being concentrated and all in one spirit. We certainly have to have harmony and spirit if the Exchange is to follow out these things, and, as I told Professor Sears when I came in, I rode down to New York with one of our large growers, and he said to me, "I believe that an Exchange or a cooperative association cannot be run in a locality unless the men are willing to do their best and put their money into it," and I said, "I don't like to see it put in that way," but he said, "If they will put their money into it, they will put their faith into it," and that is just what we are trying to do there. We simply had to stick together and pay our bills. There are ways and ways of paying bills.

MR. HITTINGER: How much money do you have to have in the bank to do business with?

MR. CLARKE: Well, we have from \$1,000 to \$3,000. That seems to be enough. And of course we have the rebates from the commission firms coming in once in about every three months.

MR. HITTINGER: You spoke about giving notes.

MR. CLARKE: You see, with all those fruit packages it would amount up to a great many thousand dollars, and we couldn't swing it; besides, it would tie up our money so that we couldn't buy anything else, so we are giving notes. This is the first time we have done that, but it is just for this year, because it is a bad year. It isn't a rule of the Association but just to meet the contingency this year.

MR. JENKS: I would like to ask the speaker how they

handle the proper grading and packing of pears and apples where several members furnish small amounts. How do you get the grading uniform?

MR. CLARKE: Well, as I said, that is our big difficulty. For instance, this year our Kieffer pears are very cheap. Now, some of our members use rings, and our manager was enabled to offer for the 2¼ inch Kieffer pears, two dollars. They use rings for that size. The manager would go around and stop at a man's packing shed and look at his pears, and in that way he would be informed. And then, you know, buyers are pretty keen on what they buy and they don't let many shy ones get in, after all. Otherwise we have to depend entirely upon the honesty and forethought of the grower, for after all it is to his advantage. We haven't really any system whereby we can make a grower do that.

THE PRESIDENT: It seems to me that the fact that they still allow a man to retain his individuality in the Association will go far towards answering Mr. Jenk's inquiry. If they all went in with one mark on them, they might sneak them in, but if everybody has to put his name on, and they know it comes from A. R. Jenks or F. C. Sears, that will make a big difference.

MR. EMERSON: I would like to ask whether the Association has worked with vegetables or other products than fruit, or have thought of it?

MR. CLARKE: Well, we are in a peculiar locality. That is all we grow. We haven't anything else, unless it be eggs, to offer for sale. We are not in the vegetable business at all, but I think it could be worked just as well with vegetables as it could be with fruit.

THE PRESIDENT: Perhaps we had better close this discussion, unless there is some one who has a question he would like very especially to ask. I certainly feel that we have gotten a lot out of the discussion and that this is something to work towards in a good many ways,—some such association as they have there. I think we have some sections in our state where an association of this kind, though

perhaps not as large, but very similar, might be worked very satisfactorily.

Now, the next speaker needs practically no introduction to this Association. We have heard him before and we always hear him with pleasure, always feel, after he has talked to us, that we have been listening to a man who knows what he was talking about and has been through the mill and whose opinion we could rely upon. I have great pleasure in introducing Mr. Fred A. Smith, Director of the Essex County Independent Agricultural School, Hathorne, Mass., who will talk to us on "Raspberry Culture." (Applause).

RASPBERRY CULTURE

Fred A. Smith, Director Essex County Agricultural School

Mr. Chairman, Members of the Massachusetts Fruit Growers' Association, Ladies and Gentlemen: I remember distinctly, a few years ago, hearing a large peach grower say at one of these meetings that the consumer paid altogether more for his basket of peaches than they were worth, and since I am not a grower of peaches but an enjoyer of good peaches, I have been many times inclined to agree with him. Now, I am coming before you to make this statement in the small fruit field, namely, that I believe the ultimate consumer—about whom we hear so much—if he is able to obtain good raspberries, often pays more than they are worth. When I go to our Eastern Massachusetts markets and find raspberries which approach my ideal of a good box of berries, I am fully convinced of that. We often pay from twelve to sixteen cents per pint, and even more, for good berries, and I always think when we have spent a considerable time, in trying to determine what should be the standard package, the standard box, when I see the offerings of many of our markets, where you have to get right over the crate in order to discover the berries,—I think there ought to be some standard quantity of fruit in this standard package. (Laughter)

I think the subject that has been given me—"Raspberry Culture"—will strike you as being quite broad or general, but I am going to spend most of my time with the red raspberry, because in Massachusetts the Black Cap is not found grown in commercial quantities, and I believe it is hardly

worth while for the commercial grower to consider it for a moment. And yet I was almost born and raised in a small fruit garden, where the Black Caps revelled. That was in the days of the old variety, Ohio. I have heard my grandmother tell of the bringing of the plants of this variety back from the State of Ohio, and planting them in our Massachusetts fruit garden. I always feel sorry that, at least in our private gardens and home collections, more attention has not been given to growing this delightful fruit. Perhaps we ought to treat with our Purple Cane raspberry about as lightly as with the Black Caps, and yet I see in the Purple Cane a little more of promise to the commercial grower, and I believe the time will come when we will be growing the Purple Canes extensively, particularly as valuable varieties as the Columbian. I believe that for one who is undertaking to do anything in connection with canning work or with the fruit juice trade, there is much in this class of berry that is of value to him. I was very much interested last summer at the Geneva Station to see what valuable work they are doing in the way of breeding up races of these Purple Canes. When you recall that their best features, which is their tremendous yielding power and short fruiting season or, in other words, the opportunity of harvesting the crop in so short a time, and for that reason they should offer much appeal to us, I am sure. But with this introduction I think we may excuse all the raspberries except the reds and confine our attention to these.

Now, in the limited time that I have with you I wish to divide my talk into two parts. I wish first to tell you what I recognize as some of the **essentials** in the growing of the red raspberry, and then for a few minutes more I would like to discuss the growing by seasons, trying to touch on a few points which may be overlooked in considering the essentials. At the risk of making something of a catalogue, I am going to describe the essentials something as follows:

First, good stock;

Second, the control of diseases and insects;

- Third, selection of suitable soils and sites;
- Fourth, thorough preparation of your land;
- Fifth, a suitable supply and sufficient number of pickers;
- Sixth, a wise selection of varieties;
- Seventh, the market.

Concerning good stock, I believe we have been lax in that respect. I think we have been willing to depend too much on our nurserymen, and as you know the number of small fruit nurserymen east of the Hudson who are supplying, good stock is limited. I think the situation is forced upon us, and would certainly recommend to any grower in the raspberry business the advisability of establishing and maintaining his own nursery to supply proper stock. I have no sympathy with the plan for the extension of a plantation which is done by going to the old berry patch for plants where it is more or less run out, and trying to dig out suitable stock to carry on the new planting. One can of course get ideas and obtain new varieties and new stocks from nurserymen and growers and from Experiment Stations but just as soon as you have secured good stock, take it to your own farm and put it under nursery conditions. Sometimes, in the catalogues, you will see a distinction between raspberry plants, as ordinarily catalogued, and transplants. By experience I found out what they mean by that. You can get a lot of plants when you are taking up a nursery row, that are too small, and yet if you reset them in a nursery row and give them one year of cultivation, you develop a remarkably fine plant. Transplants are the more valuable. There are several strong features to commend this plan for growing home stock. By selecting the best type of soil it is possible to get very strong plant with a perfect root development, which reduces your loss in transplanting. It is advisable to dig your plants in the fall. Dig, count and bundle them, then when they are placed in the proper nursery storage, or even pit, or heeled in with proper protection, they are available to you on the identical day when you need them for the spring planting. These are features of the home grown

stock which one can scarcely afford to overlook. Here also comes in a chance to do some fine selecting, some might say, pedigree work. If your plants are grown vigorously and carefully in nursery row, and not allowed to fruit, you are bound to get the finest quality of plants obtainable.

Next let us consider insects and diseases. When talking with raspberry growers from various sections of the country, one hears a story something like this: "Yes, we grew red raspberries. They were very profitable, a very attractive fruit to work with, but all of a sudden some disease seemed to have overtaken our plantation, and it was necessary for us to quit the business." I know from personal experience but little about many of those difficulties. I understand that root gall has been one of the serious troubles in many sections, also that in some of the western New York fruit sections there is a disease, anthracnose, especially on the Black Cap and Purple Canes and have caused those growers to renew their plantations very rapidly. Some have held it in check at least by spraying. Here again one sees reasons for having a home grown stock of clean healthy plants growing in our own nursery. You may isolate a little nursery and keep the stock clean and have a finer available stock for replanting. In case of a threatened spread of disease, it would pay to practice short rotations and perhaps scatter plantation to other parts of the farm.

Selection of a suitable soil is fundamental. I distinctly remember my early experiences in picking wild raspberries, and I think many of you have had the same observation. We found, many times, very fine wild plantations in the meadows and swamps, and also found them at the other extreme, as on strong clay land, and yet we had no record of the yield of these wild patches.

In the light of experience extending over a great number of years in which work with many varieties and types has been carried on, I am going to tell you that the ideal soil is a good gravelly loam well filled with humus. This may be slightly modified by explaining other conditions

which it seems desirable to secure, if possible. One should have soil which is well drained and thus easy of cultivation, early in the season. This will allow you to bring the land to a fine state of tilth. We have seen the Cuthbert grown on this type of soil, and also on a heavy clay loam, and the yields were, in comparison, always favorable to the former. Plants were of better height and strength of cane. The problem of winter killing and throwing out of vines by frost was always less severe in the gravelly loams.

Let us now turn to the consideration of varieties. This is a very dangerous field upon which to give advice. My own experience leads me to believe that the red raspberry is more dependable and less variable in its behavior than the blackberry, and yet I know that the raspberry shows great variation in different locations.

First I should like to call attention to a new variety which originated and was originally grown and tested on the grounds of the New York Agricultural Experiment Station at Geneva. I have had the satisfaction of seeing this variety in fruit in their gardens. It has now been named and disseminated. The variety is June. It is a fine large berry of red color, excellent in quality, and as you may have imagined from the name, it is a very early sort. I think this will come in just ahead and perhaps displace a variety which many of us have grown, namely, the King. It is very interesting to know that this variety is a production from one of our Experiment Stations. Indeed, small fruit culture will have reached a new state of development in Massachusetts when we fruit men are strong enough to go before the officials of our Experiment Station and ask them to undertake the testing of old and development of new varieties of small fruits. Such a condition does not exist at present. The demand for experimental work and demonstration, of course, is clearly along the line of tree fruit growing. It is more inviting and more people are vitally concerned. The commercial grower can scarcely afford to take the time necessary to do this plant breeding work. It is a very promising field,

yet we will undoubtedly have to depend upon private enterprises and the Experimental Stations for this work.

In my own experience, and for a variety to follow the June, we have had very good success with the King, but I suspect that the King is a variety which may be deteriorating, may be going the way of the old Marlboro, and varieties of its time, which were prominent a few years ago. The King is an attractive berry, very vigorous in habits and growth, a great plant maker, but a berry of poor quality. It simply gives us one advantage, namely, we are able to get into the early market. Just as the Hudson River berries are going out we are able to take their place in the market and keep up the regular and constant supply. Next to that we have enjoyed working with the Ruby, which originated in the Hudson River valley, and has been very satisfactory indeed. With us, the fruit is not of superior quality, but of splendid size and color. It is not a vigorous plant maker, but a variety, I believe, from which one can get a tremendous yield per acre because the variety will permit of close planting. Then of course, we have the old Cuthbert, that seems to be one of the nearly perpetual varieties, and it is well that it is, because it is hard to imagine a berry of better quality. Those of us who like to be critical are inclined to find fault with it. I found twenty years ago that they were finding some of the same faults with it, and yet it seems to be, with possibly one exception, the most valuable berry for us today in Massachusetts. One characteristic, amounting almost to a fault, is its length of cane. Another is its proneness to winter-killing, but it is a beautifully shaped fruit of first quality, although a little too dark, but all in all it is still a wonderful variety.

Another variety I would like to call your attention to is the Herbert. It originated near Ottawa in Canada. In many ways it is quite the opposite of the Cuthbert. It is a large berry of different shape, more compact or flattened, fully as large to larger. The cane is famous for its hardi-

ness, and it is a great plant maker. In many ways it is an ideal variety.

When considering the problem of a suitable and sufficient supply of berry pickers, at this time of the year, many of you can now recall some of your experiences in that line and smile, but when you are meeting the situation from day to day in the berry picking season, it is a serious problem. We may envy those fruit growers in the older berry growing sections where it is possible to secure a picking crew who have been pickers year in and year out for a long time, and who look forward to that line of work for summer employment each season, but it is a serious problem for one trying to start in berry growing in Massachusetts. Women, of course, make the most satisfactory pickers. They have a natural care and neatness about all their work which is desirable, and if you can get a crew composed wholly of older girls and women, I think you have an ideal picking crew. If you attempt to carry on a large business you may find it necessary to bring help from the city and establish them on the farm in a tent or camp scheme. It is desirable to have a large picking crew available at all times, especially in threatening weather. I think berry picking is a serious problem and one which you need to study or weigh very carefully before undertaking to engage in or even expand a business already under way. Harvesting raspberries is of course a more serious problem than harvesting currants, from the necessity of doing the picking promptly and at the right time. In that connection, I believe one who is growing a wide line of berries and who can offer to his pickers employment for a long time, as through the strawberry season and beyond, has a much better chance than one who is trying to command labor for the harvesting of a single fruit.

The question of a good market for raspberries is not a serious one. I believe that our best markets are to be found in our cities and towns, perhaps other than Boston for a fair supply appears to reach the latter market. The Hudson

berries come in carload lots and supply this market in ample quantity, and later there seems to be a fair supply coming in from local sources. The average cities and large towns furnish us our very best market today, augmented by the more direct mountain and shore hotel trade.

For several years we supplied a wholesale trade in a town of 5000 inhabitants and was surprised to see how much this trade could be built up by supplying good fruit regularly. Again, we had occasion to use this market heavily for a Saturday trade. It was impossible to pick fruit on Saturday morning and ship it to our regular market, which was 15 miles away, and get it there in time for the Saturday retail trade. The fruit would have been lost had we not been able to resort to a special trade. We found that the housewife would take their berries in quantities of a crate and can them on Saturday, since most housewives plan to keep a fire on Saturday for the regular cooking.

And now let us consider the handling of this valuable raspberry crop a little more by season. At the outset let me urge you to practice spring planting. We have already described our plan for securing good plants. One needs to know his variety well when trying to determine the proper distance between rows. I believe varieties as dwarf as Ruby can be planted as closely as 5 feet apart. On the other hand, I have seen Cuthberts, in heavy soil, which appeared to need as much as 8 feet between rows. After a field has been properly plowed and fitted it should be marked out with a marker similar to the ones used by vegetable gardeners. If you have it arranged so that the pins in the head of the marker can be shifted, you will find this an advantage. Since every effort should be made to establish a heavy hedge-row as early as possible, I believe the plants should be planted as near as 18 inches apart in the furrow. If this is followed, your hedge-row will usually be quite well established before the end of the second season. If proper attention has been given to the planting, the grower need have but little concern for this plantation

during the balance of the year. Of course a thorough cultivation and hoeing should be kept up.

Another item of great importance is knowing when to stop cultivation. In orchard practice, we are often glad to discontinue cultivation in July and sow a cover crop. With the red raspberry, I believe cultivation should continue well into August. It is our practice to withhold the planting of the cover crop until this date. I believe that the raspberry plantation winters better if the cultivation is continued until fairly late. Vigorous foliage aids formation of strong fruit buds.

To many, the idea of a cover crop for raspberries is a new one. It is, however, a very practical thing to do. Primarily, we ought to choose some crop which will be entirely killed out during the winter. Many are thinking that it will require considerable skill to plant a crop as late as the last week in August and then secure growth enough before winter killing, to be of any value. This, however, is secured by employing oats and barley. Nearly all of the reasons favorable to a cover crop in orchard management are equally favorable when employed in a raspberry plantation. It prevents the washing of soil, adds humus, avoids deep and severe freezing, and many other things. Thus far I have never been able to figure out a legume which will lend itself profitably to this system of management, but undoubtedly one will yet be secured. To repeat, use every effort to secure a good heavy sustaining cover crop, yet one which you are sure will winter kill, in order that when spring comes you simply have to incorporate the dry, dead organic matter. This furnishes a good quantity of humus to the soil at the right season. By actual experience, we have been able to grow 30,000 pounds or 15 tons of green matter on an acre after the last week in August, and you can easily figure how much dry matter this will return in the spring cultivation. Of course one's soil needs to be in good condition to do this. We usually employ one horse plow to

turn under this dead crop, following with frequent cultivation, aiming to get the soil in perfect tilth as quickly as possible. If one employs rye as a cover crop he will have a stiff fight with the young rye plants in the row and must overcome them by careful hoeing. Crimson clover might be valuable for a cover crop, even though the plant is usually winter killed in March, as it would have the advantage of adding more nitrogen.

Since one of the larger problems of the second year in the plantation is pruning, it might be well to consider it at this time. If the question of the proper methods to be employed in pruning orchards is still unsettled, I believe that the pruning of the raspberry is also one of importance. The writer believes that pruning should be neglected until late in the spring, or until about the time the buds are ready to burst. At this time varieties, as perhaps Cuthbert, and others, will show the extent of the winter killing. With early pruning this is hard to determine. The ideal plan is to secure good strong hedge-rows with the bearing canes standing 10 inches to a foot apart. The height to which a cane should be allowed to stand is largely a matter of variety, and even hardiness of variety, and one who has had a personal experience will find it very valuable in determining at what height to prune a plantation, as oftentimes the most active buds are out rather near the end, which will often give the finest yield of fruit.

As in orchard work, so in small fruit growing, the subjects of pruning, cultivation and fertilization are rather deeply involved. In fertilizing a raspberry plantation let me urge you to practice moderation, when using nitrogen, particularly in the form of nitrate of soda. I believe we can well afford to secure most of our nitrogen from organic sources since from such sources the nitrogen is usually available later in the season. Aim to get short, sturdy canes. Nitrate of soda, employed early in the season, tends to defeat this. Early and abundant growth of new canes are a serious impediment to good harvesting. I have seen leaves

so strong and vigorous in an over-fed plantation, growing so vigorously as to make harvesting difficult.

Particularly avoid allowing a young raspberry plantation to bear too heavily. They are often inclined to do this. The second year, which is the first fruit season, they seem to be bent upon making a great record. This is where the careful grower exerts good control. One can prevent their bearing too heavily by heavily thinning and severely checking the new canes. This operation will be valuable to the growth of a fine set of canes for the next year and they will now be better established and capable of carrying through large crops.

In harvesting the raspberry we find a most exacting fruit, even more so than in harvesting the currant or gooseberry. One needs to go over the entire plantation at fruiting season as often as every other day. If this is not faithfully followed serious loss must result. The raspberry is a very perishable fruit and marketing must be attended to promptly to get the fruit properly picked at the proper time, packed carefully in good clean crates and baskets and placing promptly upon the market is necessary. We have employed auto trucks to allow us to reach a more distant market. With it, we were able to put the berries onto our markets very quickly and in a good condition.

In closing let me urge upon you the promising field which raspberry growing offers. I do not believe it is as valuable a fruit for a great majority of growers to handle as is the strawberry, and yet if many more growers give attention to this valuable fruit I still believe it will be many years before the consumer has had an ample supply of this delicious fruit. (Applause).

THE PRESIDENT: Now, we will have a few minutes of discussion on this paper. Let's have your questions.

MR. WHITCOMB: Is there any support used for the canes when they come out.

MRR. SMITH: No. I think you had better do that by

another method. I think you had better grow raspberries on a type of soil which will give you as heavy a cane as that variety is capable of carrying, and rather than engaging in a method of supporting the canes I would prefer to take a little more away in the pruning thus tending to give you a rather strong, upright cane. The Cuthbert is tall and long-jointed and gives you more trouble, but I believe that if I was forced to engage in a scheme of supporting I would grow out of raspberry growing.

MR. HITTINGER: Have you had any experience with the Franconia?

MR. SMITH: No, I don't know anything about it. I think there are a lot of the domestic berries we ought to know more about. There have been some fine varieties that have been allowed to slip away, and I suspect that the one you mention may have been one of these. One word more: I believe the commercial grower can hardly afford to grow a variety that would require protection. Much of our literature allows considerable space in telling us how to bend down raspberry plants and cover them up and how and when to uncover them in the spring, but I believe we ought to work for hardy varieties and thus avoid this work, and yet for the finest home garden varieties we ought to be willing to favor them and bring them to the finest perfection in our own home gardens. Of course every farmer should maintain a good, ample and suitable berry plantation for supplying the home table, and I believe we ought to maintain and work for improvement with these special varieties.

MR. BAILEY: How wide do you like to have the hedgerows?

MR. SMITH: Not wide. I don't know as I have ever actually measured them when in foliage. I like to think that we will not get over 15 to 18 inches from outside to outside. If they are much wider you will have trouble about your picking. A lot of fruit will be overlooked in harvesting.

MR. GILMORE: What per cent of new wood is cut away in pruning?

MR. SMITH: You mean in cane, or in the whole plantation?

MR. GILMORE: No. Each cane.

MR. SMITH: That will vary a good deal. The first point of course will be to determine the extent of winter killing. If the winter is severe, and with varieties as tender as Cuthbert, you may have to cut back severely, sometimes down to the lower buds. With the average variety, and where the winter killing is not a factor, it would be well to shorten the canes to 28 or 30 inches. In vigorous varieties, like the Cuthbert or the purple cane variety, Columbian, 35 or 40 inches would be nearly right. This is where the grower should have the most intimate knowledge of cane forming characteristics of his varieties.

MR. GILMORE: Would you advise setting out Cuthberts after an experience of that kind?

MR. SMITH: Oh, yes. It is too valuable a variety to neglect yet.

MR. HITTINGERR: How about mulching the rows?

MR. SMITH: I think that would be very useful, and that brings out another thought. This won't appeal to the pickers, but it ought to appeal to you and your pocketbooks and that thought is, during the time you are picking don't let up a moment on your cultivation. You know how the constant tramp, tramp, tramp, down the rows will compact the soil, similar to a sidewalk. Thorough cultivation should be well kept up. At this time it means a lot to you and will often increase your crop by 25%. Further, if you could bring in a mulch at that time, that would help out and also the mulch would have the same effect as a cover crop through the winter and be of continued value to you.

MR. PARSONS: When do you cut out the old cane after it has borne?

MR. SMITH: I am glad that you asked me that question. I never felt satisfied that it was a commercial opera-

tion to go through after the harvesting and take out the old cane. I have always felt that the old cane had considerable value as a winter support, and as a matter of fact, it is pretty hard to get sufficient help to do it at this, the fall, time of the year. On the other hand, in some of these very dry years, when there is so much competition for the moisture, perhaps we would do well to eliminate that old cane, and I suspect that the man with the smaller plantation had better test it out and tell us of his results. In the early spring the pruning can be promptly and well done. Our man goes through with a Clyde type of cutter and takes out the old cane very rapidly. Two men following one on each side thinning the new wood and shortening the remaining canes.

MR. HITTINGER: Do you think it is a good plan to thin out some of the new growths that come up during the growing season?

MR. SMITH: Well, I should think it would be. Of course, you are doing that with cultivation, and with hoeing, to some extent, and then again the old cane and the stronger of the new cane tends to keep that growth somewhat suppressed. I think I would in a home garden at least.

MR. HITTINGER: How about covering up the roots in the winter if you don't have a cover crop?

MR. SMITH: I should think mulching might be very valuable. You might be able to mulch with some cheap mulching material. Of course straw manure might prove valuable.

MR. HITTINGER: I have noticed around walls and places where there have been raspberries growing, that they seem to look nice all the time. Whether it is the wall or the stone I don't know but they always look nice, and that is the reason I asked about the mulching.

MR. JENKS: How about those special crates which you use?

MR. SMITH: They are simply an adaptation of the one tier crates employed by growers south of Boston. I antici-

pated that a little by my statements concerning full baskets, and I believe the last handful one puts in the basket often times is the most profitable handful. I believe it pays best, and any sort of a carrier which allows you to carry only one tier and display the whole crate, I believe is a valuable thing, and it is especially valuable to you who are getting very close to a fine trade. You feel so, don't you, Mr. Jenks?

MR. JENKS: Yes.

MR. HITTINGER: Are those pint baskets?

MR. SMITH: Yes.

MR. HITTINGER: You spoke of cutting the cane when you set out the young plant. You meant the old cane?

MR. SMITH: Yes. We use a little piece of old cane as a handle, and when cultivating it acts as a marker for the rows in the field. It is all right to let it remain until you get the new, live growth, but as soon as this growth begins, I believe most emphatically you ought to get rid of the old cane, because you draw the energy from the young shoots now commencing to break ground.

MR. HITTINGER: Do you cut it right back to the soil?

MR. SMITH: Yes.

MR. TUTTLE: In cutting back the old cane, about how much do you usually leave? Prune it as low as possible?

MR. SMITH: Yes, cut in as close as you can conveniently. This is desirable since it will facilitate spring hoeing. A raspberry plantation can be very profitably hoed early in the spring. It is a proper time to overcome all weeds which have established themselves late in the previous season after cultivation ceased.

MR. JENKS: What could you afford to market a pint of red raspberries for at a profit?

MR. SMITH: I wish Mr. Clarke would answer that.

MR. CLARKE: That is a hard question.

THE PRESIDENT: That is the reason why he turned it over to you.

MR. CLARKE: It depends entirely on how many rasp-

berries you grow per hill, but I have seen them go as low as three cents a pint, with very little profit, just about meeting expenses. However, anything over that I believe there is money in; at four or five cents a pint, I think there is money in raspberries.

QUESTION: How much did you have to pay for picking that pint?

MR. CLARKE: About a cent.

MR. HITTINGER: Land at \$200 an acre?

MR. CLARKE: The land at that price?

MR. HITTINGER: Yes.

MR. CLARKE: No, sir. I want to tell you a little story about a neighbor of mine. Last year he had two acres of a red raspberry of a kind we grow in the Hudson valley, called the Perfection, that is three or four years old and the whole valley was going wild over them. This year he told me that when his expenses were out he netted just \$2,000 from his two acres.

THE PRESIDENT: And I will vouch for Mr. Clarke's general reputation for truthfulness.

MR. SMITH: I think Mr. Clarke has brought out some valuable testimony. A good raspberry grower, catering to one of eastern cities or towns seldom has to get down to four or five cents per pint basket. When I heard the prices which growers receive at the canneries in western New York, and think of the prices we are able to get here, I always note the wide difference favorable to us.

MR. HITTINGER: How long would it take to make a raspberry plantation, before you get good results?

MR. SMITH: I think that is one of the strong arguments favorable to the red raspberry as against the strawberry. Your strawberry man sets out a plantation at a heavy initial cost, and harvests one profitable crop. Your red raspberry man, on the other hand, if things are favorable usually gets at least from four to six good crops from his plantation, and the low initial cost is well distributed over a term of years.

MR. STOCKWELL: Will you tell us what you expect to get from an acre of red raspberries?

MR. SMITH: I hoped that question was going to be on the yield, not cash receipts, and I was going to reply and say about one hundred to one hundred and twenty bushels. I expect Mr. Clarke can tell us about his Perfection or some of those varieties of great, heavy yield; but I should think the average would easily reach one hundred bushels.

MR. COOK: The speaker has told us about the Black Cap and red raspberries. Years ago when I used to grow both, there was just as much demand for the black as for the red. At that time we used to put out what we called the thimbleberry and we got from 20 to 25 cents a quart when we first began, and by the time that was gone, along came the reds. Then after a few years there was no call for the Black Cap. I don't know whether it was merely a peculiarity of the market or not. Possibly if there had been a better red variety it might have sold, but it didn't. That was a change of the market itself. You can't always tell. I have been very much interested in the remarks that have been made here, and I think that the Columbian, Cuthbert and the Herbert are the best varieties we have. Now, in the matter of cover crops, barley is one of the best things we can use, and Canada peas, if you can get them, furnish a little more nitrogen.

MR. JENKS: This past season I have been experimenting with legumes on the raspberries, and I have found the Canada field peas have been the best, have been very, very satisfactory. They grew to 15 or 18 inches in height, I planted them the very last of July, alongside of the other rows that were planted with crimson clover and soy beans and red clover. The beans didn't amount to much. The crimson clover went up to 5 or 6 inches and went into the winter in good shape. I hope it will winter-kill. The Canada field peas were perfectly satisfactory. I would like to

ask if anyone here has had any experience with irrigation in a raspberry plantation.

(No response.)

QUESTION: I would like to ask the gentleman when he sowed the Canada peas?

MR. JENKS: I have forgotten the exact time, but I am pretty certain it was the very last day of July. All sowed at the same time.

MR. COOK: I have never irrigated raspberries, but I have irrigated about everything else and I have no doubt that it will do good to the raspberries. Two years ago last June there were a large amount of raspberries injured in this section, and there was almost a failure, on account of drought. If they had had water to put on at that time they wouldn't have had that great difficulty. Whether you can use the Skinner system is a question, but there is no question but that with irrigation you can increase the crop in some seasons, sometimes doubling and sometimes giving three times as much.

THE PRESIDENT: It is very rarely that you get through a season without needing moisture.

MR. HITTINGER: Years ago, when we grew the Franconia, you would be surprised to see how much the berries would swell up in the wet season, and I think if you could have the Skinner system to use in dry weather, you would increase your berries very much. I have it on strawberries, and find it is well to irrigate them after the last little blossoms have set. Don't wet them just before picking, for that will soften the berries up too much, but just water them at night and you will increase your crop wonderfully.

MR. MARGESON: I have had a little experience in irrigating in a small way. We irrigated by open trenches running between the rows, and we have found a very large increase from that irrigation over what we had in the dry spells.

QUESTION: I would like to ask what percentage of fertilizer is used in the different varieties. I suppose rasp-

berries use more nitrogen than any other.

MR. SMITH: I don't know that I am prepared to answer that to your entire satisfaction. I would want to keep the nitrogen down. Mr. Clarke spoke of the 2-8-10- or 2-8-2 being fortified by more potash. I like to see my fertilizer brought down to about two per cent nitrogen. If you are using the cover crop and special legumes such as Mr. Jenks has spoken of today, the Canada peas, you can afford to drop back on the nitrogen; in fact I think you had better.

QUESTION: How do you like barnyard manure?

MR. SMITH: I think you had better employ that in the original preparation of land. I don't think the raspberry is a fruit that requires such a heavy application of stable manure. I think you had better use barnyard manure upon corn or grass in the preparation of the land that is going to be used for raspberries. Turning under a clover in advance of setting a raspberry plantation is wise.

MR. STOCKWELL: Once I intended to have the best thing on earth, so I took the Cuthbert and put manure on lavishly. I got some enormous big canes, way up in the air, and I thought I had a beautiful field of raspberries, but what I did have was a fine field of cane. The consequence was that with so much nitrogen they almost wholly died out.

THE PRESIDENT: Perhaps we had better close the session for this morning.

(Adjourned to 2 P. M.)

AFTERNOON SESSION

Wednesday, January 13, 1915.

(Meeting called to order at 2.10 by the President).

THE PRESIDENT: In introducing the next speaker, I am not going to say quite as much as I should like to, because I am a modest man myself and I know how it would effect him if I said all I would like to. However, I am glad that the Fruit Growers' Association and Professor Chenoweth are going to have a chance to get a little better acquainted. I think it will be good for both of them, and I only want to say that Professor Chenoweth and I have been associated together in the work at Amherst for two years, and I have had the privilege of knowing him perhaps as well as anybody, and in consequence I want the rest of you to know him. Quite recently he had an extremely flattering offer in the way of salary, to go back to his alma mater at the University of Missouri, to take charge there of the department of Pomology, and I think it speaks well for the liking of Professor Chenoweth for his job, and for the Trustees' liking for **Professor Chenoweth**, that he is not going out there. This present semester he has been giving at the college a course which we call commercial pomology, one part of which has been working in the manufacture of various things, jams and jellies, fruit juices and things of that kind, and I think it speaks well for the course and more for the instructor that practically all of those taking the course wanted to do extra work. Now, when you find a course where the students enter into the work and work overtime at it, you have got something that is pretty interesting and you have got a pretty good man handling it. I have now great pleasure in presenting Professor W. W. Chenoweth of the Massachusetts Agricultural College, who will speak to us on "The Manufacture of Horticultural By-Products." (Applause).

THE MANUFACTURE OF HORTICULTURAL BY-PRODUCTS

Prof. W. W. Chenoweth, Massachusetts Agricultural College,
Amherst, Mass.

Mr. President, Members of the Massachusetts Fruit Growers' Association, Ladies and Gentlemen:

I am glad indeed to meet with you upon this occasion and to discuss with you a subject which it seems to me is destined to have a profound influence upon the future horticulture of our commonwealth.

The elimination of waste is the keynote of success in any business enterprise. Fruit growing is just as much a business proposition as is the manufacturing of shoes or any other commodity. Conservation of time, energy and material has long been the watchword in the industrial and commercial world but it is only within the last few years that we have felt any real serious need of applying this principle to our horticultural and agricultural industries. No one will attempt to deny that the losses from our fruit plantations and vegetable gardens is considerable and in some cases enormous, and yet we have gone along year after year without making any great effort to prevent this loss. No statistics are available to show us the amount of this loss, yet the aggregate sum throughout the state must be enormous.

It is not only feasible but entirely practical to save a large portion of this annual loss by manufacturing these wasting crops into nutritious and palatable foods. An inspection of any market will show among many others the following horticultural products offered for sale: Canned goods both fruits, and vegetables of all kinds, butter, marmalades, jams, preserves, jellies, fruit juices, pickles, dried fruits, cider and vinegar. These are all standard goods with a demand equal to the supply and practically all of them are within the range of possibilities of home manufacture. Many of these products can be produced from fruits and vegetables

now permitted to decay. A little care and a little energy would convert this annual loss into a source of income.

Advantages far reaching in their effects would result if each producing community would inaugurate some plan whereby a part of its garden and orchard crops could be converted into manufactured products. (1) The amount of waste would be reduced to a minimum. (2) In seasons of large crops our markets would not be glutted. (3) The withdrawal of a part of the fresh fruits and vegetables from the market would tend to keep prices normal, as the supply could be more nearly regulated to meet the demand. Also prices of manufactured products would advance very little during seasons when these fresh fruits and vegetables are not available. It would seem then that both producer and consumer would be benefitted by this more equitable adjustment of prices. (4) There would be greater inducement for the growing of crops which are not at present considered profitable. Our native plums thrive here and are wonderfully productive, nor do they require the care of other species of plums. Also they can be grown on land too rough for general farming and orcharding. These plums are as a rule too small to be marketed profitably in the fresh state but when manufactured they make the most delicious jelly, preserves, butter, and marmalade. These products once introduced would find a ready sale at prices which would insure a good income on the investment. The grape is another fruit which seems to be neglected here, though for what reason I am unable to learn, and yet there is a fair demand for good quality grapes while the poorer grades would make many excellent manufactured products. Then there are other fruits and vegetables which would fall in this same class all of which could be grown profitably for manufacturing purposes. Many of the stony productive hillsides of our state could be converted into valuable producing lands by growing some of these neglected crops upon them.

During the past year our boys at the college have been doing some laboratory work along these lines in their course

in commercial pomology. We grow a few native plums both hortulanas and Americans and when there is any sale for these the prices vary from six to twelve cents per gallon. We tried manufacturing some of these plums just to find out what could be done. Our results were fairly uniform and gave the following figures.

1 gal. plums @ 12c.	12c.
6 lb. sugar @ 5c.	30c.
10 glasses @ 2c.	20c.
Total cost	62c.

For products we had six 8-ounce glasses of jelly and four 8-ounce glasses of marmalade. These products have a retail value as follows

Plum jelly, 25c. per glass

Plum marmalade 10c. per glass.

making a total retail value of \$1.90, which would leave \$1.28 to cover cost of labor, fuel, marketing expenses and for profit.

Then too, our second grade grapes usually sell at about 2½c. per pound. We tried several experiments with these, using the first run for juice, the second for jelly, and the pulps for butter. The addition of a small amount of apple juice improved the jelly while the apple pulp gave the butter better quality. The whole result may be best shown as follows.

10 lb. grapes @ 2½ c.	25c.
2 lb. apples @ 1½c.	3c.
4 lb. sugar @ 5c.	20c.
Containers	50c.

Total cost of materials 98c.

Product was:—Ten 10-ounce bottles grape juice.

Six 8-ounce glasses jelly

Six 8-ounce glasses butter

If the juice were sold for ten cents per bottle (which is certainly cheap enough), it alone would pay for all materials used. Evidently the jelly and butter would pay for labor

besides leaving a fair profit, as the combined retail value of the two products is not less than \$2.00.

When our foreman abandoned the strawberry beds as being no longer profitable they were allowed to stand two or three days, then pickers were sent over them with instructions to pick all sound ripe or nearly ripe fruit. This was taken into the laboratory and was there graded and prepared for cooking. The better grade was made into preserves while the poorer grade was run through a food chopper and then made into an excellent jam. The cost of these products exclusive of fuel and labor of cooking and canning was as follows: Preserves 7c. per 8-oz. jar; Jam 6c. per 8-oz. jar. When you remember that these have a retail value of 25c. to 35c. per jar it is easy to see that there is a big profit to be made from this kind of work.

I am thereby convinced that at the fag end of the season of all our small and bush fruits there will generally be found a considerable loss unless it be saved by some manufacturing process. Then too, there are the days when the market goes to pieces and these perishable fruits either sell for a pittance or are lost altogether. Why not manufacture this cheap fruit?

While the whole field of horticultural manufacture offers much interesting material for investigation and discussion, yet the one great problem of the Massachusetts fruit growers is the disposition of his low-grade apples.

Our commonwealth produces annually an average of three to four million bushels of apples. The latest census figures available show the apple crop to be as follows: Marketable apples, 2,550,000 bushels, at an average price of 70c. per bushel; Cider apples, 1,270,000 bushels at an average price of 12c. per bushel. Now anyone who has investigated our apple market to any extent may feel disposed to question these figures because he sees apples offered for sale labelled "fancy" and "No. 1" which by all known laws of right and decency should be classed as inferior cider apples. Consequently if our grading was what it should be the quantity of

cider apples would be far greater than indicated by the above figures.

Letters from many prominent fruit growers throughout the state fully bear out these figures. These same correspondents state that much of this low grade fruit is a total loss. That portion which is used is mainly converted into cider and vinegar. Only one man reported the manufacture of other than these two products. Could we carry our investigations further we would find that much of the cider and vinegar are lost through improper handling. Relatively few growers or farmers who try to convert their cider into vinegar find a market for their product because, due to methods used, a standard product is rarely produced. An examination of 64 samples of homemade vinegar by the Pennsylvania authorities some years ago showed the acetic acid content varied from .86% to 8.79%. Very little success can be expected from methods which give the above results.

Cider and vinegar, however, are not the only products that can be made from our inferior grade apples, even though little has been done to develop profitable uses for this grade of fruit. Several years ago the Virginia experiment station worked out a few problems and later other stations have attempted to develop the idea, but the amount of real good that has come to the fruit grower or rather the application made by him has been little indeed.

It has been shown that four men working with hand tools can handle 125 bushels of apples per day producing 250 gallons of cider. While these same men using an 80 ton hydraulic press can handle 750 bushels per day, making 3,000 gallons of cider, when the pomace is not repressed. Now let us apply this to present-day conditions:

(1) 4 men @ \$2.00	\$ 8.00
125 bu. apples @ 12c.	15.00
	<hr/>
	\$23.00

Product—250 gallons of cider costing 9.2c. per gallon,
while the yield per bushel is two gallons.

Specific gravity of cider 1.050.

(2) 4 men @ \$2.00	\$8.00
750 bu. apples @ 12c.	90.00
Fuel	3.00

Total cost \$101.00

Product—3000 gallons of cider costing 3.4c. per gallon,
while the yield per bushel was four gallons.

Specific gravity of cider 1.062.

In the first case the high cost of eider would prohibit its use in manufacturing purposes and besides one half is lost in the pomace. By the use of modern machinery the cost is reduced from 9.2c. per gallon to 3.4c. and might be further reduced if pomace were repressed. However this gives us a cider at a price we can afford to use for the manufacture of a variety of products.

Our own laboratory experience bears out the above figures, except that we could not quite average two gallons per bushel when the hand press was used.

Having found a means of securing a cheap cider, the next question is how is it going to be handled so that a profit may be secured.

At the present time there is a considerable demand for a pure cider jelly. This is used in cooking, flavoring, etc., and while not a table jelly yet many families use it for such. One bushel of cider apples will make about seven pounds of this jelly which has a wholesale value of five cents per pound. This leaves a margin of twenty-three cents to cover cost of making and marketing. This certainly should be sufficient to insure a fair profit.

Boiled cider is another product which is in rather general use here in New England. When properly made it is of a beautiful deep red color, very attractive and of excellent flavor. When reduced to the proper degree one bushel of cider apples will make a little more than three quarts. This

has a retail value of 75c. If the wholesale price were only one half the retail price there would still be a good healthy margin of profit after paying for labor, fuel and containers.

Cider may be kept sweet for an indefinite period either by addition of chemicals or by sterilization. This last, if done properly, is a somewhat lengthy and tedious process and will not be discussed here.

Wines of exceeding high quality and flavor may be made from cider if proper methods are employed and if the right kinds of yeasts are used. These yeasts with directions for using may be purchased from dealers in cider making machinery.

Vinegar is of course the one most important product of cider at the present time. We are all familiar with the methods in common use and most of us are not ignorant of the average results. Do not understand me to say that there is no good homemade vinegar because occasionally we find some that is really excellent, but mind you it is the exception rather than the rule. It is just as easy to make good vinegar in the home as it is to make good bread, but if the housewife used correspondingly the same methods in making the bread as the goodman employs in trying to make cider, we should all soon forsake the staff of life and call for the corn pone. The difference is this, the breadmaker employs science; the would-be vinegar maker depends upon chance.

So much of this poor vinegar has been placed on the market that the government in order to protect the consumer set a standard, and as a result very little homemade vinegar finds a place on the market. Briefly the Federal standard is as follows: Vinegar must contain not less than 4.5% acetic acid and not less than 16% apple solids, of which not more than 50% shall be sugar. Is it any surprise that vinegar of the above standard is seldom produced by the haphazard methods in common use?

Vinegar is a product of a double fermentation, and the quality is largely determined by the kind of apples used. Only clean, sound apples should be used if best grade of vine-

gar is to be made. The barrel into which the cider is put should be absolutely clean and sterile. The first step in the process is that of alcoholic fermentation. This begins within a day or two after cider is placed in the barrel. During this stage the sugar present is broken down into alcohol and carbon dioxide. The amount of alcohol will depend upon the amount of sugar present and this in its turn will determine the amount of acetic acid. Best results are obtained if the alcoholic fermentation can be carried along without interruption and this condition is best secured by the addition of several cakes of yeast to the barrel of cider and by keeping the temperature around 65 to 75 degrees F. Under these conditions the alcoholic fermentation is completed within six to ten weeks.

The second step is to convert this alcohol to acetic acid. This is brought about by the acetic acid germ, which working upon the alcohol changes it to acetic acid. When the alcoholic fermentation is completed the clear liquor is drawn off. The barrel should be thoroughly washed and the clear liquid replaced. Here again instead of depending upon chance it is best to introduce the proper germ. This may be done as follows: Either buy from a dealer a pure culture or place a small quantity of vinegar and cider in an open mouth vessel and allow to remain for a few days. A thin glistening greyish membrane will be formed on the surface. This is the mother of vinegar. By means of a light pine shaving remove this membrane and drop shaving and membrane into the alcoholic solution. Keep the temperature as for the alcoholic fermentation and acetic fermentation will be completed in two to three months. It is possible than to produce a saleable vinegar in three to six months instead of the two to three years required where cider is stored in a cellar.

One important point has been overlooked in both stages of fermentation. The barrel should not be more than two-thirds to three-fourths full, should lie on its side and have the bung hole open. Free access of air is necessary. When however, acetic fermentation has gone far enough the barrel

should be filled full and the bung driven in. Cutting off the air will stop fermentation.

Another method may be used to effect the acetic fermentation, viz, the alcoholic solution is run through a vinegar generator and is converted into vinegar within a few hours. This last method would not be practicable unless one were making large quantities of vinegar. Exclusive of labor the cost of a 50 gallon barrel of vinegar is approximately \$3.00 and when sold at retail its value is \$10.00.

Cider may be used for other purposes than those already discussed and the products obtained are not only nutritious, but are highly palatable and might easily come to be standard articles of diet. Jellies, marmalades and butter are among the most important of these and as will be shown, can be produced relatively cheap.

(1) 1 bu. apples @ 70c.	70c.
6 gal cider @ cost of 3.4c.	20c.
25 lb. sugar @ 5c.	1.20

Total for materials \$2.10

The product is about 75 pounds of delicious marmalade at a cost of 2.8c. per pound. Labor and containers would not bring the cost to exceed 4 - 5 cents per pound. Basing our judgment on the retail price of marmalade this would be a profitable way of disposing of some of the surplus crop.

If butter is preferred to marmalade it may be one of two kinds, i. e. pure apple butter or sweet, spiced apple butter.

1 bu. cooking apples @ 70c.	70c.
8 gal. cider @ cost of 3.4c.	26c.

Cost of materials 96c.

The product is four gallons of pure apple butter costing 24c. per gallon for materials alone. If a better article is desired the addition of a few pounds of sugar and a few cents worth of spices will make a product worthy a place on any man's table.

We tried this out as a laboratory experiment in which

we made apple butter the product and jelly the byproduct and vice-versa. The results were approximately the same, that is we obtained the same amounts of both products in either case. Our results were as follows:

1 bu. cooking apples @ 70c.	70c.
4 gal. cider @ cost of 3.4c.	13c.
12 lb. sugar @ 5c	60c.
Spices 2c.	2c.
Containers 1.00	1.00

Total cost of materials \$2.55

For products we had 20 glasses of jelly and 3 gallons of apple butter.

Apple jelly has a rather variable retail value, but when clear and of good quality the price is usually 25c. per glass. If sold at wholesale it should pay for all the materials used above leaving the butter to furnish the profit and pay for labor and fuel. The butter has a retail value of 50c to 75c. per gallon. If put up in neat glass jars the price would no doubt be higher.

Where apple butter alone is made the best of the cider apples could be used, which would very greatly reduce the price without lowering too much the quality.

Drying or evaporating is another means of disposing of some of the surplus crop. So variable however is the price of the dried fruit that many hesitate to enter this field of manufacturing. The cost of producing a pound of dried apples is also subject to much variation, depending upon labor, equipment, etc. From data at hand the average cost of producing a pound of dried apples varies from 3 to 5 cents. The higher grades costing more, while chops and cheap grades would be less. If the above be a fair average estimate of costs there would be a fair profit in this business even in the off years.

Thus far I have said little about the manufacture of high grade products, using for this the best grades of fruits. This is of itself a wide field and I believe offers exceptionally

good opportunities and could be carried along with the type of work already outlined without very much outlay for additional equipment. If very much of this kind of work were done in a community it would most certainly not only benefit the ones who were doing it, but the other fellow as well, since there would be less competition and prices would rule higher for fresh fruits.

The question of how this work of manufacturing horticultural by-products is to be done is an important one. It occurs to me that there are three methods anyone of which might be successful:

(1) The Home Outfit.—There are now on the market home canning outfits which can be bought for \$5.00 and up. These supplemented with the large size kitchen utensils might be made to meet all the demands of the small grower at least for the first year or so. These home outfits are all right if in proper hands. Home-made products are very apt to be like home made butter, some good, some indifferent, and much of it very poor. Where one would succeed in an undertaking of this sort many would fail.

2. The Customs Factory:—This seems to offer a better solution to the problem although it is not without its drawbacks. The greatest objection to this system would be that the grower does not secure the whole advantage as a large share of his profits would go to pay toll. Also he would not always be able to get his work done just when wanted. This would mean losses. On the other hand such a system in a community would mean the saving of large amount of waste would encourage thrift, would make a fairly uniform and saleable product and would be a fine business from the standpoint of the operator.

3. Cooperation:—This seems the most rational method. In a system of this sort all goods would have the same standard of quality. The work would be done more cheaply. It would require but a small amount of capital to give each member the benefits of the very best equipment. The cost would be much less per unit, and it would make possible the

establishment of a brand with a considerable supply of materials to supply the demand. All things considered this seems to offer better inducements to the small grower than either of the other methods, both in way of manufacturing his products and in the disposal of them.

The next question to be answered would be how are we to dispose of these products?

In rare instances only would it be necessary to enter the general market in competition with the world's products. Local trade would in most cases readily absorb the output provided it were of good quality and if it were not one could expect little else than failure.

These goods put on the local markets as homemade products would find a ready sale. Many grocerymen and marketmen have told me they would be very glad to buy such things from the farmers provided they could get good quality. Selling on the local market saves the middleman's profits which might well be divided among producer, dealer and consumer. Then too, there is the possibility of working up a trade with the consumer himself. If one's products had a fairly wide range of both fruits and vegetables this would be a most excellent plan and would be of benefit to both parties. Hotels, restaurants, and summer boarders all are possible purchasers of our products. The selling end of the proposition it would seem to me is going to be the easiest part of the whole business.

I am fully persuaded that here is a big field for the enterprising fruit and vegetable grower, an excellent opportunity to open a business which offers unlimited field for development.

THE PRESIDENT: One of the men that was in the audience this morning, in talking to me this noon, said that he didn't agree with some of the remarks that were made this morning on fertilizers and he thought we ought to have an opportunity for both sides to be presented. Now, I want every one to feel perfectly free to talk on either side, or both

sides, of any question that comes up here, so that if any one does not agree with Professor Chenoweth, I want him to feel perfectly free to ask questions or present discussion on the other side of the question. Present your own ideas or ask questions as to the things Professors Chenoweth hasn't made quite clear.

MR. C. K. SMITH: I would like to ask how large those cans are supposed to be.

PROFESSOR CHENOWETH: This one (holding up a can of preserves) is the No. 3 can. That is the trade size.

THE PRESIDENT: Can you give us an idea of what that No. 3 is, so that it will appear on the record?

PROFESSOR CHENOWETH: What you would ordinarily call a quart can, tomato size. The peas were 16 cans to the bushel, half a size smaller, about a pint and a half, 21 cuneces. The tomatoes were No. 3 and a bushel produced 18 cans. Raspberries, No. 2 cans, about $1\frac{1}{4}$ pints. The blackberries were in the same size; strawberries were of the same size as the peas, namely, No. $2\frac{1}{2}$; plums the same as the beans, the quart size; the peaches were put up in both No. $2\frac{1}{2}$ and No. 3, and as far as I have been able to find out there is very little difference in the price when you go to buy them. Price does not depend upon quantity so much as quality.

QUESTION: What do you mean when you say four cents a can for tomatoes?

PROFESSOR CHENOWETH: What it costs to grow and can them.

QUESTION: Does that include everything?

PROFESSOR CHENOWETH: Yes everything.

QUESTION: Have you got the address of the men that did it? I would like to get that before I go home.

PROFESSOR CHENOWETH: I think you will find any of the Government publications will give you the data as 49 cents a dozen for the ordinary price throughout the whole tomato belt that they reckon for growing and canning the tomatoes, and they reckon about 80 or 90 cents a dozen wholesale. The can and container cost about 2 cents a can

to-day buying them in the largest way you can.

QUESTION: That leaves you a cent and a half to two cents only for the product.

PROFESSOR CHENOWETH: Leaves you a cent and a half to two cents from the planting of the seed until the tomato is in the can.

QUESTION: Do you recall whether cans are higher to-day than they were four or five years ago?

PROFESSOR CHENOWETH: Yes: from \$1.00 to 5.00 or more per thousand depending upon size and number bought.

QUESTION: Why I raised the point is, I found that the Government figures on canning are very misleading, leaving out either labor, or forgetting to reckon in the cost of the product, or taking it for granted that the man himself wasn't worth anything anyway.

PROFESSOR CHENOWETH: Well, those figures are taken from Idaho (referring to document).

DR. WHITTIER: Including labor?

PROFESSOR CHENOWETH: Supposed to include everything.

A MEMBER: You can't grow tomatoes in Massachusetts for 20 cents a bushel and can them. You can't grow them for that.

PROFESSOR CHENOWETH: I don't know how it could be done, under present conditions, but suppose you worked all the green tomatoes, don't you suppose that cuts the price materially? I imagine that is where the tomato would fail in this section of the country, because we haven't a long enough growing season; but I believe that if all the green and immature and young tomatoes were worked up into various products that are standard on the market there would be no reason why you would not make a very large part of the profit from them.

QUESTION: That introduces another calculation. I was wondering how you got your crop raised and canned for the price you give.

PROFESSOR CHENOWETH: I don't claim any responsibility for those figures, because those are from the Idaho calculations. Our work has all been with fruit.

MR. HITTINGER: Don't you sell some of those on the market before you start in canning?

PROFESSOR CHENOWETH: Oh, yes, in a great many sections they do, perhaps practically all of the first grade.

MR. HITTINGER: Then that would make a difference.

PROFESSOR CHENOWETH: Yes. You might sell enough fresh fruit to more than pay the cost of growing the crop, and then of course in the canning you could figure that those tomatoes were costing you nothing, and that would get around the idea of figuring in the cost of growing.

MR. JENKS: I think it is in a way creating a wrong impression to compare your cost in the wholesale way against the retail price to the consumer. I notice that you were in each place particular and careful to approximate the wholesale price, too, but there is a big gap, and selling expense enters in between the grower and the ultimate consumer or the manufacturer and the ultimate consumer, and that is what a beginner will run up against, and it is like a stone wall when you first strike it.

PROFESSOR CHENOWETH: Why should it be, if you deal with your local trade?

MR. JENKS: You mean a house-to-house canvass? Why, you can do that, of course. It is going to cost money to get to those consumers, and you have got to keep shoving it up to them.

PROFESSOR CHENOWETH: I haven't yet talked to a single dealer who has not said that he would be willing to buy the product from the farmer if he knew he was getting an article he could pass on to his customers and be willing to stand back of. If you could do that to help supply the market with your dealer, wouldn't he be willing to divide the profit between himself and you?

MR. JENKS: Certainly: but my point was that I notice it is the tendency of all the Government reports to take re-

tail prices as to the products at, for instance, 25 cents, which leaves you with a contemplated profit which doesn't materialize.

PROFESSOR CHENOWETH: These are the only Government figures I have used.

MR. JENKS: I know, but I am not speaking so much of your figures to-day as of the bulletins that are now being issued to give us data on cost of production at home, exclusive of labor, and then hold up the retail price. My point merely is that a man wants to stop and think twice before he thinks that the difference is all profit. I should think you could allow 50%, and still have enough for a safe profit. You can cut your retail price in two, and then show a profit.

PROFESSOR CHENOWETH: Yes, that is so.

MR. JENKS: Well, then that's all right. There are two ways of figuring that profit. One is to give a man good pay for his time, figure the cost of what he would have to pay for labor, and then get a managerial profit on top of that, which is another thing. You figure one way that a man would earn \$3 a day; figuring the other way he would earn nothing. If he has got to pay a man \$2 a day to do that work and then get a profit for himself on top of that, it makes a difference whether he earns \$3 a day or actually gets one dollar a day over the other cost for himself.

THE PRESIDENT: If he can hire a man at two dollars and gets three, that is a pretty good profit.

PROFESSOR CHENOWETH: That is if you can hire a man for two dollars who is competent and trustworthy enough to do this work.

THE PRESIDENT: In a larger way you would have several men. A great many would be at less than two dollars, with a man at perhaps three dollars to supervise. As soon as you put it on a larger commercial basis you reduce your labor cost. I should be perfectly willing to back up Professor Chenoweth if you had a real good product and could get in touch with the proper grocers who would be willing to handle it at a reasonable profit. I know they are

in our section, although we have the other type, of course.

MR. HITTINGER: How many years could you keep that product in good shape?

PROFESSOR CHENOWETH: I couldn't answer that, sir, because I don't know. Some of it you probably would not want to keep longer than that year. You would want to dispose of it within a year, jellies particularly. They are very apt to crystalize if you attempt to keep them too long, but with the canned fruits and vegetables, I don't know.

MR. HITTINGER: If you couldn't sell it, you would be stuck again, wouldn't you?

PROFESSOR CHENOWETH: I don't think there would be any danger but what you could sell it.

MR. CUNNINGHAM: If you make cider and let it get hard, you can turn it into vinegar.

PROFESSOR CHENOWETH: It depends altogether on how hard it gets. Hard cider is cider that contains alcohol, and the amount of acetic acid that can be obtained from a hard cider depends on the amount of alcohol. If you have in this hard cider somewhere around five or six per cent. of alcohol, you can get a good vinegar out of it. If you have three or four per cent alcohol, you can't.

QUESTION: What do you do in that case to make vinegar? Add acetic acid?

PROFESSOR CHENOWETH: No. The only thing I could see to do would be to use an inferior grade of vinegar like this (indicating a bottle) to tone down the vinegar of six or seven per cent acetic acid.

QUESTION: Is it necessary to use a porcelain kettle?

PROFESSOR CHENOWETH: No, a tin vessel would give the same results. I don't see why a man who is making maple syrup couldn't use his evaporator, if he is using a modern one, use the same pan in the fall in making boiled cider and jellies, thus making his pan pay for itself. And you could put out a product that would be very attractive and would sell much more readily than this black, burned stuff you see on the market.

QUESTION: Would a brass kettle be objectionable?

PROFESSOR CHENOWETH: I don't think so. Brass is all right for the manufacture of most products.

QUESTION: Will boiled cider ferment if it is properly boiled?

PROFESSOR CHENOWETH: If it is boiled and put into a sterilized vessel and immediately sealed, it won't. It will ferment if you leave it exposed, but will not ferment as easily as the unboiled. This bottle (illustrating) I suspect would keep a considerable time if the bottle were uncorked, but as it is sealed up, I am sure it would keep a year.

QUESTION: How much was that boiled down?

PROFESSOR CHENOWETH: About five to one. If you want to make jelly, take about seven to one. If exposed in a glass vessel like this (indicating) for a few days, it would pass into a jelly, enough of the water would evaporate out and it would set and form a jelly.

QUESTION: If it were boiled from five to one and then corked tight, would it ferment, or would there be danger of the bottle breaking?

PROFESSOR CHENOWETH: No danger if bottled while hot.

THE PRESIDENT: It wouldn't have any germs in it to ferment.

QUESTION: Can you get the light colored boiled cider by the use of a barrel and copper coil?

PROFESSOR CHENOWETH: Yes, I think you could. You could also use a coil and barrel in manufacturing butter and jams.

QUESTION: I have seen a place where they used a barrel and a copper coil and used steam, and the boiled cider was transparent, with hardly any color, and it was thick and very clear, you could see right through it, like glycerine soap.

PROFESSOR CHENOWETH: You mean it was colorless?

QUESTION: Yes, very much so.

THE PRESIDENT: From some things that Mr. Browne has said to me. I think his experience has been valuable on this question, and I am going to call on him to discuss it with you.

MR. MARCUS BROWNE: When your secretary asked me to come up and speak a few words this afternoon in regard to my amateur attempts at canning apples, etc., this fall, I at first said I would not. My attitude has always been that if I have a good thing I should keep it to myself. and I think I am just like the rest of the New England farmers in that respect. However, after having been on the road for the last six weeks and getting banged around and kicked out of doors I realize that if we are really going to do much we must pass on a few of these good things and get together. Cooperation has been a word we hear a good deal of in Massachusetts, and forget it as soon as we hear it, and we are all afraid of our neighbors, but we have got to get over that if we are going to get ahead.

I went into canning this year, not because I wanted to but because I had to. I have studied the subject off and on for three years, and the commission returns began to be so bad that I realized that if I was going to get anything at all out of my crop I had got to do something, so up to inside of two weeks I was canning. I haven't a factory; I have a wagon shed, whitewashed it and put a floor in and used plenty of water. On the question of canning apples, in the first place you have got to have a pretty good apple. I always had an idea the canners used everything the hogs didn't want, but I find that isn't so. You can deacon a barrel of apples and get away with it, but you can't do it with your cans, because the can will blow its head off in about six weeks. Cans cost money. The No. 10 cans, a gallon can, holding about three quarts, cost me this year \$42 a thousand, f. o. b. shipping point. They come in cases of a dozen each, and the case costs you twelve cents besides that, and you have got to have the case, and your freight costs you about \$4 a thousand, in earload lots, sight draft against bill

of lading, and that is about the best you can do. I have tried them all, and if you buy in less than carload lots you have to pay \$10 a thousand more, so that if you are going into it in a small way your can would cost you \$52 a thousand f. o. b. shipping point. It costs a lot of money for the cans and the cases. It cost me 78 cents, laid down in my shop, for a dozen, cans and cases alone, before we began work. That is a figure that makes you stop and think. Also, there is absolutely no use in starting unless you have got an abundant supply of good labor cheap—not cheap labor, but good labor cheap—female preferred for most of the canning work. Then if you have many women around you have got to have a licensed fireman, and we use a steam engine, because, having the steam, it seemed to be the cheapest to use that. You have got to have a licensed engineer and firemen, and your boiler has got to pass inspection. Then you have to have, for canning apples, a coring and paring machine and an assortment of knives and tables and buckets. Personally, I came down to the fibre pail. I like to have plenty of water, an abundance of steam, and some sunshiny place and somebody with me that knows how. That is what you have got to have when you start out. The man I had cost me sixty cents an hour for every hour he was on the job, and if on the other hand we were shut down two hours, I didn't pay him. I figured that was cheaper than paying him by the week, and he was worth the money, because he was fireman and electrician and what-not; he could do most everything. We took every old apple I had, at the start, and put them on the paring machine, and from there they dropped into a tub of water, and from there they were shoveled onto a table—using an iron scoop—to the women, and there is the whole product, classed as No. 1, 2, or 3, by the work done on that table by those women. They take the apples as they come from the machine, peeled and cored. Theoretically the core is out, but one man standing in front of those machines would feed just as fast as he could, and sometimes the machines take the cores out, and sometimes they take a

hole through the side where the core ought to be, but the women have to cut that apple into quarters, remove every bit of the core and remove all of the skin which the machine didn't take, and also any rotten spots. I will say that an apple three-quarters rotten can go through one of these machines and it will pare it and core it. They are a wonderful machine, but by the time the women get through that labor of cutting out, it is a question whether it pays you to put it through. You take an apple that is half rotten, and after you cut out absolutely every bit of rot, it can go into a can, but if any rot goes in, good-bye can! After the women are through with those apples they go into the water and from there you pack your can. We use the sanitary open top can, using no solder or acid, and if you are going to start in, that is the only kind, because the old style soldered can is getting to be a thing of the past. The cans are filled just as fast as they can be, just as you would fill a barrel of apples for shipment across the water, and just before that can goes into the closing or sealing machine, it is filled brim full of boiling hot water—the water ought to be fairly jumping—and then a machine, which you hire from the Can Company, crimps that can and it is delivered further along and then put into the crate, and from there it is put into boiling water and cooked. How much it is cooked depends upon the variety of apple and the condition of the apples and the demand of the trade to which you are shipping your apples. I would say that I wouldn't think of putting the Northern Spy, Baldwin, Hubbardston and a little bit of Greenings in one can and expect to get it first class. The Hubbardston and the Spy and the Baldwin would all require a minute and a half, perhaps, difference in cooking, and wherever I could I would can all of one variety at a time.

Of course, when you go out to sell your apples, they will tell you that anything that is put right up on the farm, coming right from the farmer, they will be glad to handle. That is before you come around with your apples. When you come around with your sample, that has got to grade up

to A-1, or it will get its proper grade, and get it quickly. The people in the canning industry aren't all fools; there are some mighty fine people putting up some mighty fine stuff, and it is pretty hard to keep up to the commercial grades as they are now. I will say, however, that the fact that you put it up on the farm has a selling value, is a selling asset, to the retail trade, but not so much to the wholesaler. One told me yesterday that he did not care a cuss where it was put up so long as it was good enough to put his label on. That is the attitude the wholesaler takes. You have to make up your mind whether you are going to sell to the wholesaler or to the retailer, and be governed accordingly. You also have to make up your mind as to your source of supply. You have got to have proper equipment, you have got to figure on your coal, water, salt; figure on buying knives about once in two weeks. All of them are not lost. You see them walking down the driveway at night when they are going home, with those knives, but you can't take them away from them all the time. Every can you buy doesn't go to market, so there is a leakage. A certain amount of the cans are damaged or bent, and the cases get broken. If you are going to deal in this business in a large way, you have got to figure on paying a small brokerage or commission, so that while there is a profit, it isn't a gold mine.

I should say from my own experience that I heartily agree with Professor Chenoweth that the idea of an individual canning plant on every farm will only make a farce out of this whole thing, and so far as taking them to a custom man is concerned, I would want to know the custom man pretty well before I took the stuff to him. If you are going out on the road with your stuff you want to know, when you pull a can out of your grip and open it, what it is going to open up like. I saw a drummer the other day selling some stuff, and he was cracking up a carload he had just had come in, said they were fine, and he opened up a can and it was a sour can. All he could do was to get out. He wasn't the guilty one, and he found it hard or impossible to place the

blame where it belonged. But cans will go wrong, so you want to put in all the effort you can to know that your stuff is A-1. One thing that appeals to me about canning apples is that when you get agoing, you are going to sell every apple. Of course we are all going to sell our best stuff, but what about the rest of it? That is where the profit is. Probably out of any crop of fruit, what you get out of the best perhaps will pay the cost of growing, but if you don't get a good price out of the balance you aren't getting a great deal of profit, and it is because by canning you can get a dollar out of most of your stuff, that it appeals to me. I should not want to can apples for a business without having a cider mill in conjunction, and I have seen some pretty good jellies made out of cores and skins of these apples which I had to throw away, and if I had been equipped to make jellies I could have got quite a few tumblers of jellies out of the same apples that went into the can. It is an involved question and certainly calls for a fairly large plant in a certain section, under the hands of men who know how, and I think it would be a mighty good idea for the farmer to sell his apples to the factory at a definite price and then get his extra profit as dividends, not trying to get much more of a price than he does now in the first place. That is, if you are getting twelve cents a bushel for cider apples and start a factory, sell to the factory at twelve cents and let the factory make the profit, and then you will get your pay as profits back to the stockholder, but don't try to get the factory to pay 36 cents a bushel to start off with and then come around in the fall and want to know, "Where are my dividends?" I am on the fence and ready to stand back of the canning proposition. I feel that the canners are as a class about as hard up, broken, bankrupt a bunch of men as there are in the country. (Laughter and applause). They don't know what it costs to can a dozen. They go into it; go out and borrow money for the cans; get the farmers to trust them until fall for the stuff that is put into the cans, and after they have done all that, without really knowing what it cost them, they are in

the hands of some broker, and along the first of November when their note comes due, the jobbers all know it and the brokers know it, and of course at that time the market will be terrible; they can't sell a thing, they can't do a thing! Well, that is the way they are cleaned out year after year and year after year, and how they live between falls and springs is a question to me. That is the condition of the small canner throughout the country, and that is what is going to happen if we all try to put up stuff on our own farm. (Applause).

MR. W. D. ROSS: I plead guilty to being the one who told the President that we ought to have both sides discussed, and I think the last speaker has brought out the idea I had in mind. It costs more to do these things than what we realize, and when the speaker this forenoon said there was a margin of ten or fifteen dollars a ton on fertilizer, I am sure that if he would go into the details which this gentleman has gone into here, he would find that cut down to two or three instead of ten or fifteen. I am very glad we have had both sides discussed this afternoon, because I wanted to hear both sides, and I think when a man hears both sides he understands a good deal better. It is all right to talk of what these things sell for, and what they can be made for, but when some of these things have to be put up in glass receptacles, packed and shipped in boxes and sawdust, and there is freight and cartage and breakage and all those things, there is a big difference in the end.

MR. MUNSON: I would like to ask the last speaker what the margin is on fertilizer?

MR. ROSS: If you had stock in my company, you would find out.

MR. MUNSON: That doesn't answer the question. I haven't any money to buy stock.

MR. ROSS: I have been in this business thirty-four years, I have been running it over twenty-five, and I say it costs about 15 or 16 2-3% to do business, and if you can fig-

ure any profit out of that, I would like to have you show me.

QUESTION: I would like to ask Mr. Browne whether the cores and skins could be used as fertilizer around the trees that they are taken from?

MR. BROWNE: Professor Sears is a better man to answer that than I am. I suppose they have some fertilizing value, but it would be pretty expensive in view of the fact that you can have jellies made from them, and at the same time you might have some disease carried back on the skins, or some scabs that you might not want, from them.

MRR. CLARKE: I want to state that the figures that I gave this morning on fertilizer were actual figures from different concerns. We have bids from practically all the principal fertilizer concerns in the country, and I was giving actual figures between their bids at the wholesale rates and those at which we could buy the chemicals for and mix them.

MR. MUNSON: I would like to ask Professor Chenoweth which he thinks most profitable as a by-product of the apple; whether it is the boiled cider or the marmalade or the jellies, supposing a man could handle only one.

PROFESSOR CHENOWETH: It seems to me it wouldn't be profitable to confine yourself to any one.

MR. MUNSON: I mean, between butter and jellies, or boiled cider, and also the evaporated.

PROFESSOR CHENOWETH: The only objection I see to butter and marmalade is that New England people don't eat those things. If you could get a market for those products in the middle West, or the group of states this side of the Mississippi River, then I should say the butter would be profitable. Out there among the country people I have seen it selling for from 50 to 75 cents per gallon, but New England people use very little apple butter. I have had only one man who knew the article when it was made. Marmalade or apple sauce are better known here in New England than the butter, but for this particular section I should think either sterilized cider which would be sweet, or boiled cider, would be preferable to the butter.

MR. MUNSON: Have you experimented any with the evaporated apple?

PROFESSOR CHENOWETH: No. We know nothing about evaporating. I think I am safe in saying that the average cost of the evaporating work is three to four cents per pound.

MR. FROST: I would like to ask if any one here has used an evaporator? I know one man in New York who has evaporated apples, claims that he finds it the best way of using the apples, and that he had a market for all his cores and skins dried. A few years ago he was shipping all of his cores and skins to Germany at a good profit.

THE PRESIDENT: I understood that one of the hardships that we were undergoing on account of the war situation was that we couldn't export cores and skins to Europe, to come back as champagne.

MR. SMITH: I would like to ask the gentleman about his experience with canning, as to whether his experience would justify him in an opinion as to whether a cooperative cannery would be profitable and advisable for the community.

MR. BROWNE: I will say both yes and no. If there is some good strong hand guiding that thing and the others are willing to lie down when they are told to, it can be done. But, for instance, take tomatoes; it is impossible to make a uniform pack of tomatoes. If you were to take the Matchless and the Bonny Bess and the June Pink, and a lot of those as they came in, and put them into cans, you would have a tomato that would have to grade about second or third grade. It would mean that the men in the locality must pack the same variety of the same vegetable. In canning squash you would want either Marrow or Hubbard. If the growers of the locality really meant business and got together and agreed, then I think that a cooperative canning plant would be profitable, because it would assure them of some profit for their stuff, and not poor excuses, such as they often get from the shippers or commission men.

THE PRESIDENT: It seems to narrow down to the same thing that most questions do, depends on who is managing it.

MR. BROWNE: It does.

THE PRESIDENT: Now we come to our other subject of the afternoon. I think the next subject is a very timely one. It has been true, undoubtedly, that there has perhaps been over-enthusiasm on the apple to the exclusion of a great many other fruits, and particularly, it seems to me, at this end of the State to the exclusion of the pear. If I were in a pear section it seems to me I should feel there was a fine opening for taking that up, because there is so little interest in it, so few being planted at the present time. I told you this morning we had on our program men who had done these things, and our next speaker needs no particular introduction to you, except to say that he is no exception to the rule. I am always very glad when he has anything to say, because he speaks from experience. He is a man of sound judgment, a man whose opinion is worth something, and I have great pleasure in introducing Mr. Richard Hittinger, of the Hittinger Fruit Company, Belmont, Mass., who will speak to us on "Pear Growing." (Applause). ..

PEAR GROWING.

Mr. Richard Hittinger, Hittinger Fruit Co., Belmont

Mr. President, Ladies and Gentlemen: A good many years ago, we grew a great many pears in our section out through Belmont, Watertown, Cambridge and Dorchester and all through Brighton. There never seemed to be any trouble. The trees grew and bore fruit, and everything was all right. But now to give you some of our experience of years ago in setting our young trees. We bought our trees from the nurseries, trimmed up the roots and saved the little fibrous roots and were careful to spread them out when we

set the trees. We were very particular to put a little dirt underneath but in this practice we seemed to lose a good many trees. In later years I thought it over and noticed when we planted trees that didn't have fibrous roots they made a fine growth, so I made up my mind I might just as well cut those little roots off and trim up the large ones. Before planting the trees I soaked them in water, leaving them in for about six hours at first, and after that I kept on increasing the time; now I leave them in the water from twenty-four to thirty-six hours and sometimes two or three days. In this way I had pretty good success, seldom losing a tree. In planting I put the tree in the hole and throw dirt in, then shake the tree up in order to settle the dirt around the roots. I fill the hole and tread the dirt around the roots in good shape; if the soil is dry, generally put on a pail of water and let it settle, then finish filling the hole with loose dirt. In this way I very seldom lose a tree. In trimming the tree, I used to cut it back pretty well, heading in all the young growth. I watched some of those trees and found they made a poor growth the first year but the next year they seemed to do pretty well.

In planting trees of late years I have noticed that when set out they start and then seem to die down. I think most of this trouble is caused by the stock on which they are budded in the nursery. The trees look all right but some of the suckers coming from the stock look as if they were buckthorn, wild stuff: no pear to it, and I think this is one of the great troubles with our pears today.

I set out quite an orchard of Kieffers and grafted them into the Bose. When they suckered out I broke the suckers off and it seemed to kill the trees; they died right down. There was one tree I didn't touch and that seemed to grow in nice shape, but the suckers crowded the graft so I bent them down, not breaking them off, so they wouldn't interfere with the grafts. After a couple of years the grafts seemed to grow right up and I got a good crop; then I cut off the suckers that were left and the tree seemed to be all right.

Since that time I have followed this practice.

I planted some Le Conte trees. They were reported to be a good pear to graft the Bosc into and I have done that, but I wish I had never planted this variety. The scions died and I think it was on account of the stock into which they were grafted.

I believe that if I were going to plant pears again, I would set the rows 20 or 25 feet apart, and put the trees about eight feet in the rows. This gives you a chance to cultivate in the center. You may think the trees will grow into one another. They will if they are 12 or 15 feet apart, but put them closer and they will have a tendency to grow out sideways. I would plant rows north and south so the sun could strike on the east side in the morning and the west side in the afternoon. This system of planting is better in spraying, because you spray on the sides and do not have to go around the tree.

I have planted currant bushes for ten or twelve years in rows; instead of putting them 4 by 5, I have put them about $7\frac{1}{2}$ by 2 in the row. Put one row of currants in the tree row, and one in the center, where the pear trees are 15 feet apart. This gives you a good chance to cultivate the currants and conserve the moisture. If you let the ground get hard, the currants are apt to blister. We have had quite a lot where the bushes were too close together and then we tried mulching, but I didn't like to cover the entire ground because we were afraid of fire. I believe in putting in the rows as I have done this year, spreading the manure on both sides ploughing up a furrow on each side, and leveling it right off so that there is a little ledge where the bush stands, because it will keep the bushes from lying on the ground and will give you a chance to pick the fruit. The manure is added to the fertilizer and the mulch and it keeps the berries green. I think this will make a pretty good way of handling the currants in with the pears. In planting a new orchard, instead of putting the currant rows in with the tree rows, I would rather put two rows, one each side of the tree

rows. You could then mulch in between and you wouldn't have to cultivate so near the trees.

I think that if we would grow two or three good varieties instead of so many different kinds, we would be much better off. The Bartlett of course is a very good pear, but the trouble is it comes in when the California pears are on. The Western pears come early and stay late, so they don't give us much chance to dispose of our Bartletts. The Bose comes in after the Bartlett and so finds a hard market.

There are many good varieties of pears, but I think when you bring too many varieties onto the market you get people mixed up. Years ago, when the Bartlett season was over the neighbors came around and inquired if we had the long-necked Bartlett, (the Vicker), and I think we have a similar condition today with apples and everything of that kind. People are fooled on them. They get apples that are good for nothing and are claimed to be such and such a variety. People don't want them; they say they are not good for anything. People are all afraid that some one else is going to get the best of it. It is like people getting on a car, they tumble over each other, but you take your time and you will get as good a place as the other fellow. I think it is just as well not to be in too big a hurry sometimes. I think from what I have seen of the pear business it ought to be taken up again. I can remember when we had about six or seven thousand bushels and today I wouldn't average over two thousand bushels on the same ground on account of trees that have been hurt.

For the last five or six years our pear crop hasn't been a success on account of the condition of the trees. I have had but two pretty fair crops during this time. There was a pretty fair crop last year and a nice crop of Bose and Bartlett the year we had the Fruit Growers' meeting. I lay a good deal of the trouble to the blossoms. Last year I noticed the Seckles were very full of blossoms and some of our others had very few. We had a lot of dull, bad weather when the blossoms came out, and I think that had a good

deal to do with our failure on the pears.

I always used to plow in the fall, turning the soil toward the trees in order to shed water. Lately I have done away with the practice, merely running the flat cultivator and leaving the ground level all through the summer. In the spring I put on a cultivator and loosen the soil, leaving it just as rough as I can. If you get a lot of rain, the soil hardens down, but if you use a flat tooth cultivator you will keep a dry mulch all the time which seems to hold the moisture in good shape.

Another very good thing for an orchard is to plant some crop which will remain for the whole year in every other bay, and in the other bays put in crops you can cultivate. I had one orchard where I planted dandelions. The season was very dry and the crop large. I hurt that whole orchard and it didn't get over the results for quite a while, but the effect didn't discourage me. It was a good thing in one way for it formed a lot of fruit buds for next year. Since that experience I have planted one bay to crops of that kind, and kept the other cultivated, reversing the operation next year. It seemed to check the trees just about enough. I have also done that with peach trees.

On the question of pruning the trees, I believe more trees are hurt from over-pruning than in any other way. I think people cut out too much. I think you can train a tree and save an awful lot of cutting. A tree will grow up thick, but you can spread it out with a lath or something and you will be surprised how you have opened up that tree. When you find limbs that are lying down, take a piece of hose and run a wire through it, and put it under the limb and raise the branch to position. You will be surprised how this system saves the limbs.

I think trees want to be renewed about every so often and when you see them commence to throw out suckers, it is time to change over. You can see a place where you may cut off a limb and let one of these new shoots grow, and after that you very seldom will be troubled by other suckers. I

tried that quite a number of years ago and it saved cutting off young wood. Do it the other way and you destroy some nice, young wood and some nice fruit. What gave me the idea more than anything else was that sometimes a limb would break off and it would be only a couple of years before a nice limb and some fine fruit would appear. I thought that a good sign to go ahead and do the same with the rest of the trees. I think trees want to be renewed; I think you prolong the life of the tree, but I don't like to do too much cutting.

Snow storms spread the branches and help open heads of the trees. The weight of snow for a day or two will bend the limbs and they will hold their shape.

When you graft a tree, the first limb generally grows crooked, and as a general rule will bear pears more quickly than any other part of the graft. I think if a person had time to bend the branches over tending to retard the flow of sap and put a weight on to hold them until they become shaped, they would set fruit buds more quickly.

It was about twenty-five or thirty years ago that we were first struck by pear blight. It seemed to strike on the Sheldon and after that it was severe on the Clapp's Favorite, then the Bartlett. We were troubled with blight for three years and some orchards were destroyed. Some of the trees we cut back and they began to sucker out and made pretty good trees again.

The scale came next and we were in the same box again. So we started spraying with lime-sulfur, and when that didn't seem to do any good I got discouraged and thought of cutting the trees down. I didn't want to do that so I cut out every other limb. The trees seemed to sucker out and we sprayed with lime-sulfur and again with oil; we killed the scale and gave the trees a new chance. Today the trees are in nice shape. They have suckered out and I didn't cut off the young suckers until they were a couple of years old, and then I thinned out a few and let the rest grow. Two years ago we had a pretty nice crop of Bartletts. Last year

there was a nice blossom, but they didn't seem to set very well. We had some pretty nice pears, but now they are looking as though we are going' to get a pretty good crop for next year.

The pear psylla came about twenty years ago, and they went right across, starting in Watertown and out through Belmont and over through Arlington along the low ground. They didn't touch the trees on the hills; in fact, half of the orchards were free from them quite a while. After the psylla came around the pears were not worth picking. They were all black and the leaves fell from the trees. When the men went in to pick the fruit they came out of the tree so black you couldn't tell whether they were black men or white men. We found the only thing that checked the psylla was spraying twice in one season, early in the fall and again in the spring. We used oil and I have been spraying with it ever since. I have heard a good deal of discussion that spraying with oil kills trees but I haven't seen any bad effects from its use, and I don't know whether to try the lime-sulfur or not. Lime-sulfur is nasty stuff to use. A man doesn't like to use it, so I am in a quandary, and that is what I want to find out today; whether it is policy to use the lime-sulfur or keep on with the oil.

I don't know that there is anything I can add to this. Thank you. (Applause.)

THE PRESIDENT: Have you any questions or any discussion?

QUESTION: I would like to ask the speaker if he raises apples on the same line as pears, whether they will grow on the same kind of soil and in the same location?

MR. HITTINGER: Well, we have apples, pears, peaches and everything on the same ground, all mixed in, and they seem to grow all right and thrive.

QUESTION: I have apples growing and doing well, and I have rows of pear trees between, and there seems to be room enough, but they don't seem to do anything. They don't grow.

MR. HITTINGER: I guess you had the same trouble we had, the pear psylla.

QUESTION: I have had this black leaf and black on the pears.

MR. HITTINGER: That is just what we went through.

MR. TUTTLE: I would like to ask just how you pick out your limbs that you are going to cut back.

MR. HITTINGER: It doesn't make any odds. I would watch and just see where the suckers come up, and then cut out one limb or two limbs or something of that kind after you see the wood come back. Sometimes the wood looks all right and you see a lot of suckers. In the case of the dandelion planting, quite a lot of suckers came out, showing that the wood was hurt, so I commenced to cut out some of the branches and let the young wood grow, and had good trees until the pear psylla struck us, that was what knocked me out.

MR. TUTTLE: What three varieties of pear do you think are the best for market?

MR. HITTINGER: Oh, of course the Bartlett is a very good variety, but, as I said, the trouble is that the California Bartletts come in before ours are ready and they are here after ours are past. Then the Bosc is a good pear to grow, and Anjou, but I don't know whether people will take to it since the Bosc has come in. It don't seem to sell as well as it used to. The Worden Seckle seems to be a handsome pear.

MR. TUTTLE: How about early varieties for the summer trade?

MR. HITTINGER: The trouble with those early ones is that the California pears are right here to take their places.

MR. TUTTLE: I mean for the local trade.

MR. HITTINGER: There was a pear they called the Gifford, that we made quite a lot of money on until the Bartlett come in and took its place.

MR. TUTTLE: How about the Seckle?

MR. HITTINGER: The Seekle is all right, only I don't think it sells as well as it did years ago. They seem to be very small, some way or other.

QUESTION: Can the Bose be grafted successfully?

MR. HITTINGER: As I explained before, you can put the scions in and let the suckers grow until you get the top up in good shape, then break the suckers off as they come, but don't try to cut them off when you put the scions in, because you will kill the whole thing.

QUESTION: What is the method of keeping pears before marketing them?

MR. HITTINGER: We generally sell them to the fellows that put them in cold storage. But if you have a good cellar and put the pears in, and ventilate it at night and shut it up in the daytime, you can keep them quite a while.

QUESTION: What about fertilizers?

MR. HITTINGER: We don't use any, only stable manure. We have so much of that that we don't have a chance to use much of anything else.

MR. BROWNE: Have you wiped out the psylla? If you have, what spray do you think did it? I have it every year and can't seem to shake it.

MR. HITTINGER: I haven't seen any there for the last two or three years and all I used was the oil. I sprayed twice, once in the fall and once in the spring, giving two good sprayings. I said I would either kill or cure, and now I only give it one, and I have hardly any of it on the trees.

THE PRESIDENT: I was going to ask Mr. Clarke if he would give us his experience in fighting psylla.

MR. CLARKE: We haven't been doing much successfully. We have been using all that the New York station has recommended and a little more, and still we have it with us, and that is why there is no profit in the pear business with us. But we have a little more hope this year than before; the pears look better and there are more produced. We have used lime-sulfur at the very last moment before the

buds come out, but two years ago we had severe injury from spraying with lime-sulfur just as the blossoms bloomed, by causing a stunting of the whole tree, and for six weeks the tree practically stood still. Last year we tried oil on two orchards, and did very well, but there are a good many pears in that section, and the pear psylla came from those neighboring orchards and from the fence rows and rubbish that might be around, and so we feel that we can lay a great deal to the oil, though we have got to follow it up by some spray mixture until the pear psylla is controlled in the whole section.

MR. HITTINGER: I wish you could have seen our trees seven or eight years ago. One year we had a lot of the Bose pears, and there wasn't a leaf on the trees. I thought they were going to die, but I gave them a good spraying with oil the next year, and the trees started out new, and I had some nice pears, good and bright. I had a few pears on some of the trees that were a little rusty, but not from the pear psylla.

QUESTION: What kind of oil did you use?

MR. HITTINGER: Arlington Oil.

MR. CLARKE: What do you use for summer spraying, for instance, for the codling moth?

MR. HITTINGER: Only arsenate of lead for the eating insects. We haven't used anything for that fungus or anything of that kind. We are a little handicapped. We have crops underneath and we can hardly get in there to spray.

QUESTION: What strength did you use?

MR. HITTINGER: I think it was 1 to 12. I have used 1 to 15, but when I put it onto the apples it was 1 to 10. I think, and now I use 1 to 12. I was going to say, that if I was going to plant a pear orchard again I would give them about 22 or 25 feet, and I would plant the rows north and south, as I said before.

THE PRESIDENT: You mean the rows 22 feet apart?

MR. HITTINGER: The rows 22, and the trees about 8 feet apart in the rows. That is the way I planted peaches,

about 8 feet by 20, running the rows north and south, and that made a good way to take care of them. If you get the trees too far apart they will lop into each other, but if they are close together they will spread out sideways.

THE PRESIDENT: That is a new doctrine to me.

QUESTION: Have you grown the Flemish Beauty?

MR. HITTINGER: I have seen them, but not a great many. I don't know whether you could sell them or not.

A MEMBER: We have a few, and they seem to be about as good as any I have seen.

MR. HITTINGER: It is a nice pear.

THE PRESIDENT: I shouldn't suppose there would be any great difficulty in disposing of good Flemish Beauty pears, if they were sound and clean.

MR. SMITH: How long have those trees stood that you planted about 20 feet apart and 8 feet in the row?

MR. HITTINGER: I have some that were planted 12 or 15 years ago. A year or so ago I cleaned them out.

MR. SMITH: And you had good results at that distance?

MR. HITTINGER: Fine results. I have one that was planted that way about 12 years ago, and I have had seven or eight good crops. Once I got two or three crops one year right after the other.

A MEMBER: There are a good many that say that the Bosc has to be double-worked, onto another stock that has already been worked in, and I want to find out whether that is so or not.

MR. HITTINGER: I notice some of these trees that we have grafted the Bosc into will do a great deal better than some other. The Worden Seekle seems to grow all right, and the Anjou is a good stock to graft the Bosc into. In grafting I have always had the very best success in grafting the whole tree. Years ago they used to graft three or four limbs this year and two or three next year. I would rather graft all and let the suckers grow around the body of the tree for a year or two, and, as the graft gets up and you cut

the suckers off, I don't believe you would have any trouble. But I think it will hurt the tree to cut off those suckers before the graft gets well up.

A MEMBER: I would like to say a word about varieties. I have had some considerable experience in selling, and I believe that for an all-around pear, if you are near a local market, the Bartlett is the best you can grow. I feel safe in stating that 75% of the consumers of your home trade would prefer to have the Bartlett. Mr. Hittinger stated that the California pears come in. You might find them at a reduced price over the pears we grow here, but I believe customers will usually take the Bartlett even at a little higher price, and I think the Bose is the next best for eating and keeping and selling. A great many will buy that for eating. I think you won't take any risk in growing more Bartletts than any others, especially if you can get in touch with the consumer instead of the commission man.

MR. STOCKWELL: Well, doesn't the speaker expect to get more than 12 or 15 years for the life of a pear tree?

MR. HITTINGER: Yes, you could get 100 years out of a pear tree if you got the right stock at the start, but with the trees you get to-day, I don't believe you can get twenty years.

QUESTION: How about dwarf stock?

MR. HITTINGER: The Duchess and the Louis Bon were pretty good pears years ago.

THE PRESIDENT: It doesn't seem to me that we need to be any more afraid of the California Bartletts than of the Northwestern apples. I don't see why we should be, because ours are going to be so much better.

MR. HITTINGER: Years ago the way we used to do was just before the time to pick them,—a couple of weeks,—we would pick off the largest Bartletts and ship them down into the Provinces, and get ten or twelve dollars a barrel, and that would give the others a chance to grow, and they used to do first rate. But those times have gone by.

MR. FROST: I would like to state to you the advice I

received from one of the biggest commission men in Boston for the fancy trade. He said he would pick out the Bartlett as the one to plant. The reason was that a few years ago they used to get any quantity of Bartletts from people with small yards and a few trees, getting anywhere from five to twenty-five bushels a year, and that for the last twenty years he hasn't got one from those sources. He also made the statement that the California Bartletts are not coming into Boston anywhere nearly as abundant as they were in the past and that there are not enough Bartletts being brought in to supply the demand.

MR. HITTINGER: Aren't they coming from Washington?

MR. FROST: A little more than they did.

MR. HITTINGER: I was out that way last summer, and they told me there were a lot coming in from that section. Years ago the Bartlett had the preference over any pear that was grown. It came in early and they put it away and could always sell it. But I was speaking of conditions in late years.

MR. MUNROE MORSE: Is there any good pear you can keep in the winter for home use?

MR. HITTINGER: The Winter Nellis used to be, and I think the Anjou is a good pear. You can keep it in cold storage or keep it in the cellar. Half of the fruit is spoiled before the weather becomes suitable to keep it. You can keep it in the cellar anywhere around here, but you must watch that cellar at night and let it cool off, and in the daytime shut it off from the outside heat.

MR. MORSE: But sometimes they won't cool off.

MR. HITTINGER: Anywhere from the first of September you can get cool enough nights to cool off a cellar.

QUESTION: What is the matter with the Lawrence?

MR. HITTINGER: A very nice pear.

QUESTION: I would like to ask, in regard to the pear psylla, if any one has been able to control it in growing seasons, if they haven't been treated in the dormant season.

THE PRESIDENT: Has anybody had any experience in controlling the pear psylla in the summer?

MR. CLARKE: As I said before, we haven't completely controlled it, but I do know a few parties around German-town, New York, who have done something with it. Mr. Morrell is probably one of the largest pear growers in the Hudson Valley, and he had the pear psylla after the blossoms had fallen, and he kept his sprayers working night and day with Black-leaf-40, and he has controlled it. He even went so far as to spray at the time of picking. That is an expensive proposition.

QUESTION: How do you mix your oil and water?

MR. HITTINGER: I have a barrel, and take about 20 gallons of the oil and then put in about 10 gallons of water and mix it all up in there. I use 10-gallon milk cans, put in so much stock solution and add water to complete the proportion. Generally mix it up in one place and put it in the can and cart that around to keep the sprayer going. It is an easy way to handle it. Generally we use a little warm water, so that it won't be too cold for the men when they are handling it. Cold water will do, but I think warm water works a little better.

MR. SMITH, of Wellesley: I want to tell you a pretty expensive experience I had last Friday. Usually we put in all the water and add the oil and stir it thoroughly and get a good emulsion. I always got a good mixture until last Friday, but then the oil all gathered on top, half an inch deep, and I couldn't mix it.

MR. HITTINGER: They claim that it is not fit to use then.

MR. SMITH: Well, that is my point. I poured it out. I had three men with a horse waiting for it, and the whole business was thrown away. This was the same oil we have been using six or seven years, mixing it in the same way.

THE PRESIDENT: The manufacturers would probably take it back if you had sent them a sample. Mr. Frost might

tell us something about it. Some of us here are reckless enough to use his oil.

MR. FROST: It may have been in the barrel. I don't care what brand of oil it is, sometimes it will change, and the manufacturers cannot prevent it. I think it is due to the barrel being improperly paraffined. Most of the barrels are paraffined on the inside, and if that paraffine is not pretty nearly perfect, the wood takes up certain ingredients in the oil and throws them out. That is one reason why manufacturers are, most of them very careful about advising you not to use it if you get free oil but return it. It is something that simply can't be prevented.

MR. SMITH: I intended to send it back, but before doing so I drew some more out of the barrel and commenced at the other end, put the oil in first and then added a very little water and a little more water, and kept stirring, and in that way I got what appeared to be a perfect emulsion. There wasn't a particle of oil on top; it looked like milk, and that is what I can't understand. I have kept it just as I did heretofore, in the barn cellar, until I had a chance to use it.

THE PRESIDENT: Apparently your explanation and Mr. Frost's wouldn't be the same, because when you treated it the second way you spoke of, it was all right.

MR. SMITH: Yes.

MR. FROST: Sometimes when a barrel has stood for a long while there will be a little sediment and unless that oil is thoroughly stirred in the barrel you might get some that wouldn't mix properly.

MR. SMITH: I looked out for that; it got stirred all right.

MR. FROST: I can't account for any reason why it should have brought about a perfect mixture with one part, and a poor mixture with the rest. That was never brought up to me before.

A MEMBER: I would like to ask Mr. Frost if the temperature has anything to do with it. I have three barrels that I have kept out in a cool place.

MR. FROST: Temperature shouldn't make a particle of difference; there is so small a percentage of water that it should stand any temperature indefinitely.

QUESTION: How about lime-sulfur?

MR. FROST: That should stand any temperature, but you might get a little more crystalization.

MR. SMITH: In keeping oil, isn't it necessary to have it air tight.

MR. FROST: Yes, it is better.

THE PRESIDENT: I just want to suggest to the audience that to-morrow morning is our spraying session, and we also have on the back of the program here, on the third page, a long list of questions suggested. I want to make the suggestion that we carry the spraying question over until to-morrow morning. If you want to bring up any of these questions on the program, we might do that now.

MR. F. A. SMITH: I want to ask Mr. Clarke how they control foliage diseases on currants.

MR. CLARKE: We have been using lime-sulfur, and also a home-made Bordeaux. I think the home-made Bordeaux is by far the best. It is the cheapest, and, as far as we know, the best.

THE PRESIDENT: Some one called for Question No. 9: "To what extent should we thin our apples?" Will any one volunteer, or shall I call on Mr. Fred Smith?

MR. F. A. SMITH: I am very sure you can't thin them enough to save the trees from breaking without propping, but I believe it is a mighty good thing to do, and you can't overdo it, especially on the young trees while they are getting into bearing. You ought to give a good deal of conscientious attention to thinning, and I believe it will pay very well indeed to do it. It is a profitable operation.

MR. MUNROE MORSE: I would like to ask if it costs any more the season through to thin the apples and then harvest the crop, or harvest them all together finally.

MR. SMITH: I think the results from proper thinning are so much better that it is a very profitable operation.

MR. FROST: I would like the President to answer that, too.

THE PRESIDENT: We have had some experience in thinning and I want to endorse most enthusiastically Mr. Smith's statement that it is something we ought to do more of. The rule we have always laid down is, in thinning apples, to take off all the apples from each cluster except a single apple. We find that is a rule that is a good deal easier for the men or boys who are doing the work, to keep in mind, much easier than telling them to thin to about eight inches apart, because then they spend a lot of time wondering whether it is $7\frac{1}{2}$ or 8 inches. But if they see one apple on a spur, it is an easy thing to follow that out on the others and keep it in mind, and you would be surprised, when you get through, to see how equally that is distributed over the trees. The great difficulty is to get enough off. You might think that a man who didn't have any interest in the orchard itself except working in it, would be perfectly willing to take off all you wanted him to by hand, but they won't take off enough in most instances, and when they get through with the thinning you are always sure that they will think, at first, that they have taken off too much. Even a man who has been through the mill looks at his trees and wonders if they aren't too thin, if they have not too few apples on the trees and too many on the ground. But I believe there is no operation connected with orcharding at the present time that we ought to push more than we do thinning, nothing that will help the orchard industry any more. I don't mean to say it is more important than spraying, but most of us are interested in spraying, and are doing it, but scarcely any one is thinning his fruit. On peaches our rule is that they should be thinned so that no two will touch. That is a simple rule and easily kept in mind, and yet when they get through they are pretty well thinned.

Now, as to the question that Mr. Morse asked, there isn't any question that it costs a little more to break that up into two operations, but we have kept very careful accounts on

some Baldwin trees that will run, in a good year anywhere from three to eight barrels and we started thinning the 10th of July, and went over the whole tree, taking off every apple except one in a cluster, and waited about a month and went over the trees again, and on the second time over you could usually detect the poor or defective apples, and pick out any clusters that had been overlooked the first time over. We have been using boys for that thinning, and paying them ten cents an hour, and we have had men at twelve cents added to that, and using labor of that kind it has cost us for the two thinnings on trees even bearing perhaps four barrels per tree, 40 cents a tree for the two thinnings, or ten cents a barrel. I haven't any figures available to show how much advantage we got from the thinning, but of course it was a good deal more than ten cents. The only real figures I have are shown by an incident about a neighbor of ours, also a commission man in Boston, who wanted to buy our crop, and he started in by saying he would give us two dollars, and I laughed at him, and I said, "If you want to offer us three dollars, we will talk to you." Well, he came up to \$2.25 and then \$2.50, and he said he was a fool for offering \$2.50, but it was the best crop he had seen and he wanted it, and I said that I was probably a fool for not taking it, but we wanted \$3, and he went away and he said if anybody offered more than that to let him know. He finally offered us what he said was one dollar a barrel more than was offered to any one else. Now, I think that the main difference between our apples and anybody else's was that they were thinned. There were other people who sprayed and took just as good care, only we had thinned and got rid of the poor ones, and we had nothing but good stuff left.

QUESTION: Do you always thin a crop so that you won't have to prop?

THE PRESIDENT: No, I don't believe you can do that; certainly not with a good many varieties.

A MEMBER: I have heard it stated both ways.

THE PRESIDENT: I have known Mr. Marshall to say

that he never would let a prop be under his trees. I am perfectly willing to admit off-hand that Mr. Marshall's opinion is better than mine, but he has special conditions, young trees, and Mackintosh apples that don't bear very heavily. I think if he had old Baldwin trees he might feel differently.

A MEMBER: I had a tree twelve years old that produced 21 barrels.

MR. PARSONS: On some parts of the trees I have nothing but good apples, and on some parts nothing but bad. Will it help the good apples to pick off all those poor apples?

THE PRESIDENT: I should suppose it would, without any question, because otherwise you strain all your trees to develop those poor apples.

QUESTION: If the trees were not bearing heavily, would you still apply that rule of leaving only one in a cluster? Would you sometimes leave two?

THE PRESIDENT: I don't think you would. I think it would be allowable then to leave a couple. In leaving two apples, you always run the risk of having the codling moth, but if you spray, spray thoroughly you probably will get around that difficulty, but in that case I wouldn't thin as severely on any one part of the tree if I only had a few apples in the tree.

MR. TUTTLE: Do you draw the line at any height on the tree to which you would advise thinning?

THE PRESIDENT: Well, I think if you need a 30-foot ladder to reach the lowest limbs, I wouldn't attempt to thin it. On some old-timers I don't blame any one for balking.

QUESTION: How do you get at these higher trees to thin, without injuring the trees or leaves?

THE PRESIDENT: The only way to do it is to take the lower limbs and thin them from a step-ladder, and use an orchard ladder for the higher limbs. I appreciate the fact that when you get these old, high trees, the cost of thinning may be more than the advantage of it is worth.

QUESTION: When you get too high you had better cut it out, I suppose you mean.

THE PRESIDENT: Or cut the top out. I am very much in favor of taking the old-timers and cutting the tops down to where you can get at them.

MR. FROST: I would like to state what I saw Mr. J. Norris Barnes of Connecticut do, and see if any one tried it here. He made two pickings, and he thought that was about as profitable as he had ever done. That might be called thinning in the fall.

THE PRESIDENT: About the ordinary time to harvest.

MR. FROST: They were Baldwins, and he showed me Baldwins that had been left there ten days earlier, that he said were little green Baldwins which had increased in size tremendously, and they were as nice color as I had ever seen. It gave me an idea, and I was wondering if any one had tried it.

MR. MUNSON: I can tell of a man who picked his Baldwins—they were grown in sod and they colored up very early—he picked the large and best-colored ones, and ten days later he came back and picked the rest off the ground. So if you are going to run chances against the weather, there is always that to figure on.

THE PRESIDENT: And you have that to figure on no matter when you pick them.

MR. MUNSON: Well, they will stick on a certain length of time anyway.

THE PRESIDENT: Still, it seems to me good orchard practice, on a good many varieties, to make at least two pickings. Mr. Frost's point is a good one. Mr. Munson's point is also good, and you have to choose between the two propositions.

MR. MUNSON: But in the ordinary Baldwin orchard I think you will have to agree with me, that we have got to leave them on fully as long as we can, to get good color.

THE PRESIDENT: But I think you will get a lot of color on them, on the better apples, long before you will on

the poorer, and you can afford to lose some poorer ones for the sake of getting the others bigger and better.

MR. MUNROE MORSE: Will thinning the apples make those that are left on there hang on better than if they were all left?

THE PRESIDENT: I don't know, I am sure, but I shouldn't suppose it would have any particular effect on that. The only point I can see is that where there are two apples hanging together they might break one another off more often than where one was taken off, but I don't believe it makes them stick any better.

QUESTION: What time do you thin?

The PRESIDENT: About the 10th of July and the 10th of August. Those are roughly the two dates.

QUESTION: Is there any practical way of thinning except by hand? I picked ten barrels, one barrel off the tree and eight or nine on the ground, but they weren't picked quite soon enough. Wouldn't it take quite a long time to thin a tree like that? Couldn't it be done by a small-tooth rake or something of that kind, for the first picking, and then do it more thoroughly?

THE PRESIDENT: I don't know. Apparently the audience don't think so, for many of them are laughing. I don't believe there is any satisfactory short-cut in the matter of thinning. I think you have got to have somebody with more or less brains to do the work.

Now, Question 17 is asked for: "What is a fair price for labor, per barrel, for picking apples on average sized trees with a medium crop?"

MR. MUNSON: If you can get a man to pick by the barrel and pick fast enough, it will pay pretty well, but as a rule by the day is the cheapest way. The going price in most sections for picking by the barrel is 20 cents, picking the trees as they run, large and small. A man can make a pretty good day's pay, and will pick more than ten barrels; and ten barrels on high trees is considered a pretty good day's picking.

THE PRESIDENT: How many barrels do you think a man ought to pick in such an orchard as you have?

MR. MUNSON: On my own anywhere from 15 to 20 barrels a day, but he could pick half from the ground or a step-ladder and we wouldn't use any ladders over 12 feet, I believe.

A MEMBER: My experience is that the ordinary man won't pick ten barrels from high trees. They are more apt to pick about six. You would have to pay him \$2 a day.

MR. MUNSON: On one I lease, the apples take a 20-foot ladder to pick, and a few take a 25-foot ladder, and two years ago the rain came while we were picking, and I put my men in and picked in the rain, which is not very good, but we had to do it. And if they didn't pick an average of ten barrels a day, it seemed that something was wrong, and I took opportunity to go and see what it was, and they averaged ten barrels a day.

THE PRESIDENT: Mr. Munson had charge of the work on our farm the first year we set it, and I think he can get more work out of a man than any other man I ever saw, and still keep on first-rate terms with his men.

MR. CLARKE: We pay wages by the day and not by the barrel, at the rate of \$1.60 a day, and it costs something like 26 or 27 cents a barrel to pick the 30-year old trees and over.

MR. JENKS: The same question came up for answer in Rochester last week. Many of the fruit-growers answered, 15 cents. Professor Hedrick said it was always 15 cents until this year, when because of the big crops and labor being plentiful, it was 12½ cents on the average for Western New York conditions.

THE PRESIDENT: In our neighborhood in Franklin County, in Buckland, they have a man who picked 100 barrels in a day. That is a sworn statement. It makes a difference how you pick. I was told he went over the same trees shortly afterwards, and got forty barrels more. I imagine it depends upon whether you are picking without

any bruising, or whether you get most of the apples and some of the twigs.

Now, Question 14 is asked for: "What is the best practical grader for the small grower?"

(No response).

THE PRESIDENT: Apparently we don't grade with the grader around here?

MR. FROST: A new one came out at Rochester, New York, that was selling for \$60, and I understand it is going to be just about what the small grower wants. There is a bare possibility of its being at Hartford at the next convention down there. I have been watching the graders every year for a long while, and I have always felt they were all too expensive, and this one came the nearest to a reasonable price that I have heard of.

THE PRESIDENT: No. 19 has been asked for: "Who has had experience with a small cold storage plant, of from 1000 to 5000 barrel capacity? Give experience and results."

MR. HITTER: Years ago I had an ice plant which we put in for our pears, somewhere about three or four thousand bushels, and I put in my Bartletts, and when they came out I would have the Bose and the Anjous. That was an ice cooler and worked fairly well. But of course late in the season the ice would melt down and I wouldn't get the results I ought to; but if a person had a good cellar, he could work the cellar in good shape if he would watch it, and when he got a good, cool night, open it up. You must have it so you can open it up. The trouble is that some of these places have only a little window, and it takes all night to get any air in there. I use that cellar now, but I open it up thoroughly, and you would be surprised to see how quickly you can cool it right down. For the last few years I have sold our pears just as they were picked, so I haven't had so much use for it.

QUESTION: I would like to ask what is the best way when you are picking your apples, whether to put them directly into the cellar, or in a shed or barn and keep them

until you find it is cold, and then put them in the cellar?

THE PRESIDENT: I think it is very desirable to get them in just as quick as possible. I know Mr. Windsor makes a practice of picking one afternoon, and the apples that are picked that afternoon go into cold storage the next day. On the other hand, I have been told that a neighbor of his, gets them into actual cold storage anywhere within a week or ten days, and Mr. Windsor is very much more successful than the other man. I remember also an investigation that the United States Department undertook, which shows very definitely that apples held in an open shed, subject to ordinary temperature for a couple of weeks before being put into storage, as against the same apples put directly in, the latter show very much better keeping qualities.

A MEMBER: I was referring to one that had no cold storage, but simply a cellar.

THE PRESIDENT: I should say that cellar storage should be better than outside, especially if handled as Mr. Hittinger suggests.

A MEMBER: In regard to Mr. Windsor, I believe he sent his apples into cold storage every day.

THE PRESIDENT: Yes, that is his practice. The apples were never off the trees more than a day before they were put in storage.

(Adjourned to 7.30 p. m.)

EVENING SESSION

7.30 p. m., Wednesday

(Meeting called to order at 7.30 by the President).

THE PRESIDENT: I suppose nearly every one realizes that we do not eat half enough apples, and one thing we have to do to-night is to discuss the subject of the different ways in which we can get more people to eat apples. From my own experience I feel that if any one could have a good supply of first-class apples and get started eating them regularly, we could increase the consumption of apples four million per cent. I have been eating the Grimes Golden, and I am going to advise all of you to start in and keep going until you eat anywhere from two to half a dozen every night. Of course, I happen to have a source of supply which is fairly reasonable, or with my meagre salary I couldn't afford to do that, but I do think every one should eat more apples. A good many things come in to influence consumption. The question of quality seems to me all-important; the question of knowing about varieties and getting started on the right ones is important; and from the standpoint of the grower, the question of getting other people interested, the matter of advertising, for instance, as to the ways of eating them, and various other elements is very important! This evening our session starts with a discussion of the matter of advertising. Mr. Sevey, of the New England Homestead is going to speak to you on that, and that will be followed by a discussion of other ways of increasing the consumption of apples, and in order to give us a notion of what a real good apple is like, the Vice-Presidents of the Association are going to come around and distribute apples among the audience, and we hope by the time the meeting is ended everybody will be an enthusiastic believer in the apple for

consumption. You know that little verse about the apple:

“Apple, apple, call for apple, everywhere you go;
 Scrutinize the bill-of-fare,
 And if the apple is not there,
 Call the landlord down with care.
 He will come with smirking manner
 With some over-ripe banana
 Or a grape fruit sour as gall
 Tough and hard as a base ball.
 Take no substitute, but grapple
 With the problem: call for apple.”

And that is what we want all you people to do. At my table tonight we all ate baked apple, and that is what we ought to do. If you don't believe in that side of the question, here is something that may suit you better. It was a little sentiment I saw in a paper recently and ran this way: “After all, why should the apple receive so much honor? Has it not been the fruit of discord ever since the world began? Down with the apple—especially if it is a big and juicy one.” (Laughter and applause).

We are asking our speakers to-night to give short and snappy papers as the subjects are to be treated from a popular standpoint rather than technical. We are going to give them each half an hour, and if either one goes over that I am going to turn the four vice-presidents of the Association loose on him. Our first speaker is Mr. Sevey, Editor of the New England Homestead, who is going to talk on “Horticultural Advertising.” I asked a neighbor of mine once, when our farm had something we wanted to sell, where he thought we had better advertise, and he said there was only one place to advertise here in New England, and that was in the New England Homestead. I take great pleasure in introducing Mr. Sevey, who runs that institution. (Applause).

HORTICULTURAL ADVERTISING

Address by G. C. Sevey of Springfield
Before Massachusetts Fruit Growers' Association
January 13, 1915.

To an audience of this character, there is no need of pointing out the value of advertising. The advantages are taken for granted, as much as the expectation that the sun will rise before breakfast tomorrow morning. We have witnessed so many enterprises, big and little, prove profitable through publicity that advertising is accepted as a factor second only to production. In the early days only such foresighted men as P. T. Barnum grasped its importance. But the rank and file of business men in various walks of life soon caught on and now business would stagnate within a week without some sort of advertising.

The presenting of the facts about a product in the most convincing and psychological manner to the consumer has become an art—a real business which pays high salaries that put to blush those of many of the old professions. Through the entire field of business, advertising pays and pays big when properly done. The methods vary as the colors of the rainbow, but in some way it must enter a successful business. The product itself may be the advertising medium, giving so good satisfaction that more orders follow. Hence, even if a manufacturer never appropriated a single dollar for advertising purposes, he is still in the advertising game since his product is of such character that people come for more.

Now I see no fundamental reason why advertising will not pay in horticultural lines as well, or better than in commercial be it incubators, cream separators, 57 kinds of pickles or baby carriages. Yet, as in other things, farmers as a

class are the slowest to reap the benefits. Our fruit growers are advertising whether they know it or not. In far too many instances they do not, else there would not be so much poor stuff found in the market. The product produced is ever the most convincing argument of all. Its manner of grading, packing and the like, impress favorably or unfavorably. You cannot escape it. Most of us have listened many times to the advice about clean packages, honest pack, and the like, but have we considered it from the viewpoint of advertising value? If similar convincing arguments as to value of our product had to be bought over the counter, the largeness of the figure would amaze you. Too long have farmers delayed looking into this advertising magic, which has made millionaires out of very ordinary people indeed. I imply no millionaire fruit growers, but mean that in a systematic way we should utilize this business factor of so great importance.

What are the fundamentals to be counted for permanent success? Advertising will sell three cents' worth of drugs for \$1 a box—once. But fruit growers are interested only in legitimate business—a business that as it grows will be a credit and an honor to ourselves and to posterity and will withstand the closest scrutiny of interstate commerce and nosey investigating committees. With this idea of permanent accumulative value, let me say that give a good advertising man three things and he will build an immense business. They are first, a product in general use; second, a product as good or better than can be obtained elsewhere and third, a reasonable price. All this assumes that there has been an appropriation for advertising purposes.

These are assets around which advertising has built many fortunes. A second thought will show that fruit growers have all three factors right under their thumbs. There are hundreds of people who use fruit to one who wants a baby carriage or a cream separator. Yet, baby carriages and cream separators are advertised profitably to the tune of thousands of dollars annually.

As to the second factor, may not the farmer produce a high grade product? Who or what will dispute his right except the limitations he himself imposes? Naught but his own ambition, judgment and enterprise determine the product. Even frost and drouth are amenable to his foresight and tenacity. No manufacturer ever had more complete control of his product. Yet the fact is that the manufacturer standardizes and inspects his product, rejecting the inferior; while the farmer bunches the lot or slips in an occasional specimen below par, believing he can get by, reaping first prices for second grade quality. Such have not yet grasped the subtle influence of advertising. Just such things as finding a few small apples in the middle of the barrel advertise the grower unfavorably and decide the buyer to purchase elsewhere next time. Any reputable manufacturing concern never thinks of sending out a product below the standard sold. It would not dare to and in the aggregate, millions of dollars are spent by them standing back of their goods and guaranteeing to be as recommended. The fruit grower has the same possibilities in manufacture and grading completely under his control, just as much so as a manufacturer who makes cream separators. It would seem that it is only ordinary horse sense which tells us that if other business enterprises cannot succeed by selling products below standard, the fruit grower should not try it. Experience is a good but expensive school. Manufacturers learn their lessons quickly, but judging from the fruit often found on the markets bearing No. 1 brand, it appears some fruit growers will never learn their lesson. These are familiar facts to all, but if you please, we are looking at them from a new angle—that of advertising.

Regarding the third factor of reasonable price, I believe the farmer is at no disadvantage when compared with the ordinary manufacturer who advertises so liberally. As a matter of fact, I think the average farmer sells his product at a lower or more reasonable price than the manufacturer does his. This for various reasons. One is that the manu-

facturer knows exactly what his product is costing him to produce. This, plus his profit, is the selling cost. On the other hand, the fruit grower, as a rule, does not know the cost of production, and not infrequently sells at a price actually below cost of production. Moreover, farmers as a class seem willing to work for less profit than other manufacturers. Therefore, we find that in all three factors in successful advertising—those of having something in general use, something of high quality and to sell at a reasonable price, the fruit grower has as clear, or clearer, field than the manufacturer of the thousand and other commodities so liberally advertised and sold at a profit.

Thus, clinching the possibilities of horticultural advertising, the next question is how it will be done. There are numerous old ways which have proved successful in other lines of business that can be readily adapted to horticulture. New methods, too, will suggest themselves from time to time. My belief is that the easiest thing in the world to advertise favorably is a product of the soil, particularly a fruit product. There are so many people who wish to buy that an advertising campaign will strike lives wires and “prospects” in almost whatever direction it starts.

I have already mentioned the advertising promoted by the product itself. This is the great big factor in horticultural advertising. All sorts of schemes and much money can be appropriated in the line of horticultural advertising, but if this one factor is ignored, ultimate failure is certain. The first question the fruit grower may well ask himself is, have I anything worth advertising? If only one point is remembered in this discussion, I hope it will be that of emphasizing the tremendous importance of the product itself. Money and effort spent in advertising an inferior product as first quality are not only useless but detrimental. Yet, the fact remains that hundreds of farmers are doing just that today. It may not be deliberate, but the buyer has no appreciation of that fact, for he was brought up with the understanding that ignorance of the law excuses no one.

The matter of grading, uniformity, neatness of package, etc. are really a part of the factor already mentioned, of having a high grade product to place in the market. It is not necessary to review the familiar arguments of why these things are important and really necessary. My only suggestion is that these time-worn factors be viewed from this standpoint of advertising value. Off hand, I venture that the convincing argument in the high grade product I have indicated, is equal to a full page advertisement in a reputable journal, which, we will say, would cost \$400 per issue. Now just imagine you are paying that price when you determine what your product is to be and how it will reach the market and how its appearance and quality will strike the consumer.

The more I look about and the better acquainted I become with the average way of doing things on the New England farm, the more fully am I convinced that one of the greatest failings of the fruit grower, and the farmer, is that he does not consider the fellow on the other end. I know it is the popular thing when addressing farm meetings to point out the wickedness of the middleman and the foolishness of the consumer. Without entering this big problem of an unreasonable and parasitic system of distribution, I will readily agree that there are dozens of things for which the farmer should not be held responsible, and which work to his disadvantage as well as that of the ultimate consumer. That is another problem as great, if not greater, than I know of in America today. Tariff and finance are not "in it" when compared with this monster we have allowed to develop in the form of an uneconomic system of distribution.

But this question is not to enter the present discussion. The point is that the fruit grower will, if he is wise, consider the desires of consumers. Fortunately, we find the latter in a receptive state of mind as to reliable products they get from the farm. They are not only willing, but positively anxious to listen to any arguments fruit growers can present as to the value of their product. Thus you see

the subtle and the strategic position horticulturists occupy who wish to advertise. Also, you see why I bear down so hard on a reliable product. This confidence once established between producer and the consumer must not be broken. This means that we should continually watch the product, since an unreliable one is the most vulnerable point for the enemy to enter.

I see no reason why the press will not do as much for horticultural advertisers as for men in other lines of business. As a matter of fact, occasional farmers have tried this with excellent results. It may be done by individuals or in a co-operative way. The orange growers of California, who have a strong central association, tried an experiment in four states in the central Mississippi valley last year. They put small attractive ads in the leading local papers in the territory and increased the consumption of oranges in those states more than 200% in one season. Isn't that worth while? Can you see any reason why similar publicity would not increase the demand for apples, strawberries or peaches? In view of the increased setting of orchards and the enterprise of natural fruit competitors, such as orange growers New England horticulturists may be eventually driven to this avenue of advertising to create sufficient demand for their products. However, it is better business to anticipate that event by suitable publicity and the establishment of confidence for a certain brand of fruits and vegetables. It is openly stated by those who ought to know, that the average newspaper reader today glances over the ads as much as through the news columns. At any rate, all will agree that the press offers one excellent avenue to reach the consuming public. That this is true is indicated by the increasing number of horticulturists who are patronizing it and doing so at a profit. For instance, the Packer recently carried a large half page display, illustrated, pointing out why consumers should call for a certain brand of cucumbers grown in Aurora, Illinois. It must have paid or the campaign would not have continued. It should be as easy to

sell apples, peaches and small fruits as it is green cucumbers.

Then, of course, much publicity can be secured through distribution of circulars in various ways. They may be mailed prospective customers, distributed from house to house, or given customers by retail distributors. Suppose a fruit grower has a good reliable grade of strawberry. He could have some attractive circulars prepared and give them to several retail concerns in his city market that handle his berries. They, in turn, would distribute along with other orders, pointing out that this particular brand of strawberries is the one to buy and where it can be obtained. If the strawberries are all right to start with, this could have but one outcome and that is a rapid increase in consumption of this particular brand. The same thing applies to all other fruits. Opportunity is given the enterprising grower to thus increase the demand for his product, which in turn, will eventually mean a better price. Many growers are doing just this already, as well as other things besides.

Another means of advertising is to display fruits and vegetables at various shows and fairs. Very few farmers appreciate the value of free advertising that can be thus secured. Of course it goes back to the original starting point that the product must be as good or better than others shown. There will not be many sales following a display of inferior apples at a fruit show. The old saying is, there is plenty of room at the top. While this refers to individuals and their work, it has a horticultural application in the strong demand that is never satisfied for fruits which are of high quality. The conclusion is that if you have a poor product, it is a waste of time and energy from the advertising standpoint to display it at shows and fairs. However, it may be worth the required effort if it will only wake one up to a realization of how poor the product really is, when measured by the product of competitors.

Then, of course, there is the possibility of advertising through store windows. City merchants are only too glad to display fine specimens of fruit. Until a year ago, it was

not an uncommon thing to see western apple displays in the front windows of railroad offices in Boston. Now, thank goodness, they realize that there is something nearer home worth putting in the windows.

Still another avenue of publicity is to distribute free samples in various ways, accompanied by information concerning its production and how a desirable quantity can be secured. Parcel post has opened up a fine field of distribution in small packages. Probably all read the article in a prominent magazine a few months ago, where a man built up a handsome business in the apple trade by first sending an apple to each prominent business man in a city. Each apple was accompanied by suitable description brought out in a catchy way. It created a desire on the part of the business man to have more apples like this. A surprisingly large number took the chance and enclosed a check. Within a few days the apples were delivered at the desk just like the sample. You will note the fine thing about all this horticultural advertising is that its effects are cumulative. That is, these business men not only bought once but came back for more. Still further, they told their friends about it, which resulted in new orders. These satisfied customers are always bringing in new ones and the new ones, still others, and so on, just as a huge snow ball is rolled up in damp weather.

Then again, hundreds of fruit growers are located on main highways where lots of traffic is passing to and fro. A bulletin board in front of the house or a display of the produce for sale would dispose of large quantities. This means a small cash outlay and to one possessing any imagination, it is not difficult to see the possible sales to automobile parties which are now so numerous. I understand that two well-known college professors, who are learning to do by doing, are setting a fine example in this line. The Bay Road fruit farm, of which our honored president of this society is a co-owner, enjoys the distinction of having a trolley line pass through it. One of these enterprising professors, it may have been Professor Sears, conceived the idea of a fruit

stand at a strategic point to catch this trade. The sales, I understand approximated \$1,000 for the season. Wasn't that worth while?

The west is just nicely entering upon this line of advertising. Indications are that history is to repeat itself. For a decade fruit growers on the Pacific slope have been walking into eastern markets, taking the cream of trade right out from under the nose of local growers. This was largely through a superior product as regards standardization and external appearance. Within the past two years our eastern growers have been rapidly awakening to the fact that two can play at that game. This accounts for our rapidly improved methods of cultivation, grading and packing. We have not only the ability to standardize and produce fruit of fine external appearance, but fortunately can produce the goods whose beauty is more than skin deep. These conditions, when put into effect, simply mean that the eastern fruit grower will never again fear western shippers as regards looks. We have all the west can produce and quality in addition. For good measure, we are a few extra thousand miles nearer the market. It is essential, however, to note that the knowledge of these facts by fruit growers alone is not sufficient. Consumers must be told and convinced. That is where enters horticultural advertising.

As I see it, history is to repeat itself in this same consideration of advertising. Those western brethren are now walking into our markets by dint of clever publicity and it is up to eastern growers to wake up and play at the same game. I see no good reason why our growers must forever be those of the west. Surely, we have some enterprise and ability and can raise the money and energy to develop publicity campaigns. I have seen in the markets a certain brand of goods, such as the high quality and consumers prize it, sold with the same care and fancy silverware by sending the manufacturer each specimen. This is simply a further advertising method to horticulture, that have already proved a success in other lines. There is no doubt

about how this has increased the consumption on that particular brand of orange. When figured out in dollars and cents, advertising cost is small as compared with what the loss would be, following a big crop with only ordinary demand.

There are dozens of ways to go at this advertising game. New ones will suggest themselves from time to time. However, there is one other point I wish to emphasize especially and that is the immense possibilities that might follow associated effort to finance an advertising project. For instance, apple growers in the apple valley across the Connecticut river, in this state, formed an association last season. Suppose these men co-operatively undertook an advertising campaign with a particular brand of apples upon which they are to specialize. Within two or three years the demand for their goods would be so keen that prices would be appreciably above normal. That this is not visionary is proved by the tangible results secured by the Oxford County Bears fruit growers' association in Maine. Their associated effort in creating a strong demand for goods has met with remarkable success. A co-operative financing of such a project can be approached in various ways, but the important thing is to do it. This, of course, being with the proviso that the product is high grade to begin with and will be so maintained. You see I continually come back to that same point of quality and reliability. It is our present weakness and it is a wise man who knows and recognizes his weaknesses. Our slogan is to have produce worth advertising; otherwise, why bother? The very first lesson of horticultural advertising is standardization, uniformity and quality.

To epitomize the essentials that I have tried to call to your attention, let me summarize, to wit:

1. It is not sufficient to talk long and loud about better fruit of uniform and desirable quality. We must produce it. Otherwise we fail in the alpha and omega of horticultural advertising.
2. Given a product, let us standardize it, correctly

pack it in desirable containers, honestly label it, put on a distinguishing brand, and send it forth with the conviction that a satisfied customer is the best known advertising medium.

3. Finally, utilize individually and collectively old and new methods of worth to set forth the reasons why consumers should use more New England fruit.

There are two recommendations bearing on my subject that I wish to submit to our association, which I feel might help materially. One relates to brands, farm names or trademarks. At present there is no system, much confusion, some duplication and occasional injustice in this matter. There are farms in the same county with the same or similar name. There being no system, it is everyone for himself and the devil take the hindmost. This problem might be approached through registered trademark but the inconvenience, expense and red tape are in question. The society might provide a means of registering and assigning names. However, this would be haphazard since not all farmers, and not even all fruit growers, in the state are members and what is more important still, there is no legal authority back of it. I am inclined to think the better way is to enact a state law providing for the naming of farms or establishment of trademarks for agricultural products. Rhode Island now has a bill in its legislature, backed by the board of agriculture, to that effect. Hence, I recommend that a committee of three be appointed by the president to review the facts, draft a suitable bill, cause it to be introduced in the legislature and appear in its behalf at committee hearings.

The second action I would like to see relates to standardizing fruit of uniform quality. I have no quarrel with the movement on foot by the Boston chamber of commerce and New England horticultural organizations to secure a uniform grading and packing law. Still, I do not feel that such a law will fully solve the problem. Quite outside of the possible injustice that might fall upon a few, I never took much stock in trying to educate and make people honest

through legislation. I think it should be supplemented with practical demonstration of why it is dollars in their pockets to standardize and suitably pack fruit.

To this end I would like to see more associated effort of fruit growers. Since there are almost as many minds as to what a No. 1 apple is as there are fruit growers, it is essential to have a standard and men to grade accordingly, who are not the growers of the fruit. Where grading and packing have been done by those other than the growers, it has paid handsomely. Witness its work in Maine, in Nova Scotia and in the west. While it may not be practical for average individual growers, it is for a group of them, even if they number no more than ten or a dozen. I am confident that Massachusetts would have more co-operative fruit efforts today if farmers knew how to get started. In my editorial work I receive many requests each season from farmers saying they wish to get started in associated effort, but how will they do it, where can they get information and do I know of any association to whom they can write? I have been able to give some assistance and our county farm leagues will help further. Still, we should go further and have a definite review of the subject.

I recommend that a standing committee of three be appointed at the same time as our other committee, whose duty it will be to gather information about co-operative undertakings of fruit growers, be it growing, grading, packing, marketing or utilization of wastes; this committee to have said information suitably tabulated for such use and such distribution as the association may deem advisable.

I am fully aware that this offering of resolutions is the form of a Greek chorus. But seriously, I never read much before in my life. I had the same feeling when our New England fruit growers' association met to discuss the same thing some while ago. I wish to wish the consideration finally for a united course of action. Let us go on the principle of talking less and doing more. Neither one false move to eventually lead to the right action than to forever breed indecision.

There is nothing so dead as the demoralizing spirit of skepticism and inertia. My remarks may have brought you new thoughts and again they may have. At any rate, you have borne patiently with me, for which I am duly thankful.

THE PRESIDENT: This gentlemen has five minutes in which to answer questions. I hope you won't let him waste any of his time. Or we should be glad to have anyone who has had experience offer any discussion.

QUEST·ON: In utilizing the parcel post for delivery, is there some arrangement in vogue for the collection of money for the article sent. Suppose I ship a crate of apples by parcel post to somebody, how will he pay for them? Must I trust him until he gets ready to pay?

MR. SEVEY: Up to date it is up to the grower, and I think it must ever be so at the start. In other words you will note I referred in my paper to this man who sent a single apple to several prominent business men. Now, he simply inclosed information giving a description of what it was, how it was produced and something just to whet their appetite for a whole big package of them, and then he says, "Now, just send me a check and you will get so many apples delivered right at your desk." They sent the check before he sent the fruit. To answer the question specifically, it is up to each individual shipper, to make arrangement for collection. I certainly wouldn't want to ship a lot of goods to an irresponsible party. It is simply a matter you must solve for yourself.

A MEMBER: It seems to me the only way it could be solved would be something like the express companies do, collect when delivered, but that isn't possible with the parcel post.

MR. SEVEY: No, I wouldn't say so at this stage. It may be later on, but I can't see that that needs to frighten us, for it is not a very heavy task to go ahead and make arrangements with the people who wish to have this fruit, to have them pay for it.

MR. ARTHUR: I believe there is an arrangement in connection with the parcel post by which you ship the package and it is paid for at the point of destination.

MR. PRATT: That is in vogue, and the fee is the same as with the post office money order.

MR. SEVEY: That is good.

THE PRESIDENT: Now, Dr. Twitchell is here, and he says he has had some personal experience in this advertising business, and we will be glad to give him a few minutes.

DR. G. M. TWITCHELL: In answer to the question raised by the gentleman on the other side of the hall, I will say that during the past year I have shipped a great many baskets of apples. I used the 8-pound grape basket, because I had them, and I repeated that until my stock was exhausted. The parties were notified in advance of the amount, and the check was sent, and I sent the order as called for, adding postage so as to give me a good price. I think the best way is to let the money be sent. Now, a little bit of experience concerning what Mr. Sevey set before us so clearly to-night. I am spending eight months of the year on one of our farms down in Maine on a little piece of land in the midst of a section where they produce about 50,000 barrels of apples in a good, normal year. I found some of my neighbors were shipping to the commission houses and getting 60 and 70 and 80 cents per barrel for choise Gravensteins. I found apples of that same brand, and no better, being retailed in Boston for 60 cents per peck, and I took it up with one of our newspaper correspondent of one of the Boston dailies, and wrote something to him, and it was made over and sent to the Sunday paper for the Sunday story, with his name. Monday morning I received some letters; Tuesday morning I had between 20 and 30, and so they came in. They called for apples, and came straight from the consumers. My feeling for years has been that we could do quite a business if we could get directly to the consumers, and I have felt that the consumers wanted to get directly to the producers, but perhaps did not know just how to reach them. Well, the

result was that I sold all the apples that I raised except a few that I foolishly put into foreign shipments and a number of barrels for my friends, but I turned over to others calls for over 1500 barrels as the result of my name appearing in that Sunday letter in the Boston Globe. That is Horticultural advertising. It seems to me that you gentlemen want to do that if you have a good thing, and then you can sell direct. It is limited only by the men themselves. Another little instance. With quite a crop of plums to dispose of last year and with the market flooded, I left a tree which was nearest the street, as long as possible, and that tree brought me a good many customers; automobile parties going through would see those plums on the tree, and stop, and I sold enough to pay for that advertising, even if I lost a few plums on that tree. So in many ways it is possible to advertise our apples.

Mr. Sevey has spoken about the Oxford Bears. I intended to speak of that to-morrow, but I may say just a word now. It was organized in 1910 with nine members of a family, or neighbors, living upon one of the hills of Oxford County. The association itself was organized in 1912. So good is the quality of the fruit that they sell to the European market direct, and the stuff is being sold before the arrival of the fruit and without being inspected. The agent of the Association, who packs all the fruit, told me the other day that he had packed over 1200 barrels. I had the misfortune to have a few barrels on the *Arabie* which returned me 85 cents, and I know they were well sorted, but at that I was better off than some of my neighbors. For the Association the No. 1 Baldwins netted around \$1.69, and the No. 2's netted \$1.12, and since then they have ranged from \$2.35 to \$3.50 net, showing that the uniform pack which Mr. Sevey emphasized, and the advertising—because every barrel sent out by the Oxford Bears carries its own illustrated label on the head, does give value in the market, and when the fact is established that the package is uniform throughout, then the market is certain. (Applause.)

THE PRESIDENT: Our secretary has something I think is very interesting.

SECRETARY BROWN: (Illustrating on a corrugated paper box containing 100 apples). This is one of the boxes referred to by Editor Sevey and came from Virginia to Mr. Atherton of Broekton. As you notice, it has corrugated separators, and each apple is in its own compartment, with the layer board between. This package came from Virginia by express and was received with every apple in perfect condition. Some apples from several of our best growers were also shipped to Broekton in the standard apple or so-called western box and the express companies carried them in the usual way, piling them on the bulge so when they arrived there the apples were flattened on two sides. So it is not only a case of educating the public to eat apples but educating the express companies to handle the packages properly. We simply must have a package that the express company can't smash up, and apparently this is one that answers. The New England Fruit Show has offered prizes for the most attractive and practicable packages, with this idea in mind. The Boston bushel box has been used with corrugated liners and layer boards, but even then it is awkward in shape and the express companies like to give them a sling and dump them on one corner, and such apples as the McIntosh will be bruised, so that it seems to me that if we are going after a special market with an absolute guarantee of delivering fancy apples in first-class condition, a package of this sort will do. Mr. Atherton was very much pleased with the way the apples arrived. Of course the flavor is not up to our New England apples as we will discover when we sample this lower layer which even now show no bruises.

QUESTION: Tell us the expense of a package like that.

SECRETARY BROWN: Probably about twenty cents. There are some labels on here, and the grower got out quite a lot of expensive circulars with lithographing, and on one corner (indicating) is this label, "Do not open until Christ-

mas", this being a special Christmas box. The price was \$5.00, delivered, and there were 100 apples, 40 each of two kinds and 20 of another, and the carton cost 75 cents to get up here from Virginia, so that he got \$4.00 for the 100 apples as I don't think the package cost over 25 cents, with the labels. Four cents apiece for these apples aside from the overhead charges of the special advertising is certainly a mighty good price for this year.

MR. W. D. ROSS: I am very glad the Secretary brought out the fact that that package came by express. One of the good things the paper box has done is to bring down the express rates, and my experience has been that you can send a great many packages by express and parcel post, but the express is better than the parcel post. In the first place, the express companies get the goods and give a receipt, guaranteeing to deliver them in good condition. They will send the money back to you if you want it, on collection. In the parcel post a great many losses occur, there is no question about that, because there is so much business that has to be done in a haphazard way. Outside of small packages and for nearby places, the parcel post is not at all satisfactory, not so much so as express. At the usual express rates, we use the express companies, wherever we can. They are much safer and better in every way and the rates are less when you go beyond the second or third zone, and you get a guarantee.

THE PRESIDENT: You must remember that Uncle Sam hasn't had as much experience as the express companies. I think we have taken all the time we ought to for this end of the matter. I am very glad to introduce next Dr. F. F. Whittier, of Boston, who is to talk to us on "Increasing the Consumption of Apples. (Applause).

INCREASING THE CONSUMPTION OF APPLES.

Dr. F. F. Whittier, Boston

Mr. Chairman, Fellow Members, Ladies and Gentlemen: When requested to speak at this time on the topic assigned me I was asked for something "snappy" a difficult undertaking with so juicy a fruit as the apple.

We will treat the subject briefly in order that there may be more time for discussion.

Let us consider: educating the consumer, standardizing the pack, regulating the price, dealing as direct as possible with the consumer and establishing central distributing plants owned and controlled by producers collectively.

Increasing the consumption and therefore the sale of apples like that of most any other product, necessitates the education and cooperation of the consumer. It should be as much within the province of the Apple Grower to plan and execute an efficient and unique system of advertising as it is for the manufacturer of a soap to convince the public that "it floats" or the manufacturer of a Cereal Coffee to convince the user that "there is a reason." Publicity need not always be obtained by the paid ad., the reading notice or the well planned article.

Apples should be a staple food in every household as their uses are much more varied than any other fruit. They make an excellent substitute for higher priced foods and may be made a factor in reducing the cost of living. They are wholesome and easily digested, whether eaten raw cooked, evaporated, dried, preserved or canned.

The apple in the diet has not received the attention it deserves, although from remote antiquity since Eve offered it to Adam as a delicacy it has been recognized for its health-restoring and curative properties. A writer in the Bible exclaims, "Comfort me with apples for I am sick of love." The importance of the apple in the diet as an ideal fruit should

be embodied in cook books for use in cooking schools and the home. For arthritic and gouty subjects it works wonders, especially certain varieties, by eliminating uric acid from the system. New cider produces beneficial results on the liver preventing self poisoning with all its far reaching results. "An apple a day keeps the Doctor away" is no myth.

Ways should be devised for placing in every home apple recipe books containing not only well proven methods of preparing the apple for domestic use but also new combinations which could readily be obtained by offering prizes through Fruit Growers' Associations or Apple Cooking clubs. They should also describe the peculiar characteristics and relative values of the different varieties of apples, the season of the year when each variety is in best condition for use, how to care for them and any other information that would be conducive to a more extended use of the fruit. A book of this kind should be placed in every barrel of apples sold, with the producer's and packer's name. Other ways could be easily devised by the individual or collective initiative of producers.

There are more important factors with some, however, than recipe books as evidenced by a letter received last fall while an organization with which I am connected was endeavoring to distribute Apple literature in connection with the State Board of Agriculture and Chamber of Commerce when some 5,000 books were called for. The following shows what some consumers most desire.

"Gentlemen: In this morning's Herald I see an article relative to the consumption of apples and a cook-book with many recipes for their use. I would like to relieve my mind of a few words on the apple question and perhaps you are as easy victims as any.

Within fifteen miles of here farmers are giving apples to anyone who will take them from the trees and carry them away. If we were recently arrived immigrants, probably my husband would take a sack out to the region, and when filled, lug it home on his back; perhaps I might go with him

and drag another. Circumstances seem to prevent this method of procedure.

If we were at the other extreme, I might send the chauffeur and tell him to bring home a couple of barrels in the car: again circumstances torbid. If I want apples I can go to my marketman and pay from sixty to seventy-five cents a pec.: for them.

I wish that the gentlemen who are trying to boom apples would try to grasp the fact that what New England housewives need are not recipes for cooking apples—we were born and brought up on apples—what we need are the apples to cook.”

It is also within the province of the producers collectively to establish grades for their products. The determination caused by necessity on the part of the consumer to come more directly in touch with the producer for the benefit of both should be an added incentive for the progressive producer to place his products on the market in such a way as to meet the demand of the consumer: This is done in some cases by the individual producer to the satisfaction of both, but to do the big thing it should be done collectively by the producers.

So much has been said in the past on the subject of packing and grading that interest has been aroused and action has been taken by organizations interested, so that it is hoped some legislation will soon be enacted whereby this desire will become a reality. I quote from the last number of Current Affairs the official organ of the Boston Chamber of Commerce.

“A law for the uniform grading of apples in New England has been formulated by the Chamber’s special committee on apple laws. It fixes a standard system of grading the fruit and provides effective measures for the enforcement of the act. Its enactment by the Six States would place the apple industry on a uniform and business-like basis throughout New England and, in the opinion of its proponents, would vastly benefit the industry as a whole.”

“The proposed law has its origin in a request made to the Chamber last fall by a conference of New England apple men then meeting in Boston. This conference pointed out the need of uniform regulations for grading apples in New England, and asked the Chamber, as a disinterested body, to make an inquiry into this situation and draw up corrective legislation. The Chamber appointed its committee early in December, naming the following gentlemen: Charles S. Smith of Boston, Chairman; A. K. Gardner, State Horticulturist of Maine; Stancliffe Hale, of Glastonbury, Conn., Wilfrid Wheeler, Secretary of the Massachusetts State Board of Agriculture; Edgar W. J. Hearty and Alfred W. Otis, of Boston; Professor Thomas N. Carver of Harvard University. Since its organization the committee has held four meetings, has made a careful analysis of the apple-grading laws of Maine and New York, and the so-called Sulzer bill (the United States law); and the law which it has formulated and is now ready to report represents the good features of these laws adapted to the practical needs of the industry in New England.”

“The object of the proposed legislation is obvious. If there are established fixed standards for New England apples, fixed standards of packing as well as grading the fruit, the markets will classify the product accordingly. Reputation will be gained. Buyers will have confidence in New England apples—and this will build up a reputation all along the line with wholesalers, retailers and the ultimate consumer. Everybody concerned with the industry should benefit by such a situation. The consumer, assured of his money’s worth, would buy more apples. The effect of this increased demand would be registered through every department of the industry, back to the orchard.”

The price of apples under the present “system” of merchandising manipulated as it is by interest wholly outside of and foreign to the producers’ interest is an unfortunate hinderance to the increase in the consumption of apples. The condition of the apple crop in New England the past autumn

furnishes an illustration of the "system". Speculators bought the crop in many instances at a loss to the producer and are holding them in cold storage to be brought out later and marketed at a great advance. The profit going into the capacious maw of greed rather than to the benefit of the producer and consumer where it should and could go if the apple growers were properly organized.

There are consumers to whom the price is of secondary importance. This applies, however, more to buyers of fancy and high grade apples than to the great bulk of the fruit. As long, however, as existing conditions continue there can be no stability in prices. The "system" talks about "supply and demand" but the producer and consumer are still at the mercy of the beast competition. When the producers combine to do their own business and show the same efficiency in the sale of their apples as is shown in other lines prices will enter as a factor in the increase in the consumption of apples.

I can speak of a period 40 years ago and practically the same methods are employed in general marketing of most farm products in New England as that time except so far as relates to cold storage. The peculiar situation of the New England states necessitates uniform action as well in regulating the price as in standardizing the pack in order to obtain the best results. Local conservatism has retained antiquated and haphazard methods.

Other parts of the country particularly the West and Middle West, in order to develop their agricultural industries have had to organize as a matter of necessity in order to overcome the abuses that have crept in between producer and consumer. In connection with the use of this word abuse, I wish it distinctly understood that I have no intention of knocking the middle man as such. I simply state that there are too many of them dominating the farmer, from the warehouse man down through the Auction company, fruit distributing and marketing companies, brokers, jobbers, wholesalers, commission agents, soliciting agents, local

buyers and retailers duplicating expenses all of which falls on the producer, consumer or both. That elusive 5 cents out of the consumer's dollar vanishes in thin air when the producer should have received 20% more and the consumer saved 20% to add to the family bank account. There are many men of integrity connected with the marketing of apples but they control the farmer and also the price of the commodity and reap a harvest that should revert to the producer or afford a more attractive price to the consumer. It is simply a case of the tail wagging the dog.

The apple growers should control the marketing agencies including the cold storage plants, or their product through producer's cooperative organizations and the price both for domestic and foreign trade should be established by systematic auction sales also controlled by them which would result in a benefit to both producer and consumer.

The abuses at present, however, are not all with the middle men. There are many producers who kill the goose that lays the golden egg daily by filling the middle of the barrel with inferior apples, and by acting as though they thought the parcel post was instituted wholly for the producer. Whether direct buying is a success or not depends upon the producer and the price, that is, the price may be in advance of the wholesale price but not more than the retail price for the same quality. The consumer's object in direct buying is to effect the saving as well as the producer's object is to receive more for his product. Only square dealing on both sides will accomplish satisfactory results.

At \$2 a barrel f. o. b. station a barrel of apples will net a producer a fair return. A price for which, if he could be assured a continuance would encourage the production. Economically distributed such an apple could be placed in the hands of the consumer at \$3 or less. By present methods this same apple would cost the consumer from \$4 to \$6. If adding one kernel to an ear of corn increases the value of the country's crop \$5,000,000, to what extent would the reduction of 20% in the cost of apples to the consumer in-

crease the consumption of the fruit and at the same time net the producer 20 to 50% more for his crop.

For a number of years I have had an opportunity of studying the economy of distributing standard goods from producer to consumer and it is interesting to note what can be saved for the consumer by eliminating wasteful and untruthful advertising and unnecessary duplication of other expenses, through the old method of distribution. "Competition is the life of trade" is an old saying. General Sherman described the modern article when he gave his beautiful synonym for war, learned from experience.

The distribution of food has been a gradual evolution from time immemorial having its inception as barter and exchange locally. With the enlargement of the community's horizon increased methods of distribution have followed lines of least resistance and as no franchise was necessary there has been no public supervision till recent years of any phase of the food problem as in case of other utilities.

The clock has struck for some change in our present methods of distribution. That change must be based on the spirit of cooperation. I need only to call your attention to the method of handling citrus foods and other products in the West, you already know the story. You also know how the Western apple is crowding into New England. What are you going to do about it? What interests us mostly is increasing the consumption of New England apples. I think I saw it stated in some literature sent out by our society that if each of the 200,000 families in Massachusetts would buy a barrel of apples it would take care of the Massachusetts crop this year. It is up to the Massachusetts producer to bring it about.

What is the present method? A farmer in the western part of the state has some apples to sell. A local dealer pays him for them a certain price, he brings them to the city by horse or wagon and sells them for a price. The dealer sells them again to the consumer. The most important fact here is that the price paid the farmer is very low and the price charged the consumer is very high. The farmer gets a very low price for his crop and the consumer pays a very high price for his food.

of transportation. The scene changes. A little later there is a call for apples from the western part of the state. \$3.00 a barrel, please, f. o. b. Boston plus transportation. By the time they reach the consumer the price has grown to \$4 or \$5. This is no dream. What are you going to do about it? Organize cooperative associations and do some team work the same as producers have done elsewhere. Build cold storage plants at central points and hold your apples for distribution locally, making advancement to tide over special cases. Save two transportation charges and the advance in the price. You can get at least one dollar more for your apples and at the same time save the consumer as much. In other words manage your own business. In connection with your cold storage plant you can have a creamery if you choose or a store which rightly managed will save you 10% on living expenses, that is, if you want to save. The trouble is that there are too many people who do not care to save. I have learned this from experience. I am also learning that it is about as difficult to secure united selling among the producers as it is to secure united buying among consumers. I recently called over the telephone a member of this organization, a successful farmer, to obtain his aid in assisting me to interest some of the producers in his town to organize a central plant in that vicinity. The answer came back, "I am through, I have tried to get the farmers to organize until I am tired. I sent in my resignation to the Grange yesterday. I am done." I think it was Pope who said "If not so frequent, would not this be strange, that 'tis so frequent this is stranger still."

A Cooperative Organization is one that conducts its business for the benefit of its members. The stock cooperation formed for profit conducts its business in order that the stockholders may receive a dividend. In the former the voting power is equal or proportioned to the amount of business transacted through the association and the net profits are divided pro rata according to the merchandise sold or bought for the member. In the latter the voting power and

distribution of profits depend on the capital invested.

In the former the controlling factor is men, in the latter it is money. The "one man, one vote" principle of the former means "each for all and all for each." The principle of the latter is each for himself and may his Satanic majesty take the one that gets left. In some states the "one man, one vote" principle has been incorporated in the laws providing for the formation of Cooperative Societies, in other state modifications are allowed so that the voting power is in the proportion that the business or acreage of each member bears to the total business or acreage of which a citrus fruit association is an example.

Under the present economic conditions it is a fundamental principle that farmers' cooperative organizations to be successful, must be founded on a special industry such as cotton, poultry, butter or apples. The unit of each Agricultural Industrial Organization must also cover a comparatively small area. Later, as a matter of efficiency and economy these units may federate and organize, one association to market the fruit and purchase supplies for the several units using the established brands of both associations if desired. The local associations are more successful when formed from necessity and not by professional organizers desiring to control the product of some community or by some idealist seeking to convince farmers that organization is the placebo for all the troubles of humanity.

The success of farmers' business organizations depends upon the voting power, policy and management of its business operations remaining exclusively in the hands of producers otherwise it may be exploited by those whose interest is more to obtain returns from capital invested than to improve the condition of the farmers by encouraging the distribution of their produce and the purchase of supplies on cooperative lines.

Your attention is called to some of the advertising matter used to increase the consumption of apples grown in Washington, Oregon, Idaho, and Montana. The North

Western Exchange is the marketing agency of the apple growers of these states and sells the whole crop by auction to one party. This should be an object lesson to the Massachusetts Fruit Growers' Association. Every western apple put into New England and every orange and grape fruit put on the table of a New England consumer is a substitute for an article inferior to a New England apple. Much of this could be checked by the united action of New England Apple Growers.

The choice remains for the apple producer of New England acting individually to sell at wholesale and buy at retail or by acting collectively to profit by both transactions and at the same time place the New England apple in the position it deserves as King of Apples.

With the increasing economic pressure brought to bear by various causes now operating in this country and with knowledge gleaned from experience cooperation both in selling and buying must become more general in the future and will result, we believe, in increasing the consumption of any product including the apple.

Anyone caring for further information in reference to cooperative organizations should read "Cooperation and Agriculture" by G. Harold Powell, General Manager of the California Fruit Growers' exchange. It is one of the "Rural Science Series" published by the MacMillan Company. It can be found in most any library and should be in every one. This book particularly is mentioned because it contains an excellent bibliography of cooperation and allied subjects.

The state Agricultural College at Amherst will assist in forming local organizations.

As stated in the beginning, I have tried simply to outline the subject of increasing the consumption of apples in order that more time may be given for bringing out the particular points by questions and discussion which I trust may result sooner or later in the organization of a New England Apple Growers' League to handle the questions that affect the apple industry as a whole in New England the same as

the Citrus Protective League of California supervises the citrus fruit business of that state and the Northwestern Fruit Exchange markets for the local organizations the fruit of the four Northwestern states.

THE PRESIDENT: Are there any questions to be asked Dr. Whittier?

MR. MUNSON: I would like to ask Dr. Whittier if those were No. 1 apples he spoke about, and what constituted the No. 1 apples in those barrels?

DR. WHITTIER: I didn't mean to say I bought them. A friend told me that if he could get \$1.25 f. o. b. for his No. 1 apples, that what he got above that would be velvet. They were No. 1 apples, I know that. He is a well-known producer, and he puts up fine fruit, and his fruit is known quite extensively. My brother is an apple buyer in that town, and I know there were 700 barrels bought for \$1 a barrel.

MR. MUNSON: But what was in those barrels?

DR. WHITTIER: They were No. 1 apples, they had to be, in fact, because they were put through an examination. It is a mighty grave problem to get the apples from the producer to the consumer; it is one of the hardest we are up against.

MR. C. K. SMITH: Do I understand that \$1.25 includes the cost of the apple?

DR. WHITTIER: Yes, and they were paying 38 cents for their barrels when I was there.

MR. SMITH: I had the bulletin from New York, showing results, and giving the cost at \$1.29, and that didn't include any fertilizer and also included items that New England can't duplicate. For a period of five years the average cost was \$1.29.

DR. WHITTIER: They would be somewhere around in that vicinity.

MR. SMITH: That was the actual cost of producing that barrel and delivering it at the station, over a mile and a half of ordinary country roads.

THE PRESIDENT: That is practically what Dr. Whittier said, only four cents difference.

MR. SMITH: Where is the profit coming in to the grocer?

THE PRESIDENT: He is going to sell them at \$2.

DR. WHITTIER: I said that anything any one got above \$1.25 was velvet, so if a man gets \$2, he is getting a profit of 75 cents. I admit that isn't enough for the farmer.

PROF. STIMPSON: I think that this is a pretty important subject. The Board of Education has just finished the preparation of an exhibit for the Panama-Pacific Exposition, consisting of 400 colored lantern slides. Last night I showed one of those slides in Boston before an audience. It was a picture of a boy 17 years old who a year ago this last summer set out 345 apple trees. The picture showed one of his apple trees against a sheet, a beautiful tree, low-headed, well-balanced, and it had made an excellent growth. After the lecture was over a woman in the audience came up and wanted to know if I thought the Board of Education had any right to be establishing schools for the encouragement of boys to produce apple trees with the expectation of selling fruit. (Laughter). Well, I told her that we had great hopes of such organizations as this being able to work out the problem of selling.

THE PRESIDENT: Now we are to have some moving pictures of Orcharding in Massachusetts.

(Moving pictures shown to the audience).

(Adjourned to Thursday, at 10.30 a. m.)

SECOND DAY

Morning Session, 10.30 o'clock

Thursday, January 14, 1914.

Meeting called to order at 10.30 a. m. by the President).

THE PRESIDENT: We have this morning a most important session, the most important on our program, one in which more people are interested, probably, than in any other one phase of the business, and we are fortunate in having better weather so that more people can get out. We have had some splendid subjects already, and I have been delighted with the way people have taken hold of the work and fired in the questions. We are going this morning to have a discussion on spraying, which always brings out interesting questions. We are all new at the business, no matter how long we have been at it. We are fortunate this morning in having with us one of the younger men who has gone into the business in a practical way, and I have great pleasure in introducing Professor A. J. Farley of Rutgers College, New Brunswick, New Jersey, who is going to talk to us on "Practical Pointers on Spraying." (Applause).

PRACTICAL POINTERS ON SPRAYING

Prof. Arthur J. Farley, Rutgers College,

New Brunswick, N. J.

The remarkable increase in the number of fruit trees planted annually during the last twenty years has been accompanied by a corresponding increase in the number and variety of injurious insect and fungus pests. This fact has caused the practice, or perhaps it would be more correct to

say, the art, of spraying, to become a regular and necessary part of the fruit growers' farm operations. We still find an occasional man who claims that he is able to grow profitable crops of fancy fruit without spraying, but even such claims are now few and far between. Thousands of pages have been written and still more words spoken on the spraying of fruit trees; yet the up-to-date fruit grower is still looking for something new. You will not find anything very new in my talk this morning, but perhaps it will be possible for me to present some of the old points in a way that will be of some practical value, or at least start a discussion. Your president and secretary have both impressed upon me their desire for a practical spraying talk. It is fortunate that such is the case, as it would be impossible for me to talk from the technical viewpoint of the trained entomologist or plant pathologist. Therefore, my talk this morning will be from the standpoint of the practical fruit grower.

First let us consider the **essentials** for success in spraying. Is it essential that the fruit grower have a thorough knowledge of the details involved in the preparation of a large number of spray mixtures? Is it essential that he know the chemical analysis of every spray mixture that he finds it necessary to use in his orchard? Is it essential that he know the exact life history and habits of every insect that may be found in orchards? Such points are quite essential to the scientific investigator, but not absolutely **essential** to success in practical spraying. A fruit grower, equipped with a clear understanding of the preparation, and practical range of usefulness, of three or four standard spray mixtures; with an efficient outfit, and with a determination to do thorough work, will be more successful than the man who insists on experimenting with every new preparation that comes along regardless of actual experience. We might say that the essentials for successful results in spraying are three: first, thoroughness of application; second, proper materials; third, applications made at the right time.

Let us now consider the part that each of the above points play in producing high class fruit free from diseases,

THOROUGHNESS OF APPLICATION.

First, what constitutes a thorough application? To state it briefly, thoroughness means putting enough material to do the work in all places where work is to be done. To insure complete control, a tree infested by San Jose scale must be sprayed in such a way that every scale is covered with the insecticide. This means that the spray must be driven into the crevices of the bark, forced behind and under bud scales, and through the fine, hairy covering of the young shoots. In spraying peach trees for leaf curl every bud, twig and branch must be coated with a thin layer of spray material. Any part of the tree that is not covered remains exposed to infestation by the leaf curl fungus. In spraying for the codling moth every apple whose calyx cup does not receive its share of poison is liable to be injured or destroyed by the young worm eating its way into the seed cavity. On the other hand we must bear in mind that it is possible to apply too much material, which not only results in unnecessary waste, but, with active growing trees may cause severe injury to both fruit and foliage. If the nozzle is held too long in one position, thereby drenching certain branches the danger of injury is materially increased. The solution collects in drops on the leaves; these drops coalesce to form large ones and as the solution evaporates it becomes more concentrated and burns. We find that a relatively coarse spray applied at very high pressure is more likely to cause burning than a fine spray applied with moderate pressure. It is a noticeable fact that foliage injury, as a result of spraying, has been more common since power sprayers came into general use than it was when applications were commonly made with pumps producing low pressure. It is claimed by some that a coarse spray applied under very high pressure is necessary to control codling moth, but in our experience a fine spray with moderate pressure gives just as

perfect control. However, a strong, powerful pump together with strong durable hose and efficient nozzles are very important factors in making thorough applications. The nozzle, although really the business end of the spray outfit is very often slighted. With inefficient nozzles the most industrious and careful man is seriously handicapped. On the other hand, a man who moves slowly may waste valuable material unless provided with a suitable nozzle. We find it a great advantage to have nozzles that may be changed to regulate the amount and fineness of the spray according to the size and character of the trees to be sprayed, the outfit used, and the speed of the men who direct the nozzles. With the disc type of nozzle this may be accomplished by providing several discs having apertures of different sizes, while with the Bordeaux type of nozzle provision is made whereby the nozzle may be accurately adjusted. The importance of the nozzle in regulating the amount of material necessary to cover a certain number of trees is shown by the following figures. In our experimental peach orchard at Vineland, N. J., fifty gallons of self-boiled lime-sulfur were required to cover seventy well pruned three-year-old trees when using Simplex nozzles supplied with discs having an aperture two millimeters in diameter, while just twice the number of trees or 140, were sprayed with the same amount of material when Simplex nozzles having an aperture only one millimeter in diameter were used. The time required to actually spray 140 trees with one nozzle was just twice as long as the time required to spray 70 trees with the other nozzle. Frequently the time required to fill the spray tank is almost equal to the time required to apply the material, and if the amount of material will cover double the number of trees by using a disc or cap with a smaller aperture both time and material are saved. If the one who directs the spray nozzle does not move it as rapidly as the spray covers the branch, material is wasted. To illustrate this point let me cite another test with peach trees. It was found that 125 gallons of mixture

covered 180 trees when two certain men were directing the nozzle. When another man took the place of one of these men, 125 gallons of mixture was sufficient for 250 trees, while the time required remained the same. It is quite true that the figures I have given represent only one instance and will not be the same under all conditions, but, nevertheless they serve to show how important the regulation of the nozzle may be to the practical fruit grower. The length of time, during which a certain application should be made, is usually quite limited and, therefore, anything that can be done to save time is of great value. We have found two types of nozzles very satisfactory for our work; one represented by the Simplex and the other represented by the Blizzard.

Other factors that influence thoroughness of application are, kind of labor, weather conditions and condition of trees. The best equipment becomes inefficient in the hands of careless men who are anxious to get over the orchard in a hurry and complete as soon as possible a job that is to them very disagreeable. Lack of personal supervision of, or participation in, the actual spraying operations is quite often responsible for poor results. The condition of the weather, particularly the velocity and direction of the wind has a direct influence on thoroughness of application. It is possible, but not always practical to spray when the velocity of the wind is very high. We find it possible, and often necessary, to spray when the wind is very high, but our results are not as satisfactory and, of course, the amount of material wasted is much greater than when the work can be done in moderate weather. We try to take advantage of the change in the direction of the wind on different days in order that we may spray from at least two sides **with** the wind, i. e. on large apple trees not peach. The last, but not by any means the least important factor that I am going to mention as influencing thoroughness of application, is that of **condition of trees**. I do not know just what the situation is in Massachusetts, but I do know that in New Jersey we have thousands

of trees that have been allowed to grow so high and so thick that it would be highly impracticable and in many cases impossible for the most careful man to thoroughly cover them with spray material even though he were provided with the most efficient outfit on the market, and made the attempt under ideal weather conditions. Trees that are thick not only make thorough spraying very difficult, if not impossible, but also afford ideal conditions for the growth of many fungi, hence proper pruning is decidedly important. The scraping off of the rough bark on old trees is also of great assistance to thorough spraying as well as a means of destroying the hiding place of injurious insects.

Let us now consider, very briefly, the second essential for success in spraying.

PROPER MATERIALS.

First we have the fungicides used to prevent the development of fungus diseases. The fungicides in general use are home-made concentrated, commercial concentrated and self-boiled lime-sulfur solutions, home-made Bordeaux mixture and commercial combinations of Bordeaux mixture and arsenate of lead.

Among insecticides, the most common are arsenate of lead as a stomach poison, and concentrated lime-sulfur, miscible oils, whale oil soap and tobacco decoctions as contact poisons. Among the materials just mentioned I believe you will agree that arsenate of lead is undoubtedly the cheapest and most efficient stomach poison for such insects as codling moth and plum curculio. We generally use three pounds of the paste or one and one-half pounds of the powdered form of arsenate of lead to fifty gallons of spray mixture with excellent results. There are many who claim that smaller amounts than those just mentioned will give equally as good results, but under average conditions I believe these amounts will give better satisfaction. Thorough agitation of any spray mixture containing arsenate of lead is extremely important. Concentrated lime-sulfur and

miscible oils have both proven themselves efficient for the control of San Jose scale. We generally prefer the lime-sulfur in preference to the oil for apples on account of its comparative low cost, while we always recommend the use of lime-sulfur in preference to oil for peaches, not only on account of the high cost of the oil, but also because of the efficiency of the lime-sulfur in controlling peach leaf curl. For apple orchards that are very badly infested with San Jose scale we sometimes recommend an application of oil in the late fall, followed by an application of lime-sulfur in the spring. For such insects as red-bugs, plant lice and leaf hoppers, we are using a combination of whale-oil soap and black leaf 40 at the rate of 4 pounds of soap and one pint of black-leaf to 100 gallons of spray mixture. The soap in this combination, although of some value as an insecticide is primarily added as a spreader for the black-leaf. The main objection to black-leaf 40 and similar materials is its high cost, but so far we have been unable to find a substitute that is cheaper and at the same time practical and efficient. A recent report on investigational work along this line conducted by the Virginia Agricultural Experiment Station indicates that a practical method may be developed whereby fruit growers will be able to prepare nicotine decoctions of uniform strength from tobacco stems, and sweeping. However, it seems doubtful if such a method will ever be practical except for those fruit growers who are able to buy tobacco stems or sweepings at a very low figure.

Among the fungicides mentioned a few moments ago, concentrated lime-sulfur (commercial and home-made) is now the most popular material in New Jersey for apples, and for the dormant spring spraying of the peach, while self-boiled lime-sulfur is by all means the most common fungicide in use for summer spraying the peach. A few of our peach growers are using very dilute concentrated lime-sulfur as a summer spray for the peach, but we do not recommend it on account of the great liability of its causing serious burning of the foliage. Bordeaux mixture is still

used, but in a very limited way. Many growers who several years ago depended entirely on Bordeaux as a fungicide for the apple are now using some form of concentrated lime-sulfur mixture. The commercial combinations of Bordeaux and arsenate of lead are used quite extensively by some of our growers, but we do not recommend their use for two reasons, the high cost and the danger of burning foliage and russetting fruit. The more a practical fruit-grower can keep away from complex combinations of insecticides and fungicides the less risk he will run of foliage and fruit burning, but under average conditions it is practically impossible to get along without combining two or three different materials in one application. This is true of the arsenate of lead lime-sulfur combination as well as the combination of Bordeaux mixture and arsenate of lead. During the past year we have added black leaf 40 and whale oil soap to each of the above combinations with very satisfactory results. This gives us a three way mixture efficient against codling moth, curculio, red bug, aphid and scab. We have found that the lime-sulfur-arsenate of lead combination is more efficient against codling moth and curculio than arsenate of lead used alone. This is no doubt due to the fact that the lime-sulfur acts as a spreader for the arsenate of lead. On the other hand, some combinations of lime-sulfur and arsenate of lead have caused more burning of foliage than the lime-sulfur or arsenate of lead used alone. It is a well known fact that the addition of lead arsenate to lime-sulfur causes a chemical change to take place, forming a new combination dark gray almost chocolate in color. During the progress of this chemical change a very small amount of free arsenic may be formed which is very likely to cause burning. Provided this is true it would seem that the addition of a small quantity of lime to the lime-sulfur-arsenate of lead combination would tend to decrease the amount of burning. We have found that home-made concentrated lime-sulfur mixtures properly diluted do not, as a rule burn foliage as badly when mixed with arsenate of lead as the commercial

mixtures. This probably is due to the fact that the home-made mixtures contain a larger excess of lime than the commercial mixtures, thus decreasing the amount of free arsenic.

There has been more or less agitation during the last few years in regard to the use of a combination of finely divided sulfur and arsenate of lead in controlling insect and fungus troubles. Experiments to test the value of such a combination have been conducted at the New Jersey Experiment Station for two years. The following comparisons have been made on apple trees:

First, Pyrox, second commercial concentrated lime-sulfur mixed with arsenate of lead, third a solution made by mixing finely divided sulfur containing 10% arsenate of lead with water at the rate of 10 pounds to fifty gallons of water and fourth the same combination of finely divided sulfur and arsenate of lead applied as a dust. Each experiment included a check plot that received arsenate of lead only. Separate applications of black-leaf 40 were made to each plot to control aphids.

Our experiments with peaches include the same combination of finely divided sulfur with arsenate of lead applied wet and as a dust; together with self-boiled lime-sulfur and atomic sulfur. Records were taken to determine the amount of injury caused by codling moth, scab and curculio, as well as any injury that might be caused by the material itself. Without going into details a few brief statements showing our results and conclusions may be of interest. The arsenate of lead used alone did not spread satisfactorily and failed to protect the fruit from curculio injury. This was more evident on apples than on peaches. The damage by curculio and codling moth was very slight on all other apple plots. The apples on the check plots were seriously enough injured to present a decidedly unsatisfactory appearance. The apple scab control was over 90% on all plots except the one receiving only arsenate of lead. The apples from the trees sprayed with Pyrox were slightly russeted. This

injury although slight on individual apples was sufficient to noticeably impair their general appearance and finish. The apples sprayed with the finely divided sulfur-arsenate of lead combination in suspension were small and poorly colored. The apples sprayed with the concentrated lime-sulfur arsenate of lead combination and with the fine sulfur arsenate of lead dust were noticeable for their superior finish and general excellent appearance. Both the sulfur-arsenate of lead dust and sulfur-arsenate of lead suspension gave almost perfect control of peach scab, but caused serious defoliation of the trees. Self-boiled lime-sulfur gave satisfactory commercial control of peach scab without injury to the foliage. These indicate that the sulfur dust treatment may be equal to our common wet sprays as far as apple and peach scab, codling moth and curculio are concerned, but is liable to cause serious injury to peach foliage. It is quite probable that dusting would be very satisfactory provided the application could be made in accordance with local weather conditions. However, such an arrangement is entirely impractical for the average fruit-grower. The chief advantage claimed for the sulfur equipment is its rapidity of application, permitting the grower, when weather conditions favorable to scab infection occur, to protect a much larger area of his orchard in a given time and with the same labor than is possible with a wet spray. This advantage is of doubtful value under average conditions, while against it must be charged the greater cost of the material, the necessity of maintaining a wet spraying apparatus for San Jose Scale and peach leaf curl in addition to the dusting machinery and the impossibility of using black leaf 40 or similar decoctions for the control of aphids.

TIME OF APPLICATION.

We should never lose sight of the fact that none of the spray materials mentioned will give satisfactory results unless the application is made at the proper time. There is a certain time during the life cycle of every insect and fungus

disease at which an application of the proper spray material will do the most good, while the same material applied with usual care at any other time would be just so much time and material thrown away. The successful fruit grower acquires a practical knowledge of the life history of the more important insects and fungi, and acts accordingly. We all know that spraying as a preventative is more efficient than spraying to check the spread of an insect or a disease after it has made its appearance. This is particularly true of spraying to control fungous diseases such as peach leaf curl, apple scab and brown rot. The main object of applying a fungicide is to prevent the germination of the seeds or spores from which the disease develops, not to check the growth of the fungous plant after its roots or mycelium have once become established. It is extremely important to be ready at the proper time. We are now using and recommending the following applications of spray material for the apple.

FIRST: Concentrated lime-sulfur 1 to 9 or miscible oil 1 to 16 applied in the spring before the buds start. This is primarily for San Jose scale, but serves as a general house cleaning.

SECOND: Concentrated lime-sulfur at the rate of five quarts of the commercial mixture to 50 gallons of water to which is added 3 pounds of arsenate of lead paste, or $1\frac{1}{2}$ pounds of the arsenate of lead powder.

This is applied just before the blossom buds open or just when they begin to show some pink, or white color. This is primarily for scab and curculio.

THIRD: The same combination of arsenate of lead and lime-sulfur is applied just after the petals fall, or before the lobes of the calyx close. This is primarily for the codling moth, curculio and scab.

FOURTH: A similar combination is again applied ten days or two weeks after the petals have fallen. This application is also made to control the codling moth, curculio and scab. The Black-leaf 40 at the rate of one-half pint to fifty

gallons of mixture is added to the three latter applications, if aphids or leaf hoppers are present.

FIFTH: The same combination of arsenate of lead is applied between the middle of June and the first of July to control the sooty mold fungus, and the second brood of the codling moth.

These applications are often modified in various ways to suit conditions; some growers preferring one material and some another. The application just before the blossoms open is sometimes omitted, particularly in those localities and on those varieties that are not subject to scab.

I will not weary you with a discussion of peach spraying, except to say that in addition to the application of concentrated lime-sulfur early in the spring before the buds start, for scale and leaf-curl, we find two applications of self-boiled lime-sulfur and arsenate of lead, one just after the petals fall, and another as the husks begin to fall from the small fruits, very effective against curculio. In closing let me repeat again the three essentials for success in spraying. **FIRST:** Thoroughness of application. **SECOND:** Proper materials. **THIRD:** Applications made at the proper time.

THE PRESIDENT: We will be glad to have any questions that anyone wishes to ask or any discussion that anyone cares to offer.

MR. STOCKWELL: I should like to ask the speaker in regard to spraying young peach trees, when he sprays them.

PROFESSOR FARLEY: For the curculio and scab we make one application of self-boiled lime-sulfur and arsenate of lead just after the petals have fallen. At the same stage you would make application to the apple trees for the codling moth.

MR. STOCKWELL: With what strength?

PROF. FARLEY: Three pounds arsenate of lead to 50 gallons of spray mixture. For self-boiled lime-sulfur we use 8 pounds of stone lime, 8 pounds of sulfur, with water to make 50 gallons.

MR. STOCKWELL: And could you use the commercial?

PROF. FARLEY: Some growers have used the dilute strength of the commercial lime-sulfur mixtures, but would never recommend it on peach trees, because of the liability of serious burning of the foliage. We have had that experience so many times that we have given up the use of the commercial concentrated or home-made concentrated lime-sulfur on peach trees after the leaves have appeared. We make a second application of self-boiled lime-sulfur and arsenate of lead just as the little husks on the small fruit are splitting and falling off. You will find self-boiled lime-sulfur a very simple mixture to prepare after you have tried once or twice. There is nothing difficult about it at all.

THE PRESIDENT: It might be interesting to have you tell us just how that is done, the process of making your self-boiled lime-sulfur.

PROF. FARLEY: We use as a formula, 8 pounds of stone lime and 8 pounds of sulfur with water to make 50 gallons. If we have any amount of spraying to do, and wish to use more than 50 gallons of spray mixture we increase proportionately the amounts of lime and sulfur. If we have a 100-gallon or a 150-gallon tank, we make up enough mixture at one time to fill the tank. For instance, if we want 100 gallons of the self-boiled lime-sulfur, we use 16 pounds of lime and 16 pounds of sulfur, together with sufficient water to make 100 gallons of mixture. We get better results when the larger quantities of lime and sulfur are used, because the mixture is made, not by boiling with heat or by steam, but simply from the heat of the slaking lime. You must have good lime that will slake vigorously and quickly with intense heat. The quality of the lime is very essential in making the self-boiled lime-sulfur. We first mix the sulfur in a tub with water to form a thick paste. The lime is then placed in the bottom of a barrel and just enough water poured over the lime to start it slaking. When the slaking becomes vigorous we add our sulfur paste and thoroughly mix the sulfur paste with the slaking lime. More

water should be added if the mixture becomes too thick. Then let it boil for about five minutes. The actual time depends on the kind of lime that is used but it is safe to let it cook until all active slaking has ceased. The mixture should boil very vigorously for a few minutes. Just as soon as this active boiling ceases, add enough water to quickly cool the mixture. Strain the material into the spray tank adding enough water to equal the amount called for in the formula 8 pounds of lime and 8 pounds of sulfur should be used for every 50 gallons of spraying material. Some of our growers use a self-boiled mixture made by allowing the boiling to continue for a longer time, for apples with very successful results. There is less danger of burning than with the concentrated mixture but the control of fungus diseases is not as perfect. Let me give you one warning in connection with the use of self-boiled lime-sulfur for the peach: if you let the mixture boil too long, you are likely to get just as serious injury from the self-boiled lime-sulfur mixture as you would from the concentrated mixture. Stop all further action by the addition of plenty of cold water just as soon as the active boiling ceases.

MR. WILDER: I would like to ask if there is a fixed standard for the concentrated lime-sulfur?

PROF. FARLEY: A fixed standard from the manufacturers' standpoint?

MR. WILDER: Yes, and also the user's standpoint; can we get the same concentrated lime-sulfur of all manufacturers?

PROF. FARLEY: I doubt if you can get material of exactly the same strength from all manufacturers, but the strength is specified on the label, which you will find on the barrel. The strength is determined by a specific gravity test. Commercial concentrated lime-sulfur mixture should have a specific gravity of at least 1.30.

QUESTION: I would like to ask the strength of that mid-summer spray between June and July for the green fungus.

PROF. FARLEY: The sooty mold fungus?

QUESTION: Yes.

PROF. FARLEY: We use the same strength that we use for the early spring spraying, that is, five quarts of the ordinary concentrated commercial lime-sulfur to 50 gallons of water. That is more dilute than some have been using concentrated lime-sulfur, but owing to the reports of serious burning of the foliage we have decreased the amount of lime-sulfur to five quarts to 50 gallons for all summer spraying of apples.

MR. C. K. SMITH: I would like to ask what your experience has been with the powdered and with the paste arsenate of lead.

PROF. FARLEY: We have never made any strict comparison between the two; that is, we have never compared trees sprayed with the powdered arsenate of lead with similar trees sprayed with the paste form. In a general way both forms of lead have been equally efficient. We have used about half and half during the past two years, and have been unable to distinguish any difference one way or another.

MR. SMITH: Have you tried the powdered form of lime-sulfur or a substitute for lime-sulfur?

PROF. FARLEY: You mean the soluble sulfur?

MR. R. SMITH: I guess that's it.

PROF. FARLEY: We have not tested it at the Experiment Stations. A number of our growers have used it as a summer spray, with very unsatisfactory results. I believe the New York State Experiment Station has conducted experiments with soluble sulfur for at least two years. This last report states that it has not yet proven itself a good substitute for the regular lime-sulfur mixtures. We are still depending on the lime-sulfur mixtures believing that they are more efficient, and in the case of the home made preparations just as inexpensive.

MR. SAGE: What do you use for controlling pear

blight? That has been very serious for the last two years with me.

PROF. FARLEY: We have never had any good results in attempting to control the pear blight by spraying. We have depended more on cultural methods, i. e. to check excessive growth and on cutting out the blighted branches and twigs. We find the pear blight, or fire blight, is very serious on both apples and pears, being most serious on our lighter soils where the trees are making a very rank, vigorous growth. We also find it more serious during a dry period, than during a wet period. There are no absolute remedies, so far as spraying is concerned, as it is a bacterial disease and not caused by either an insect or a fungus.

MR. MANN: I wanted a little more information on that soluble sulfur. I find it one of my best friends and a great deal better to use than lime-sulfur or oil. I have completely controlled some very badly scaled trees. It seems to me it is one of those things we want to know about.

THE PRESIDENT: I would like to ask for any experience any of you have had with the soluble sulfur in the dry, powdered form, because I find we get a great many inquiries at the college in reference to it. Has any one else besides Mr. Mann had any experience?

A MEMBER: I would like to say I got some of that soluble sulfur and put it on according to directions, but I looked out not to go over all my trees, because I was not sure of it, and it burned the foliage worse than the Bordeaux mixture ever did with me. But I had arsenate of lead with it, and they tell me that is what made the burning of the foliage.

THE PRESIDENT: They put out a powdered soluble sulfur with poison which is supposed to be all right.

MR. DAVENPORT: I have tried that soluble sulfur for several years, and had similar results with the summer spray, where I used it with arsenate of lead. Practically always got burning. But in using it alone as a winter spray for San Jose scale, I certainly have had good results. Of

course, the greatest advantage is that it is cheaper and it saves a great deal on freight rates if you have to ship it any distance, but outside of that, if the freight rate isn't any lower, it might be just as well to use the ordinary lime-sulfur.

THE PRESIDENT: Have you tried the combination?

MR. DAVENPORT: With arsenate of lead?

THE PRESIDENT: No, I mean the combined form.

MR. DAVENPORT: No, I haven't.

A MEMBER: I wonder if a great many people don't burn the lime. That is the trouble in slaking, that if the lime is lively it is liable to burn, and if it is burned, the lime mixture is not much good.

PROF. FARLEY: You mean by not adding sufficient water to properly slake the lime?

A MEMBER: If you had a large chunk, not getting it in quick enough, and it would get very hot.

PROF. FARLEY: That might occur if your lime is in very large lumps, or you fail to add enough water to keep the mixture in the form of a thick paste. Sometimes after you add the sulfur paste to the slaking lime the mixture becomes quite dry, and unless you add enough water to keep the mixture in a liquid form, the lime is liable to burn and make a poor mixture. However we have more unsuccessful results in preparing the self-boiled mixture by using a poor grade of lime, than by improper slaking.

QUESTION: How can you tell if it is a poor grade until after you buy it and try it?

PROF. FARLEY: We have had much better results and I am sure it pays us to buy the high grade of lime for preparing self-boiled lime-sulfur mixtures. We have had lime so poor that small chunks dropped into a pail containing a little water showed no more action than the same number of stones. On the other hand, you drop a chunk of high grade lime in a pail containing some cold water and it will start off just as soon as it touches the water. That is the kind of

lime we prefer. (It should be the calcium lime rather than the magnesium lime as the latter is a cold lime.—Sec'y.)

Question: That is white, isn't it?

PROF. FARLEY: Yes. It costs more, but we think it is worth while.

MR. MARGESON: Did you ever use hot water in slaking?

PROF. FARLEY: Yes, when we had a slow-acting lime. With the higher grades of lime we do not find it necessary to use the hot water, but if it will not slake with cold water we use hot water, and if it will not slake with hot water we try another brand.

THE PRESIDENT: Well, I am still interested in the soluble sulfur. I am going to ask Mr. Jenks, who has been to the New York Fruit Growers' Meeting, what he heard out there about it.

MR. JENKS: There seems to be as much difference of opinion there as there appears to be here. I don't recall any one getting up and highly recommending it for summer work, but many of the larger growers did say the same thing Mr. Davenport has said. I should say that Mr. Davenport's opinion was the concensus of opinion in western New York.

THE PRESIDENT: That is, that it is good for winter but questionable for summer?

MR. JENKS: Yes.

QUESTION: I would like to ask in regard to a remedy for the so-called "yellows" in peaches.

PROF. FARLEY: The only remedy I know of is pulling out and destroying the affected trees. We have been working on the "yellows" question in New Jersey for the last ten or fifteen years, and I think we are a little further advanced now than we were when we started, but only a little. Dr. Cooke, our plant pathologist, believes that he can tell "yellows" in a tree by a certain chemical analysis and he is working along that line; but so far as the cause of the disease is concerned, we have very little more information now than we had twenty-five or even fifty years ago. It is a

very serious question with us. We now offer buds from vigorous trees that we know or are reasonably sure are free from "yellows," to our nurserymen, trying to get them to propagate trees from these buds. I think that the common practice of taking buds from the nursery trees for the propagation of more trees is very dangerous. After the "yellows" once starts in the nursery it is easily carried from one tree to another by budding and a large number may be inoculated each year. Both yellows and little-peach are very serious with us, but they have been able to control them if the trees are taken out at the first indication of disease. That is an important point. The average grower does not notice the yellows on his trees until it is in the advanced stage, and by that time it may have infected a dozen surrounding trees. It is a great temptation, if a man plants a peach orchard, to plant some peach trees and care for those trees three or four years as the case may be, up until the time he sees the first crop, and about that time he sees unmistakable signs of yellows, and he says, "I am going to get that first crop. I have taken care of the trees. I will get this crop, and then I will pull the trees out." I have heard that said many times, but in the meantime the chances are that the tree has infected three or four or half a dozen trees right around it.

MR. DICKINSON: I would like to ask as to the control of the aphid on the apple, and whether the combined spray for aphid and scale is possible.

PROF. FARLEY: I think it is possible, provided you use concentrated lime-sulfur. That will help control the aphid. If you see the aphid on the buds at that time, the application of concentrated lime-sulfur at scale strength will assist in controlling your aphid.

THE PRESIDENT: Does it have any effect on the eggs?

PROF. FARLEY: I doubt it. It may prevent some of the eggs from hatching, but not very many. We generally depend upon the tobacco decoctions, using those together with the concentrated lime-sulfur. We have had better re-

sults since we have been using the tobacco decoctions.

MR. BRONSON: What is the weakest strength of lime-sulfur for summer spraying that will prevent the germination of apple scab or kill it after germination?

PROF. FARLEY: I couldn't tell you.

MR. BRONSON: In other words, we have recommended to us the use of 1 to 40, and a large number of our reports say that burning takes place when used at that strength in eastern Massachusetts for the control of apple scab. Will 1 to 80, for example, be strong enough to prevent germination or kill a very large percentage of the scab spores after they have germinated?

PROF. FARLEY: I doubt if 1 to 80 would be strong enough.

MR. BRONSON: So that spraying with 1 to 80 would be so much time and material thrown away?

PROF. FARLEY: Oh, no; it wouldn't be time and material thrown away. It would give partial control, but I doubt if it would prevent the germination of the scab spores, in all conditions of development. It might control them to a limited extent, but the control would not be thorough.

MR. BRONSON: I would like to ask if the college has had reports on that burning, and what the effect of the 1 to 40 is as to burning?

THE PRESIDENT: We have had a great deal of complaint that the combination of lime-sulfur and arsenate of lead is troubling the eastern end of the State. I don't know that we have had any reports about 1 to 40 or 1 to 50 alone, but when they get the combination, particularly when they put in as much arsenate of lead as they have to do in the eastern part of the State for the gypsy moth, then you do get trouble. I think Mr. Mann can tell us about that.

MR. MANN: I have always seen trouble when we had that strength of lime-sulfur. Any strength of arsenate we would use would be 5 to 8 pounds to 50 gallons.

THE PRESIDENT: At Amherst we use 1 to 50; that

would be all right, but you people use so much arsenate of lead that it would be different. I have been up against the aphid this last year, and what I am interested in here is to find the best and easiest way to control that aphid. I know of several old orchards that are practically lost because of the aphid.

QUESTION: How about adding more lime to the arsenate of lead before putting it in, so as to take up the free arsenic? Does that do any good?

THE PRESIDENT: Mr. Mann, have you tried adding extra lime?

MR. MANN: I don't want anything to do with that mixture.

PROF. FARLEY: I would like to ask if any one has tried adding a little lime to the lime-sulfur-arsenate of lead combination. (No response.) We have not tried it, but it has been tried in Delaware. I do not know about the experience of the growers here, but generally speaking our results have been more satisfactory, so far as burning was concerned, with the home-made lime-sulfur mixture than with the commercial mixtures. It seems to me that this may be due to the fact that there is a larger excess of lime in the home-made lime-sulfur mixture than in the commercial.

THE PRESIDENT: Mr. Wheeler, can you give us any help on this question?

MR. WILFRID WHEELER: I don't think so. I have not used it.

THE PRESIDENT: Can you, Mr. Frost?

MR. FROST: I feel about that as Mr. Mann does with the sulfur compound, where we are using arsenate of lead as strong as we have to with gypsy moth. I know that sulfur has a great tendency to break up the arsenate of lead, and I have practically given up the combination of sulfur and arsenate of lead in all cases. I also think that the climatic conditions make a great difference, and the brand of the arsenate. Some of it breaks up easier than others. I don't think we consider climatic conditions as much as we

should, because I have seen straight arsenate of lead burn under certain climatic conditions.

A MEMBER: Last year I used lime as a marker; I wanted to see how well I could make the trees look next the road, so I doubled the lime and added four pounds of arsenate of lead to 50 gallons, and 5 quarts of lime-sulfur to 50 gallons, and it didn't make a particle of burning. I don't know that that lime did it, but there was no burning and the trees looked fine all summer.

MR. H. W. ROSS: I would like to ask if the continual application of a sulfur spray in one season wouldn't have a tendency to smother the leaves by coating them over with arsenate to such an extent that you might have them all burned. It might be that the closing of the pores for so long, and then this last application coming so late, would look as if they were burned from the use of the application of the arsenate of lead and lime-sulfur combination. I know my experience has been using the arsenate of lead as strong as we did in the eastern part of the State, even for the second application, it sometimes appeared to smother the foliage rather than to burn it.

PROF. FARLEY: I couldn't answer that question. We have noticed that the arsenate of lead burning took place after several applications. We have noticed it on peaches, and that is one reason why I recommended the use of the self-boiled lime-sulfur in connection with the arsenate of lead. We find that we can safely make one application of arsenate of lead but that continued applications of arsenate of lead alone, will cause more serious burning than if some other material containing lime is combined with it. I do not know about the closing up of the pores of the leaves, but I doubt if continued applications of arsenate of lead have very much effect. In regard to the point Mr. Frost mentioned concerning the effect of climatic conditions on burning I wish to say that we have had the same experience with the peach. We have applied concentrated lime-sulfur to peach foliage at a strength of 1 to 50, with no serious burn-

ing. The next day we have applied the same brand of concentrated lime-sulfur at a strength of 1 to 100, and had very serious burning. It must be the difference in the condition of the atmosphere or the condition of the leaves on two different days. The same thing would hold true with lime-sulfur used on other trees. The condition of the trees and the climatic conditions are very important points to consider in connection with this lime-sulfur burning.

MR. HALE: How about the water? Some use river water and some hard water from the well. I used some with London purple that had potash in it, and it burned badly. The year before I used different water, river water, and it was all right, and last year I used water that I had analyzed that had quite a little potash in it, not enough to injure it as drinking water, but I laid it to that. I have no doubt that water makes some difference, as much as climatic influences.

THE PRESIDENT: It might be hard to settle that question unless we went at it experimentally.

MR. HALE: When we make fish glue we have got to treat it chemically and take out all the wrong elements, or we won't always get the right glue.

PROF. FARLEY: So far as we could see, they were both fair days. It was at least partially due to the condition of the trees.

SECRETARY BROWN: You really can't tell ahead of time what those conditions are?

PROF. FARLEY: No. We have had serious burning with lime-sulfur on peaches when diluted 1 to 175.

QUESTION: Could you tell any difference in the days, generally speaking?

PROF. FARLEY: Generally speaking, they were both fair days, and both applications were put on by the same man.

QUESTION: The lime-sulfur the same?

PROF. FARLEY: Yes, and in the same orchard.

QUESTION: Was the wind the same each day?

PROF. FARLEY: I couldn't say as to the wind. We were not doing it to test out the relative burning, and did not take into account the direction of the wind, although, as I remember it, they were both good days for spraying.

QUESTION: Was the tank washed out between sprayings?

PROF. FARLEY: Yes.

MR. C. K. SMITH: I would like to ask if you have had serious burning with the self-boiled and arsenate of lead on peaches?

PROF. FARLEY: Yes we have had very serious burning with the self-boiled lime-sulfur and arsenate of lead, but in each case we can trace it back to one barrel of the mixture. That was one barrel that was allowed to boil so long that too much soluble sulfur was formed. It burned just as badly as the concentrated lime-sulfur. We have occasionally noticed a section of several rows right through an orchard in which the foliage was burned, the leaves badly spotted and some falling off, while the rows on either side were all right. The injury could be traced right down to one tankful of spray material.

MR. C. K. SMITH: But you believe it never will occur if it is properly mixed and slaked?

PROF. FARLEY: We have never experienced any trouble, because there is such a large excess of lime.

QUESTION: With ordinary, average lime, how many minutes would you let it boil?

PROF. FARLEY: From the time the boiling actually started, I would say four or five minutes. I would rather have it too weak than too strong, for peaches, because a relatively weak solution will control scab. It is hard to specify a certain length of time, because it is hard to tell what you mean by an average lime, but we go more on the appearance of the material than on the amount of boiling. Just as soon as the actual action of the lime ceases we add water. We do that before we get any of the concentrated lime-sulfur color. When we get a red color we are afraid of

the mixture for use on peaches. We try to get an amber color, and just as soon as we get it darker than that we are afraid of it for peach foliage.

MR. WARE: Can that stand over, say, two or three days, to give you a chance to try it out a little and see whether it burns, and use it afterward?

PROF. FARLEY: We have never tried that out experimentally, but we have used the self-boiled that has been made up for two or three days. Arsenate of lead should not be mixed with lime-sulfur until just before you are going to spray, because it causes a chemical change that may be injurious if the mixture is allowed to stand. As long as you do not add the arsenate you can keep the self-boiled at least two or three days. We always make up a lot the latter part of the day so that we will have a tankfull to start out with at 7 o'clock the next morning.

MR. G. N. SMITH: I agree with you that we ought to have more information about the powdered lime-sulfur, because if it can be used to take the place of the liquid, see what we are going to save in freight. If it will keep, there is another advantage, because if you don't use up the concentrated right away and try to keep it through the season, you don't know what you have got. It crystalizes in the bottom of the barrel.

A MEMBER: Isn't it possible to use the self-boiled method—that is, depending on the heat of the lime—and make it similar to the concentrated commercial product.

PROF. FARLEY: That would be all right for summer spraying for apples, but not summer spraying for peaches, and I doubt if it would be strong enough as a dormant spray for the peach or apple. If we were going to make up lime-sulfur ourselves for spraying for scale, it would be better to make up a concentrated lime-sulfur mixture, using one of the accepted formulas. We use twice the quantity of sulfur that we use lime, and boil the mixture over a fire with steam for three-quarters of an hour or an hour. The most of our large commercial growers are preparing their own

concentrated lime-sulfur mixture. The smaller growers are buying it unless it happens that they have an outfit or equipment with which to prepare it at home. It is easy enough to make and is much cheaper than the commercial mixtures. We seldom buy any commercial lime-sulfur except to use in an experimental way.

MR. MUNROE MORSE: Can you make it and get it as strong as the commercial?

PROF. FARLEY: We have not been able to. The majority of our home-made lime-sulfur concentrate will test 1, 27, but provided you do not dilute that as much as the commercial concentrate, you have the same mixture when actually applied to the trees. We find even at that lower strength it is cheaper under our conditions than it is to pay the freight on water for a certain distance. The competition is so great now between commercial lime-sulfurs that you can buy it at almost any price.

MR. PARSONS: Can the material that is crystalized in the barrel be used?

PROF. FARLEY: We have used it by heating the lime-sulfur enough to dissolve the crystal.

MR. PARSONS: And get just the same strength?

PROF. FARLEY: We always test our lime-sulfur with a hydrometer before using, no matter whether it is commercial or home-made, and then we dilute it accordingly.

MR. PARSONS: Doesn't that crystalization on the barrel weaken the rest?

PROF. FARLEY: It does to a certain extent, but you can test it.

MR. PARSONS: Without a test you don't know what it will do if you carry it over?

PROF. FARLEY: I doubt if it weakens it very much, provided you heat it enough to dissolve all the crystals.

MR. WARE: Have you noticed any great variation in tests with the hydrometer?

PROF. FARLEY: Very little variation.

SECRETARY BROWN: What is the test for diluting?

Do you make it 4 degrees to $4\frac{1}{2}$ degrees?

PROF. FARLEY: For scale, we use material having specific gravity of 1.03.

SECRETARY BROWN: And get results at that?

PROF. FARLEY: Yes, for both scale and leaf curl.

MR. MARGESON: I think that the aphid is one of the greatest pests that confronts the grower this year.

MR. STOCKWELL: I would like to ask the Professor why one couldn't spray for the scale and spray just before the buds open, and put in a sufficient amount of Black-Leaf-40 and kill the aphid at the same time?

PROF. FARLEY: I cannot answer that question so far as the aphid is concerned, but we have sprayed with concentrated lime-sulfur at scale strength on varieties that are very much subject to scab, just before the leaves appear, and found that it will help control the scab and also control the scale. I see no reason why you could not include Black-Leaf-40 in that application. We include it in the application of dilute concentrated lime-sulfur just before the blossoms open or just as they are showing the pink color. There is nothing injurious in the Black-Leaf-40, so far as we have been able to find out, nothing caustic in it. It is more cost than caustic.

MR. STOCKWELL: I understand that to successfully compete with the aphid we must spray just before the buds open, Black-Leaf-40 or something of that nature; is that correct?

PROF. FARLEY: Yes. We find also the addition of Black-Leaf-40 after the petals have fallen will sometimes help, but the period just before they open is the important time.

QUESTION: If you spray just before the buds open, with a solution of 1 to 9 concentrated lime-sulfur, wouldn't that injure the buds?

PROF. FARLEY: Just before the leaf buds open?

QUESTION. Well, put it either way, leaf buds or blossom buds. I understood the gentleman to say he

sprayed just before the buds open, with the full strength of lime-sulfur, and also added Black-Leaf-40 to destroy scale and aphid. Is it proper to spray at that time with the full strength of lime-sulfur, 1 to 9, say?

PROF. FARLEY: We have sprayed just as the tips of the leaves are showing, with lime-sulfur at scale strength. It may injure those tips, but it will not hurt the bud. As the buds develop and expand, the tree will very soon overcome the injury that is done by spraying. If you should delay that spraying until just before the blossom buds open and then apply the concentrated lime-sulfur at 1 to 9, you would get very serious injury.

A MEMBER: It seems to me this is a pretty important question, whether we can save one spraying of our trees by spraying with the full strength or lime-sulfur at 1 to 9 just before the buds open, and destroy the scale and the aphid, and thus save one spraying. But we don't want to do that if we are going to injure our trees or the crop of fruit, and if any one knows anything about it, I think it is pretty important to hear from them.

MR. STOCKWELL: In regard to spraying with 1 to 9 for the scale, I had one tree that I left and did not get around to spraying it until I could see the leaves opening, and I thought I would either kill or cure, so I put on the full strength when I could see the form of the little blossom buds, and I never saw any injury to that whatever.

THE PRESIDENT: Our experience has been just as Mr. Farley says, that where you spray after the tips of the leaves show, you do injure those tips. It seems to me the question the gentleman raises, as to whether you can spray the buds without injuring them, can be answered by saying that as long as the buds grow I don't believe there is the slightest danger in spraying with the ordinary scale strength. We have delayed spraying until the aphid had hatched and until the tips showed, which usually comes about the same time. The same amount of heat that will bring the bud will also hatch the aphid. If you can get a

combination that will kill the aphid without injuring the leaf to any extent, it is likely to injure the tip. Of course, you have a very short time to do that in. If you have very much spraying to do you will get caught.

MR. WILFRID WHEELER: It seems to me there is one question we haven't considered in this matter of the aphid, and that is the presence of the parasite early in the spring. Most of us know that the lady beetle is very destructive to the aphid, and if we can determine that they are present early in the spring, we can save considerable spraying for the aphid, because the lady beetles will take care of it. The lady beetle appears just about as soon as the ground thaws out and we can determine their presence by examining the ground around the base of the tree. If the trees are in sod we will be more apt to find them than in cultivated land, but I think this should be looked into pretty carefully before doing any spraying just before the blossoms open. The lady beetles get in their work early, and eat the eggs as well as the aphid themselves. Possibly if the lady beetle could be propagated and held over winter in some safe place, it would be an easy matter to take care of the aphid in the spring. I think the experiment stations ought to do a little more work on the parasite question, and perhaps save the expense of spraying which has to be done with conditions as they now are.

THE PRESIDENT: Can you give us an idea how many lady beetles you ought to find before you decide it is not necessary to spray?

MR. WHEELER: Well, I had a tree that was ten years old, covered with aphid eggs as thick as they could stick on it, and while I couldn't find more than a dozen lady beetles, (there may have been more) I know they took care of that aphid crop. They don't eat the entire egg; they just puncture it and suck the juice and that finishes the egg. The same way with the insect, they puncture it and take the juice. I don't think it would require a great many.

QUESTION: How about the pear psylla? I have got

\$1000 or \$1500 invested in the pear psylla (laughter), and I would like to have something said about that.

THE PRESIDENT: We paid our respects to the pear psylla yesterday. If you weren't here, you will get that in the report.

MR. CUNNINGHAM: Would lime-sulfur for the scale kill the aphid without the additional tobacco?

PROF. FARLEY: It might kill some of them, but I don't think your control would be as complete as it would if you added tobacco.

MR. STOCKWELL: How much tobacco?

PROF. FARLEY: We use half a pint to 50 gallons.

MR. WARE: In what part of the tree do you find the aphid eggs?

PROF. FARLEY: On the buds and young twigs. We find the aphid crawling around on the cluster cup when the leaves open up.

THE PRESIDENT: In the winter you wouldn't find many on the older growth.

PROF. FARLEY: No. Out on the tips or on the buds.

MR. STOCKWELL: I would like the speaker to warrant me that if I put half a pint of Black-Leaf-40 in 50 gallons of water, with 1 to 9 lime-sulfur, that it will do the business.

PROF. FARLEY: I will write that out if you want it. It will kill the aphid if you put it where the aphid is located. The material will kill every aphid that it hits, no doubt about that, but you may not hit all of them.

MR. STOCKWELL: The aphid, or the eggs?

PROF. FARLEY: The aphid.

MR. STOCKWELL: Or both?

PROF. FARLEY: The aphid, the development after the egg. Every one of those that you hit with that material will be killed.

THE PRESIDENT: I think Mr. Stockwell is confusing the question of the aphid after it is hatched, and before. I am very doubtful about the effect of winter spraying. In my opinion, you have to wait until after it is hatched before

you can do him any particular damage. We have at the college and farm two orchards where we have sprayed religiously for scale, but we get just as handsome a crop of aphids as any of our neighbors who don't spray.

MR. STOCKWELL: Then that means two applications, doesn't it?

THE PRESIDENT: Not necessarily. It means that if you wait until the aphid is hatched and then start you can use the dormant strength, and can kill both, the scale and the aphid. But you have only a short time. If you have 50 acres of orchard, you can't get over the whole of it.

MR. MANN: The manufacturers' formula recommends, in the application of arsenate of lead just as the blossoms fall, to add the Black-Leaf-40, half a pint to 50 gallons, I think. I would like to know if that will do the work, because if it will certainly do it we will spray at that time very thoroughly. I find the worst time for the aphid is along after the blossoms have fallen. I don't notice them until later.

PROF. FARLEY: All I can say is that we have controlled it for the past two years, and there is no doubt about it at all. We have killed the aphid that we have had, with that material. I don't say that we have hit every one. It may be that all of those eggs have not hatched at that time. We have put the Black-Leaf-40 on the tree both before the blossoms open, and in the codling moth spray, and in doing that have had very successful practical results in controlling the aphid. We have had very little aphid injury to trees that have had those two applications, whereas on trees that have not had them, we have had a beautiful crop of aphids.

MR. HALE: What proportion of the aphid did you miss?

PROF. FARLEY: I don't know the exact proportion, but in most cases even the most careful man will let a few branches escape in the center of the tree, and on certain trees he may not spray very thoroughly, and unless he hits the aphid it won't affect him. The aphid isn't going to run out and get in the way of the spraying material.

MR. C. K. SMITH: Last spring we set out a good many yearling whips, and cut them down to 20 or 24 inches and left no buds, and as far as we could judge there was no aphid. I would like to ask where we got that infestation, which was very bad throughout the season. It was the green aphid.

PROF. FARLEY: I think you must have missed some when examining the buds.

MR. SMITH: There wasn't a bud on the tree. Of course, there were dormant buds, but I mean to say there was nothing like the buds on the mature trees, but we got plenty of aphid.

PROF. FARLEY: Were there older trees nearby?

MR. SMITH: In some parts of the plantation. In some parts the aphid cropped out half a mile away from any other trees.

PROF. FARLEY: You can get infestation from other trees at considerable distances, which may have been the trouble.

MR. SMITH: This was over the whole piece practically simultaneously.

PROF. FARLEY: It might be that your examination was not complete enough and that there may have been quite a large number of eggs that you missed. That is probably the main cause. There must have been some eggs if you had an infestation over the entire orchard.

MR. MUNROE MORSE: Don't they have any means of passing from one tree to another?

PROF. FARLEY: Yes. They could be blown from one tree to another.

THE PRESIDENT: I have every confidence in Mr. Smith, but I think he overlooked a few eggs; and it doesn't take very many to make a good-sized family.

MR. MUNROE MORSE: Could they be blown in a wind, or fly?

THE PRESIDENT: I am not an expert entomologist, but I don't think at that stage you get the winged form. I think the eggs were there on the trees. He had the one year

whips, and they wouldn't have large buds. but they would have the regular one-year buds clear down to the bottom of the tree.

MR. HITTINGER: Wouldn't the eggs be dormant in the buds?

THE PRESIDENT: Yes, but you ought to be able to see them.

MR. G. N. SMITH: I had an experience in the spring of 1912 with the tent caterpillar and the aphid. Mr. Rees said I might kill 80%, and I told him it killed them all, and I thought that was 100%. and he agreed it was. Two years ago the tent caterpillars were very thick, and the only ones I had were on one side of a cherry tree that didn't get sprayed. I came to the conclusion that the spray might kill the tent caterpillar eggs at any season of the year. but now I think we had better wait until they begin to hatch and the eggs open. It seems to me that a spraying of lime-sulfur at 1 to 9 will kill every aphid it touches. If it don't touch it, what is the use of adding Black-leaf-40?

THE PRESIDENT: There is no question in my mind about it killing the aphid itself. but I spoke of no effect on the aphid eggs.

MR. STOCKWELL: The speaker says we have got to be very careful and not overdo spraying in the spring when we use arsenate of lead. and we want to be very thorough. be sure to touch every spot. but be sure not to do it too thoroughly. I would like somebody to draw the line there.

THE PRESIDENT: I think it is impossible to draw that line.

MR. FARLEY: It is impossible to draw a mark between too much and too little spraying, but I know in some cases we have sprayed too thoroughly and put on too much material, with the result that we had serious burning. We have drenched the trees so that there were puddles of spraying material underneath. When you get to that point I think you have too much material on the trees as well as under them. I don't agree with some people as to the spray-

ing with the Bordeaux type of nozzle, using a 250 or 300-pound pressure for the codling moth. I don't know how that situation is with growers here, but we have had just as good results where we have used 150 or 125 pounds pressure on the codling moth and scab, and better results so far as burning is concerned.

QUESTION: Did you ever use 80 pounds?

PROF. FARLEY: Yes, we have used 80 pounds and not had perfect control, but very good control.

MR. FROST: That brings a point I have never heard discussed, but which I believe is very important. I have had some of the poorest results in foliage spraying where the men have been too thorough, much poorer than where they have not been thorough enough. It hasn't been due to bad burning, but to bad eating and I have some cases where the men tried to be especially careful and they have drenched the trees so much that the poison was all washed off.

MR. FARRAR: If you have a peach orchard and oak woods are near by with gypsy moths moving out, what treatment can you give the gypsy moths to keep them from moving into the orchard?

PROF. FARLEY: We have no gypsy moths in Jersey.

MR. WILFRID WHEELER: Treat them the same way you do the army worm, by plowing a deep furrow next to the woods on the outside of your orchard, and then the gypsy moths in crawling on the ground, will collect in the furrow. Be sure that the steep side of the furrow is against the field. If the soil is at all loose they will keep slipping back, and as they get into the furrow they should be sprayed with kerosene. Also, Tarvia is one of the very best things. Any sticky substance will prevent them getting over the furrow. If they do get in the orchard, I don't see any remedy but to spray the trees thoroughly, and if you have a very bad infestation, start the furrow afterwards.

SECRETARY BROWN: How much arsenate of lead can you use on peaches? Can you use over three pounds?

MR. WHEELER: Peaches never burn with five pounds.

SECRETARY BROWN: Combined with the self-boiled, or alone?

MR. WHEELER: Just the poison alone.

MR. FROST: In some cases where a furrow could not be plowed, the Gypsy Moth Commission have used a windrow of oiled hay and Tanglefooted the trees on the outside, but you must be very careful about Tanglefoot on the peach, because it may injure the bark. If the caterpillars were too thick and swarmed over, the hay was burned and new hay put down.

MR. WHEELER: Put broad band of Tarvia, about 8 inches wide, around the place that you want to stop them from coming in. They will come to that and won't go across, but if it is cold weather you have to renew it every day or so. because it hardens up. That is also a good, effective method of keeping the traveling or crawling insects away from a row of trees around your house.

MR. WARE: Could creosote be combined with the dormant spray to control the tent caterpillar and aphids through the eggs, without injuring the bark of the tree?

PROF. FARLEY: We have never tried that. I wouldn't want to take a chance on it.

MR. FROST: I have never tried it. but I have seen trees injured with creosote, which is very injurious to the bark when used in large quantities.

THE PRESIDENT: Mr. Smith's statement that he controlled 100% of the tent caterpillar with lime-sulfur is all we need on that subject. We have never had trouble with the tent caterpillar where we sprayed in the winter with the regular strength lime-sulfur.

MR. STOCKWELL: Is there any way of spraying the gypsy moth nests?

MR. MUNSON. If you will spray with miscible oil and put the nozzle close up to the nest and be sure to soak it, it will kill the eggs.

MR. WARE: Is there any difference in the expense of using the dry arsenate of lead and the paste?

PROF. FARLEY: There is a considerable difference in the cost of the powdered lead, costing more than the other, but you use just half the amount.

THE PRESIDENT: What is the expense per cask of spray mixture?

PROF. FARLEY: Perhaps a trifle greater in the case of the powdered than it is with the usual grade of paste lead. It doesn't go quite as far in our experience, but perhaps we have been using it a little too strong, using a little too much of it.

QUESTION: Does the addition of extra lime to counteract the free arsenic affect the efficiency of the arsenate of lead in the combination of lime-sulfur with arsenate?

PROF. FARLEY: I don't think it would. I don't think you would put in enough lime to lower the efficiency of the lime-sulfur. I mentioned that in my paper. I was careful not to say that the addition of lime to the lime-sulfur-arsenate of lead combination would prevent burning, but it seems to me if free arsenic is formed with arsenate of lead and the lime-sulfur combined, that free arsenic is supposed to combine with the lime. In some cases there may not be enough free lime to take up that free arsenic, and if you add some lime it may prevent some of the burning. I say it **may**. That has been suggested recently. I have heard it mentioned by a number of different people, but I do not know of any very careful experiments that have been conducted on that point.

THE PRESIDENT: I am afraid we must draw this discussion to a close. We have some matters of business. Mr. Wilfrid Wheeler has an important matter which he wants to present.

MR. WILFRID WHEELER: I have two matters I would like to present to the Fruit Growers' Association at this time, because I think they are as important as anything that has to do with the actual growing. The first is in relation to the apple-grading law, and the second is in relation to an apple census. I am not going through this whole law.

but I want to call to your attention that a committee is at work, composed of representatives of all those interested in apple growing, for a uniform law for New England, and the part I shall take will only affect Massachusetts. There is to be a meeting at the Chamber of Commerce Tuesday at two o'clock, and I hope as many as are interested will come before the meeting and express their approval or disapproval of any part of the law they may see fit to criticize. Last fall, when one of the stores in Boston wanted to get one thousand barrels of apples to give away with their purchases, they had to go to Maine to get them, because they couldn't find enough graded apples in Massachusetts. That is just one instance which shows the necessity of that law.

(Mr. Wheeler reads and explains the proposed law).

REVISED DRAFT of the UNIFORM LAW for the GRADING of APPLES in NEW ENGLAND

Comment by Committee

The public hearing on Tuesday, January 19th, was attended by one hundred and twenty-five people, representing growers, dealers and consumers from the six New England States.

The proposed bill in general was approved—with some minor changes. Many letters have been received from growers all over New England endorsing the proposed law with some changes in phraseology.

The law answers for three main purposes:

1. That each closed package of apples should be marked to show the grade, the variety, the minimum size of the apples in the package, the name of the grower or packer, and name of state where grown.

2. That the contents of the closed package come up to the above markings within a reasonable tolerance.

3. That the system of marking in the several apple producing states should be uniform.

It is not the intention of those advocating the law that it

should be to prosecute the growers and handlers but that it should be an educational measure to gradually accomplish the three purposes mentioned above.

In New York and Maine, where there have been laws, there have been in the last two years only three prosecutions, as, when the growers learned from the inspectors what the grades meant, there was little difficulty or opposition to packing them as under the law, it greatly helping the trade.

The object of inspection is to educate the growers and distributors as to the uniform marking of the grades and to put a stop to a few who always appear not to want any system that will enlighten the ways of trade.

DEFINITION OF BARREL AND BOX

Section 1. Be it enacted by the State of Massachusetts that the Standard barrel made of wood for apples shall be of the following dimensions when measured without the distention of its parts: Length of stave $28\frac{1}{2}$ inches; Diameter of head $18\frac{1}{8}$ inches; Distance between heads 26 inches; Circumference of bulge outside measurement not less than 64 inches; Representing as near as possible 7056 cubic inches; Provided a barrel made of any other material must not contain less than 7056 cubic inches; the standard box for apples shall be of the following dimensions: Inside measurement $18\text{in.} \times 11\frac{1}{2}\text{in.} \times 10\frac{1}{2}\text{in.}$; without distention of parts, representing as nearly as possible 2174 cubic inches.

GRADES

Section 2. That the standard grades or classes for apples grown in this State when packed in closed packages shall be as follows:

Fancy, shall consist of apples of one variety, which are well matured specimens, handpicked, good color for the variety, normal shape, sound, free from diseases, insect and fungus injury, bruises, and any other defects except such as are necessarily caused in the operation of packing, and shall be properly packed in clean, strong packages.

Standard "A" Grade, shall consist of apples of one variety which are well matured specimens, hand-picked, well packed, of good color for the variety, normal shape, practically free from diseases, insect and fungus injury, bruises and other defects except such as are necessarily caused in the operation of packing; or apples of one variety which are not more than five per centum below the foregoing specifications.

Standard "B" Grade, shall consist of apples of one variety, which are well matured specimens hand-picked, properly packed, practically normal shape, practically free from diseases, insect and fungus injury, or any other defect that materially injures the appearance or useful quality of the apples, and which may be less than medium color for the variety; or apples of one variety which are not more than ten per centum below the foregoing specifications on a combination of all defects or five per centum on any single defect.

"Ungraded." Apples not conforming to the foregoing **specifications of grade**, or, if conforming, are not branded in accordance therewith, shall be classed as ungraded and so branded. The minimum size of the fruit in the package shall also be branded upon it as hereinafter specified and in addition to the other marks hereinafter required.

The marks indicating grade as above prescribed may be accompanied by any other designation of grade or brand if that designation or brand is not inconsistent with or marked more conspicuously than the one of the said four marks which is used on the said package.

The minimum size of the fruit in all classes or grades, including the ungraded, shall be determined by taking the transverse diameter of the smallest fruit in the package at right angles to the stem and blossom end. Minimum sizes shall be stated in variation of one quarter of an inch, like two inches, two and one quarter inches, two and one half inches, two and three quarters inches, three inches, three and one quarter inches, and so on, in accordance with the facts.

Minimum sizes may be designated by figures instead of words. The word "minimum" may be designated by using the abbreviation "min."

DEFINITIONS AND PROVISIONS.

Section 3. Every closed package of apples which is packed, sold, distributed, offered or exposed for sale, or distribution in the State by any person shall have affixed in a conspicuous place on the outside thereof a plainly printed statement clearly and truly stating the size, quantity of the contents, the name and address of the packer, or the person by whose authority the apples were packed, and the package marked with the true name of the variety, the class or grade and the minimum size of the apples contained therein, and the name of State where grown. If the true name of the variety shall not be known to the packer or the person by whose authority the package is packed or branded, then such variety shall be designated as "unknown". Every package of apples which is repacked shall bear the name and address of the repacker or the name of the person by whose authority it is repacked in place of that of the original packer.

The marks or brands prescribed in this act shall be in block letters and figures of size not less than thirty-six point Gothic.

Section 4. It shall be unlawful for any person within this State to pack, sell, distribute, offer or expose for sale, or distribution, apples which are adulterated or misbranded within the meaning of this act.

Section 5. For the purpose of this act apples packed in a closed package shall be deemed to be adulterated if their measure, quality, grade or purity do not conform in each particular to the claims made upon the affixed guaranty.

Section 6. "For the purpose of this act apples packed in a closed package shall be deemed to be misbranded:

First. If the package shall fail to bear all statements required by sections one, two and three.

Second. If the package shall be falsely branded or shall bear any statement design or device regarding such apples which is false or misleading, or if the package bears any statement, design or device indicating that the apples contained therein are (Name of State) "standard grade" and said apples when packed or repacked do not conform to the requirements prescribed by section one of this act.

ENFORCEMENT OF THE ACT

Section 7. The Secretary State Board of Agriculture shall make uniform rules and regulations for carrying out the provisions of this Act; and he shall publish on or before the first day of September following the passage of this Act, and after a public hearing, rules for the grading and packing of apples, specifying for each variety the minimum size which shall be admissible to the grade designated as "fancy."

Section 8. The Secretary of State Board of Agriculture, in person or by deputy, shall have free access, ingress and egress at all reasonable hours to any place or any building wherein apples are packed, stored, sold, offered or exposed for sale. He shall also have power, in person or by deputy, to open any box, barrel, or other container, and may, upon tendering the market price, take samples therefrom.

Section 9. When the said Secretary of State Board of Agriculture becomes cognizant of the violation of any of the provisions of this act he shall cause notice of such fact together with a copy of the findings, to be given to the person concerned. The person so notified shall be given an opportunity to be heard under such rules and regulations as may be prescribed by said Secretary State Board of Agriculture. Notices shall specify the date, hour and place of the hearing, said hearing to be held in the county where said inspection is made.

Section 10. There shall be appropriated from the State treasury the sum of 2000 dollars for the year nineteen hundred fifteen and the sum of * * * dollars for the year

nineteen hundred * * * for the purpose of carrying out the provisions of this Act. So much of said appropriations shall be paid by the State treasurer to the Secretary State Board of Agriculture as may be shown by his bills and vouchers of expenditures in performing the duties required by this Act.

PENALTIES AND DEFINITIONS

Section 11. Any person who adulterates or misbrands apples within the meaning of this Act, or any person who packs, sells, distributes, offers or exposes for sale, or distribution, apples in violation of any of the provisions of this Act, shall be punished by a fine not exceeding fifty dollars for the first offence, and by a fine not exceeding one hundred dollars for each subsequent offence.

Section 12. No person shall be prosecuted under the provisions of this Act when he can establish satisfactory evidence to the effect that he acted solely as a distributor, and to the effect that he was not a party to the packing and grading of such articles, or when he can establish a guaranty, signed by the person from whom he received such articles, to the effect that the same is not adulterated or misbranded within the meaning of this Act, designating it. Said guaranty, or said satisfactory evidence, to afford protection, shall contain the name and address of the party or parties, making the sale or shipment of such articles to said distributor and in such cases said party, or parties, shall be amenable to the prosecution, fines, and other penalties, which would otherwise attach to the dealer or distributor under the provisions of this Act.

Section 13. The word "person" as used in this Act shall be construed to be both plural and singular, as the case demands, and shall include corporations, companies, societies and associations. When construing and enforcing the provisions of this Act, the act, omission, or failure of any officer, agent, or other persons acting for or employed by any corporation, company, society, or association, within the scope

of his employment or office, shall in every case be also deemed to be the act, omission, or failure of such corporation, company, society or association as well as that of the person.

“For the purposes of this act apples packed in closed packages shall be deemed to be adulterated if their quality or grade when packed or repacked does not conform to the marks upon the package.”

“The words ‘closed package’ shall mean a box or barrel or other package, the contents of which cannot be seen or inspected when such package is closed.”

Section 14. The Secretary State Board of Agriculture shall diligently enforce all of the provisions of this Act, and, in this connection, he shall be entitled to have and receive the advice, counsel and assistance of the attorney general and of the attorney for the State in the several counties.

The said Secretary State Board of Agriculture in his discretion may recover the penalties for the violation of the provisions of this Act in an action on the case of his own name, the venue to be as in other civil actions, and the plaintiff prevailing in any such action shall recover full costs; or he may prosecute violators by complaint or indictment in the name of the State, and such prosecution shall be commenced in the county in which the offense was committed. All fines received under this Act by county treasurers shall be paid by them to the State Treasurer.

Trial justices and municipal and police courts are hereby invested with original jurisdiction, concurrent with the supreme judicial and superior courts, to hear, determine, enter and by appropriate process enforce judgment in actions commenced for the recovery of the penalties aforesaid, and to try, and upon conviction, to punish for offenses under the provisions of this Act.”

Now, I suppose very few of us realize the enormous loss in this State owing to an over-estimate of the apple crop by the United States Government. The estimate was based on the wildest kind of guess-work, about twice what we really did have, to my mind. The fruit growers are the most in-

terested and ought to help out. My plan is that the Board will cooperate with the Fruit Growers' Association by furnishing blanks for this census, and would like to have one man in a town who would be responsible for the apple census in that town, to have him call a meeting of every person who owns five or more apple trees of bearing age, and blanks will be furnished that man for distribution, and when they get together, the varieties are to be put down, the number of trees, their age, the last crop and any other information which might be of use, all to be supplied in that blank. Then the person taking the census tabulates the information on another blank, and returns it to our office, where it will be filed. Next year it will be necessary to call that same number together, and the original census-taker will get out a blank, the blank which they had last year, and at the end of July or around that time a fair estimate of the crop can be made, and that will be based practically on the actual number of bearing trees in the State. Now, the Government estimate taken from the census says, "This town or that town contains so many apple trees"; but that doesn't mean anything. They may be trees that are dead or never amounted to anything one way or another, but still they are counted. I believe that we can get at this information and I believe the Board can help you if you are willing to cooperate. The idea I have advanced may not be perfect, but I wish to put it up to you and say that we will be very glad to help it out and do the tabulating work which may be necessary.

QUESTION: Is this not State Census Year, and so far as the first part of this proposition is concerned, couldn't it be more accurately taken by the State census-takers? Of course, I agree with the idea of having some representative of this Association in each town.

MR. WHEELER: I don't believe the census-takers can do it, because of the fact that any kind of person who can read or write can take an ordinary census. What we want is a real apple census. The ordinary census man goes around, and the man he goes to answers him and says, "I have 100

apple trees." He doesn't know the difference between an apple tree and an elm tree, or how much it will bear, but you men who are interested in the business can tell whether John Smith or somebody else's trees are of bearing age, and if he reports such-and-such a tree you can tell whether he reports fairly accurately. I think that the trouble with the census is that it is taken by persons who don't know what they are taking, and therefore you men are in a better position.

THE PRESIDENT: Would it be satisfactory if this were carried over to our annual meeting next month, to be brought up for discussion then and perhaps we will be better prepared to take action at that time.

MR. WHEELER: Yes, I think it would.

(At this point the President reads invitations from various cities and towns, inviting the Association to hold their next meeting).

(Moved, seconded and voted, on motion of Mr. Frost, that the meeting place for 1916 be referred to an executive committee, with power to act).

(Adjourned to 2 p. m.)

AFTERNOON SESSION

2 p. m., Thursday, January 14, 1915

(Meeting called to order at 2.10 p. m. by Pres. E. W. Breed of the Worcester County Horticultural Society.)

PRES. BREED: It is always a pleasure for the Worcester County Horticultural Society to greet the members of this organization. We have always taken delight in the fact that you started your work in our library, and that you have conducted your sessions and held your society together ever since and have had such a successful career. Therefore we are always interested in whatever you do. We are glad that we are able at this time to extend to you the hospitalities of the building, and that we can be of service to you in carrying on your work. We are interested also in the program which you have provided. The subjects that you have discussed are important, but one in particular seems to be paramount at this time, and that is the utilization of horticultural by-products. It is rather singular that in every other phase of life this has always had a very prominent part, and I have reason to believe that in many cases the profit, over and above the actual cost, is often considered as coming from that one branch of it, the waste product. According to the experiences which we have had the past season, it is becoming more and more an important factor to save everything, in order to be successful.

But you have not come here to-day to listen to me, but to hear from that dean lecturer on horticulture, and its various subjects, and we have great pleasure in presenting to you Dr. George M. Twitchell, who will speak to you upon "Uniform Fruit Legislation for New England." (Applause).

UNIFORM FRUIT LEGISLATION FOR NEW ENGLAND

WHY: HOW: WHEN?

Dr. G. M. Twitchell, Auburn, Maine.

Former President Maine State Pomological Society

Industrially and commercially, we are in the midst of great revolutions where methods, habits, markets and all business relations are involved. A combination of circumstances and accidents forced the situation and the titanic struggles involving all of Europe has intensified every feature. We can never go back to old time conditions, we must conform to the new.

One of the greatest problems facing the rural inhabitant is the growing consciousness that he is part and parcel of the great industrial and commercial aggregation, governed by the same laws and principles. Living the more separate, and to some extent isolated, life of the farm, the fact of this interdependence of interests has not yet been fully-realized. The farmer is not a unit working out the problems by himself but an integral part of the great body, in town and country, facing the solution, first of all, of the bread and butter problem, and, with this, the higher and more subtle questions affecting our civilization.

This admitted, it follows that the customs and practices holding in the great centres, necessary for their life, must be applied in the narrower circles. One fact to be borne in mind is that the farmer is the only known producer. Others multiply forms, improve quality and change location, but never produce anything.

The farmer through his knowledge, skill and experience, cooperating with the laws of God in nature, must unite the rays of the sun, the elements of the air and the poten-

tialities of the soil in multiplying the products of the earth for the sustenance of man. Unfortunately he has not kept in touch with the high position he occupies in the industrial field and has failed to count himself, first of all, a manufacturer. Individual conceptions and standards have governed and naturally uniformity in products, coming from different sections, has been lacking.

Working out the problem of life by himself there has resulted a spirit of opposition to restraint over his business, and legislation, intended solely to benefit, has, too often, been considered a crime against the farm.

Opposition to remedial legislation is but the logical outcome of past experiences. Before effective measures for relief can be made active, those on the outside must first get the viewpoint of the man on the farm. Reforms can never be forced and made lasting. Men engaged in large operation can have no conception of the farmer's outlook and think him obstinate when he is but protecting his own. For this reason legislation looking to the unifying of standards of grading, packing and branding fruit must first of all be educative.

It would be criminal to force men, who all their lives have followed individual conceptions of market demands in packing, to conform to rigid legal requirements, without first making clear their material as well as financial benefits. New England farmers have, by training, practice, inheritance, and environment, grown into a spirit of independent thinking and action which the city inhabitant, with his multiplicity of helps, can know nothing of. We hear so much about the dishonesty of the farmers in, so called, deaconing of their apples, but not a word about the crime of adulteration of every named food product by manufacturers or the fraud of false representation. It is all right to put Benzoate of Soda into nearly every food and drug product, because political influence has made it legal, regardless of the certain injurious effect upon the user, but it is criminal for the farmer to put undersized or imperfect apples in the center

of the barrel. So long as this condition exists attempted legislation, from the outside, to put restrictions on the apple grower will meet violent opposition, until its sure beneficial results are firmly established.

Cooperation, which today makes business life successful, is not yet recognized as the legitimate function of the farm. We shall never witness the extension of community interests, and legal restrictions, until there is realization of the benefits and for these to be appreciated it is necessary that cost of production be determined. Legislation, necessary as it is, is **not** the initial step. It is useless to attempt legislation, in any direction, until public sentiment is alive to its importance. To be effective and permanent it must follow not precede public sentiment, not on the outside but first of all from within.

Under our form of government, with a growing disregard of law, it is unwise to attempt to press a measure which seems to trench upon individual rights, until its full significance is appreciated by those most directly affected.

Legislation which radically changes the relation of man to his neighbor must first be educative, never drastic. Looking for permanent results the individual mind must be made ready for enforcement before it can be impartial. A law on the statute books not enforced is a menace to the industry it aims to benefit.

Not one man in one thousand realizes the actual cost of a barrel of apples; how then will you unite the great body of growers for a fruit law which at every step trenches upon long established practices, on the seeming rights of individuals?

The orchardist must first of all know the cost of production. Then the certainty of greater returns following proposed legislation. In any attempted opening of the home market the consumer must be educated to the value of such legislation and the possibility of reaching producers direct. Today it would be practically impossible to find in New England a score of men, outside our local fruit growers

associations, having the same conception of a No. 1 apple.

Individual, community and market demands will modify the pack in some minor details. To force a law requiring a uniform pack and grade, without first a campaign of education, would endanger the whole proposition.

For these reasons I would lay the foundation on cost of production that it may stimulate the producers to steps for self protection along the line of a grading, packing and branding law. No step should be taken which directly or indirectly will injure the industry. For a series of years I have found the items of expense in caring for old trees to be—pruning, fertilizing (12 lbs. $4\frac{1}{2}$ -10- $4\frac{1}{2}$ per tree), spraying, (3 times), protecting from borers, and cutting the grass for a mulch, $53\frac{1}{2}$ cents per tree yearly; interest on a valuation of \$10 per tree, 60 cents, taxes per tree (2 per cent on \$100 an acre) 25 cents, interest on machinery, tools, etc., 6 cents, depreciation of trees, (2 per cent) 20 cents, depreciation on machinery (2 per cent) 5 cents, total $\$1.49\frac{1}{2}$ per tree. During these years the yield has averaged one barrel of No. 1 apples, one-eighth No. 2 and the culls and drops.

The cost of picking has been 20 cents, hauling barrels to orchard .02, barrels .37, hauling to storage .02, storage 30 days .05, packing .18, hauling to cars .05, (one-half mile), 79 cents per barrel, or a total cost of \$2.12. Distance from station and possibility of marketing drops and culls will change these totals, as certainly will average yield, but the fact remains that our apples cost us \$2.00 per barrel, ready for shipment, upon the basis of good business, figuring the overhead charges, as we must. Some trees far exceed this yield but one must figure every bearing tree and the lean years as well as fat. All labor is figured at \$2.00 per day for man and \$1.00 for horse. Modify these figures to meet individual conditions, yet the fact remains that appreciation of cost forces the study of questions promising a better price and so this legislation becomes the logical step. Thankful are we that the day has gone for the orchard to be counted a get-rich-quick-scheme, but its evil effects will long be

manifest in neglected orchards, a menace to the industry.

Profit is to be found through attention to items overlooked or thought unnecessary, especially through such methods of protection, spraying, grading, packing and branding as will insure better quality and greater uniformity in the pack. If spraying will improve size, protect from fungus diseases and insure 97 per cent free from defects, then thorough spraying becomes a necessity. If a clean packing and grading law will insure a more uniform pack, the certainty of a better price forces its early passage and enforcement. The opening of the Panama Canal, and great reduction in freight rates from the far west, is certain to give the apple industry there a tremendous boom, and obliges us to study problems from a different standpoint than formerly. It necessitates also the adoption of that thorough method of grading, packing and branding, under legal restrictions, which insures the western box apple its coveted place in our local markets.

It is not a question of what we would like but what we must have. The life of the industry is in the balance and its friends must be alive to protect. New England, which formerly dominated the industrial, political and moral thought of the nation, finds itself set one side, in many respects, and it behooves the workers to unite for specific action whereby the combined influence of these six states may be centered and their great agricultural interests made dominant.

Establish the fact of a law in each of these six states covering the grading, packing and branding of apples, with ample provisions for inspection, and you at once add to the selling price of every barrel. Individuals, and local fruit associations, have by these steps gained a leading position in the great markets at home and abroad. It becomes our duty to unite all forces for the greater good to the industry as a whole. In 1902 the Maine State Pomological Society constituted your speaker a committee of one to take up this subject of legislation with the other New England states with a view to uniting all organizations for uniform action. In

1908 at Wilton, N. H., each state being represented, a purely educative measure was agreed upon. Maine at once took the initiative and in February 1909 passed the first law, touching the grading and packing of apples, ever enacted in the East. In 1911 it was strengthened, but no provision made for enforcement, and in 1913 again changed to its present form. The result today is a general demand for its enforcement by producers and for strengthening the inspection features.

From all foreign and domestic markets there have come this year unsolicited testimonials to the good effect of this law, and the wise inspection by the state. This materially increases demand and price. At the same time a larger appropriation will be necessary next year to provide for more complete inspection. No burdensome restrictions are placed on any one, a man can pack his apples as he chooses, but his name must go upon the barrel and the brand must be a true index of the contents. At the same time let us not forget that laws are but idle words unless vitalized into action by vigilant officials backed by a critical public. Experience is proving that it is a simple proposition to pack in harmony with the sections of this law. Maine would not accept the Sulzer bill with its ten per cent defective apples for this is but the open door to serious complications.

Thousands of barrels have the past season been packed and shipped without inspection, yet there is good reason to believe that there has been a closer approach to an uniform pack than in any previous year, and our most successful orchardists and shippers are united in defence of the law.

All this has been accomplished in two years, backed by previous educative measures, and as a natural result local fruit growers' associations are springing up to take advantage of the law and the uniform pack it insures. If the other New England states are ready for an apple packing and grading law, with teeth to make it effective, then by every consideration of justice, efforts should be centralized before present legislatures to secure its enactment with am-

ple provision for inspection. If the producers are not ready, and public sentiment is not active, then surely the initial measures should be attempted. It would be a serious injury to our fruit interests to secure the passage of a law to be repudiated later at the polls, or repealed at the next session of legislature, simply because producers and the public are not ready to support and defend.

The absolute necessity for a law giving the state control over all fruit shipped is one of the certainties of the present, and the friend of the orchard will stand to protect as well as legislate, realizing alike the danger of delay as well as of ill advised action. Because New England interests are so closely interwoven, because the apple industry is to be the great cash crop on the farms in the hill sections, because all about us are the very best home markets, because the consumer is entitled to just what he purchases and the producer to the best possible price for what he sells, I stand here today to urge the union of these six New England states for such legislation as will best protect grower and consumer, and permanently stimulate the apple growing industry in every section. Not until the New England grown apple, with its superior flavor and food value, finds its place upon every counter and in every home, and supplants the inferior product from other sections, will the actual worth of an orchard be realized in any community. There's a big, big problem facing this and every other live organization. It is to help protect the industry through wise legislation, arouse producers to the importance of community rather than individual efforts, aid in eliminating unnecessary factors standing between producer and consumer, assist in equalizing transportation rates on all farm products, stimulate the largest possible development of the home market, and bring about a closer union of the New England farmers.

In no other way can an association serve the growing necessities of a burdened industry. The record of 1914 is closed and valuable only for reference. It is the new year with its broadening activities, its increasing obligations,

which faces us today and demands our most consecrated efforts. So intimately are the problems interlocked that they become different phases of the same great question to be worked over, and worked out, by the organized thinkers to a complete solution. Big business long ago learned the value and necessity for a cooperative work, and the lessons confronting us will not be solved until there is established a cooperative individualism where all are for each and each for all. Then we shall have uniform laws protecting producer and consumer, impartial enforcement demanded by all, and agriculture will rest upon the same fixed basis as other industries and the farmers of New England will have come into their own.

PRES. BREED: The question is now open for discussion, and Dr. Twitchell, as you well know, is ready to answer any questions at any time. Please try him. I rather depend upon the fruit growers for this discussion.

QUESTION: I would like to ask the Doctor what method they pursue in inspecting the apple in Maine? Do they inspect them at the barn or warehouse, or where are they supposed to be inspected? Are they rigid in their inspection, or what you might call easy? The law says there shall be no worm-holes, no wormy apples, etc. What do they call a wormy apple? A great many apples have a visible worm-hole, but it is nothing serious, and they are good apples and in every way desirable with the exception of that. That occurs some years right through, and if we have such a year as that have we got to throw all our first-class apples into seconds?

DR. TWITCHELL: We are finding that by thorough spraying, the conditions spoken of by the gentleman are very largely being eliminated, that we are thereby preventing all the wormy apples and they are being practically wiped out by thorough spraying. Our method of inspection this year has been for the inspector to go into the sheds or barns where the buyers or packers were at work, and overlook their work, open the barrels. Sometimes they would go to the

station and take a barrel out of the car or take a barrel off the team as they were unloading it into the car, then open it up and go through it to find its condition. If he found the barrel was all right, that it would pass the law, because it had been taken at random he would take that as typical and pass the pack. It might not be, but that has been the rule. Last year the work was almost entirely educational, and this year it has not been enforced as rigidly as it will be in years to come, because there has been the desire to help men to conform to the conditions of the law rather than to force them to do it. As regards the apple that is without any outward defect, that is, something which the eye could not determine, but in the new law, it requires that a barrel of fancy or No. 1, or Grade A, shall be free from wormy apples, and in Grade B, or what is under the old law No. 2, if there is one worm hole upon the side, if the skin is not broken or the keeping quality of the apple is not injured.

QUESTION: Then I understand that up to the present time they really have passed everything along in a pleasant manner?

DR. TWITCHELL: Oh, no, I could easily cite some men that wouldn't say that they had, because they have been called into court in several cases. The effort of the inspectors has been to bring about harmony with the law on the part of the packers. Where a packer has been willing to cooperate, I think the tendency has been to allow a little, looking to the future good of the industry and of the growers: but where, as in one or two cases, they have found that the violation was continued after attention being called to it, why, then there have been several cases reported.

QUESTION: Might I ask what the penalty is for violation?

DR. TWITCHELL: It reads something like this: "Any person who adulterates or misbrands apples within the meaning of this act, or any person who packs, sells, distributes, transports, offers or exposes for sale, distribution or transportation apples in violation of the provisions of this

act, shall be punished by a fine not exceeding \$100 for the first offence and by a fine not exceeding \$200 for each subsequent offence."

QUESTION: May I ask if there were many of those? Were they pushed?

DR. TWITCHELL: I think one or two cases were pushed to a finish in our court. I do know that the Commissioner has a report and counsel has instructions. There was one case where the apples had been packed in barrels and had not been properly racked and filled too full and pressure put on, and it had split the apples, and the experience of the inspector with the man who did the work was such that he reported it back to the State.

QUESTION: Is it your experience that when pressure is put on, the apples will be mashed a little bit if they are put up as they should be?

DR. TWITCHELL: They should not be smashed. They will be pressed, but the skin should not be broken. It seems to me that if you put on pressure enough to break the skin of an apple you are going to get a slack barrel, and I have found in going through the State where the inspector was assisting in packing and racking barrels, you can get a good, solid pack without breaking the skins.

PRES. BREED: How about the unclassified fruit?

DR. TWITCHELL: That would be disposed of in another class, "Unclassified." There are some people in Maine who evidently have not confidence enough in themselves to think they could put up a barrel of No. 1 or No. 2 apples, and so they put their apples into the barrel as they come, and call them unclassified and send them along to get what they can for them, not realizing how much they lose by not properly grading. We have got to seek the best way to wipe out that section in the law so that the grade of the apples can be clearly defined and allow for defects that would not be allowed in a better grade.

MR. WARE: What do you consider the cost of an average barrel of apples, to produce?

DR. TWITCHELL: I can only speak of my own experience. If I had an average yield of four bushels per tree, as one gentleman told me to-day his had averaged him for five years in every tree in his orchard, it would materially change it. It is governed by the average yield of less than a barrel and a half in this country. In the bearing trees which I have there were a lot of old trees that had been neglected for years, and I brought them back in seven years, and they were in pretty good healthy condition. Their yield for me has been only a barrel of No. 1's, and one-eighth were No. 2, culls and drops, so that the cost to me has been practically \$2 a barrel. That, of course, returns to me the interest on my investment, covering machinery and depreciation and every item of cost and for every moment's time spent on the trees or on the apples.

MR. CARTER: Can you tell us the average price per barrel with your trees? How much have you received for your apples?

DR. TWITCHELL: Well, I have received more than they have cost me. I can't give you the data, but I will only speak from memory, and say that they have averaged me better than \$2.25 a barrel for that time.

QUESTION: I thought perhaps if you knew the cost you would know the exact figures.

DR. TWITCHELL: I didn't go through my accounts for the figures.

QUESTION: Do you feel satisfied at working for that price?

DR. TWITCHELL: No, and I hope I shall never be satisfied with anything; I don't want to be. (Applause). Do you? Well, I realize your question and it deserves a better answer than that. No, I am not, and I am trying to bring those old trees into a condition where they will give me a better yield. I am also, in conjunction with others, trying now to bring about a local fruit association whereby we can have one man packing and handling the crop for the neighborhood, and that of itself is going to give me a better price

than I can get in the market alone as an individual. Those are two of the steps to take. Then I am seeking to find how I can, through that association, find a way of giving myself a lower cost, by buying our supplies in larger quantities for the entire membership. That is what cooperation will do. It isn't a very popular word now, but still that is what it will do if you give it a chance. I am not satisfied yet, gentlemen, no. I wonder if any one has any money invested where he is not satisfied if he gets 6% interest, and where it maintains the security of the investment right along? If I had any I would be very glad if I could be sure of that year in and year out. Yet I had that profit from my apples.

PRES. BREED: Some one asks if they were packed in accordance with the law.

DR. TWITCHELL: I packed mine with nothing less than 2½ inch, or at least that was what I instructed them to do.

MR. STOCKWELL: It is not very encouraging for a man to set out an orchard if he has got to pay \$2 to raise each barrel of fruit and then maybe get only two or two and a half for them.

DR. TWITCHELL: My dear man, you are not paying out two dollars. That includes everything, includes all overhead charges, improvement of your property, provides for depreciation of your plant, as well as for the expense. If the expenses were 53.5 for the men on the trees and 89 for package, storage, carting and picking of the apples, I would charge at the rate of \$2 a day for the men and \$1 a day for the team, so that you are selling your time and getting your pay for it when you are selling your apples at cost, and if we may judge from this report from the Government we haven't always been doing that on the farm.

MR. JENKS: I would like to ask the speaker what class of men they use in Maine as inspectors, whether they have any difficulty in obtaining inspectors, and how many such inspectors we would need in Massachusetts if such a law

should be passed, and how large an appropriation we should ask for to properly enforce this grading law.

DR. TWITCHELL: We have an appropriation this year of \$1500, and we have had six men. The fruit territory in Maine is pretty large. Where I am living we are sending out about 50,000 barrels, or would have if they had all been picked. These six men must cover that territory. One man is located in each of the six leading sections of the state in the fruit-growing sections. But the packers don't cover the whole territory. It will require a larger appropriation. I can't say how many packers will be required in Massachusetts, because I don't know how much territory you have to cover, but this year we are attempting to get an appropriation of \$2500 to enable us to employ more inspectors for the months during the packing season, that is, from the middle of September until the first of January.

MR. JENKS: What type of men do you use and what do you have to pay them for the day's wage?

DR. TWITCHELL: I don't know what the inspectors are receiving, but I fancy that it is about \$2 per day and their expenses; perhaps it is \$2.50, but we are getting good men, men who have been on the road, representatives of some of our fertilizing trade, or in selling implements, men who have had experience in doing business and in handling men, men who are good "mixers," who are capable of exercising prudence and reason and caution.

MR. JENKS: Good politicians?

DR. TWITCHELL: No, I wouldn't drop them down to that.

MR. JENKS: Who has the appointment of these men?

DR. TWITCHELL: The Commissioner of Agriculture has the appointment of the inspectors and the oversight of prosecution.

MR. CUNNINGHAM: Why not leave it in the hands of the people themselves, for the community to decide whether they will have packers come and pack their apples for one body of people in a uniform quality, and then you can get

the advantage of getting better prices if they like, and let other people pack their apples as they see fit?

DR. TWITCHELL: Our experience was that just as soon as it became known that Maine had passed the fruit law, it began at once to increase the demand and improved the prices for our product. It is the same experience they had in Canada when it was known that the Canadian fruit marks act had been passed. Nova Scotia felt the benefit of the act as soon as they began to ship their fruit under it. Am I not right, Professor Sears?

PROF. SEARS: Yes, sir.

DR. TWITCHELL: That is what the law will do when backed by public sentiment. In fact, it accomplishes the purpose of giving you a position in the market, and when you leave it to the individual or to individual organizations you are going to lose, I think, one of the most important features, and that is the uniformity of the pack. That is what you want to aim at, gentlemen, in New England. Boston is the great center where the majority of the fruit from New England finds an outlet to market. That being so, don't you see that the value of that product very largely depends upon its uniformity? When the time comes that you know that the apples from Vermont and the apples from Maine are graded the same, under the same general law, you will find that each state will benefit and each grower will receive more for his apples than he would get any other way.

QUESTION: How can they grade them with any justice? Different localities grow different varieties, larger and finer apples in one place than another, but all under the same inspection.

DR. TWITCHELL: There is a general interpretation of that law. They go in the same as A or B under the new law. You get the uniformity and the apples are going for just what they are.

QUESTION: Do the seasons affect the size of the apples a good deal?

DR. TWITCHELL: Yes.

QUESTION: That is true with our Baldwins. They will lose 25% of the usual size on account of a dry season.

DR. TWITCHELL: Ordinarily the Baldwin in Massachusetts is larger than the Baldwin from Maine, but we are willing to take our chances, because we know that the law has given us results that we could not get without it, and if your apples are larger and can all be graded "Fancy," while ours are A, or No. 1, we have got to take our place there. Every man will go just where he belongs if we can get that law, and when you get educated up to the uniform enforcement of it.

QUESTION: Is it their purpose to inspect more thoroughly, to have a larger number of inspectors?

DR. TWITCHELL: They will have a larger number, but they do not begin their work until about picking time.

QUESTION: Then if you get a larger appropriation you will have more inspectors. They are needed, are they not?

DR. TWITCHELL: We need more inspectors. We ought to have at least twelve inspectors.

QUESTION: Will they cover the whole State?

DR. TWITCHELL: Yes. Aroostook, which is the largest county in the state, doesn't produce practically any apples, so that the fruit section is confined to six or seven counties.

QUESTION: If we had them here in Massachusetts we would be calling for a little larger appropriation every year, and an increased army of inspectors, the same as other departments.

DR. TWITCHELL: That is a matter for Massachusetts to take care of for itself.

MR. MANN: I understood the Doctor to say that one inspector guarantees 10,000 barrels of apples in a season. If he only gets \$2 and his expenses, I pity him.

DR. TWITCHELL: He was the agent for the local fruit growers' association; he had the packing of the fruit for

that association, and the selling of it, and it was done under his authority and inspection.

MR. MANN: I handle a few myself. I handled 3300 last year, and I defy any man to pack over three times that amount and be able to guarantee what these apples are, under any law, for \$2 or \$2000.

DR. TWITCHELL: I don't think he could do that.

MR. MANN: Well, what is your guarantee worth? If you are going to inspect the apples properly and sell them that way, it will take an army of inspectors in five years, and it will cost us \$100,000, and the Governor would have to abolish them the same as he is going to abolish the Board of Agriculture. I believe every one has got to stand by his own fruit; "By their fruits ye shall know them." I don't believe you can cover it in any law. No man will be honest unless he is willing to be, and they will all go in under our own name, go to market and get through just as well as under the name of some association. I don't believe in this cooperation business, and I think I have got just as good a trade as any of you in the fruit business. I ain't going to jump in with the crowd and say, "I will come in with you and give up my business." I don't ask anybody else to do it and I don't believe in it. I have been through two or three cooperative schemes in Massachusetts, and they have all failed. I haven't seen one that hasn't, and this one will in the end. You can't do it.

A MEMBER: Cooperation is all right if it is worked right, but if it isn't it will fall, and it is not the fault of the thing itself. It is the fault of the individual more than the scheme. We tried it in Groton. We paid in our money and got left. It wasn't worked right, that was the matter. The men who should have been most honest sold their milk in Boston—this was a creamery scheme—they sold it in Boston because they could get two cents a can more than they got at the creamery. They used the creamery as a club, and instead of using it to try to build up the cooperative creamery they used it to their own advantage and the hurt of the

others. That is the way it worked and the way we all lost our money.

PROF. SEARS: You have spoken about the way the Maine law works and I want to speak of the Canadian Fruit Marks Act in Nova Scotia. I want to say in the beginning that I am very heartily in favor of this Commonwealth having some sort of law, and the Doctor is certainly correct in saying that it worked in Canada, where they have had it going for ten or twelve years. Three or four years ago, after the law had been working for six or eight years, they had had a chance to find out how it worked, and I wrote a number of different men in Nova Scotia with whom I was acquainted, to get the views of the commissioners, the authorities and the inspectors who were handling the law and who would know how the law was working, and who were near the large dealers; and also to some of the representative growers and one or two other men, perhaps, who didn't class in with any of those, and I asked them how the law was working, what they thought it had done for the apple industry in Nova Scotia and whether they had any criticism, and to my surprise all those I wrote to—I probably had fifteen or twenty letters in all—were very enthusiastic and very emphatically in favor of it and saying that the law had worked wonders for the apple industry of Canada.

And it was especially good for apples in Nova Scotia. What surprised me most of anything was that the dealers and buyers should endorse it so emphatically. The farmers said it was fine for preventing the dealers packing dishonestly, and the dealers said it was fine because it prevented the farmers packing dishonestly as they used to, and the authorities under whose direction it was carried out were all emphatically in favor, saying that it had worked wonders in Nova Scotia and Canada generally. I have at home a chart sent out by one of the large apple-concerns of Liverpool, showing the average prices realized on Baldwins in the last five years, and the Baldwins are classified as Canadian, Maine, New York and Boston. You are familiar with the type

of chart, and it is very noticeable that the Canadian line on that chart is way at the top. None of the American Baldwins average as well as the Canadian. Next comes the Maine, on the average considerably above the rest, and our Boston Baldwins stick consistently at the bottom in most cases. The Maine advancement is more noticeable in recent years. To my mind it is simply the effect of the Canadian law having been in effect longer than our Maine law, and the effect also of their having the law and our not having any here. We all know that in spite of this fact, the Canadian law isn't anywhere as good as ours. They will admit that off-hand, but people have confidence in the pack, and they have that confidence because the government is standing back of it and seeing that the thing is handled properly. So far as that fearful army of inspectors is concerned, I don't think we need be afraid of that. Our friend Mann thinks an inspector is going to look inside every barrel as it is packed. That isn't necessary. If every man was as honest as Mr. Mann we wouldn't need any inspectors, but unfortunately some of us are not, and you have got to have men to look out for those other fellows, and if they feel that their apples are likely to be inspected—(it isn't that they are always going to be, but that they are likely to be, for the inspector has the privilege of coming to that packing house or warehouse and inspecting them, or he can do it in transit or anywhere else)—that will keep that sort of man up to the mark. You don't legislate them so as to make them honest, but legislate them so they act as though they were honest. (Applause.)

DR. TWITCHELL: Coming up on the train yesterday I met a man who told me that he had bought 125 cars of apples and shipped them to Boston. He was on his way up yesterday with the lot. He had packed a good many himself and a good many he had bought already packed by others. I asked him what his impressions were in regard to the law, told him I was coming here to-day to speak on this question, and asked him what he, as a buyer, thought of this law, and he said, "I am frank to say I would rather be allowed my

liberty; but I must admit to you that the law has had a remarkably good effect in toning up the average of the pack, and I know, further, that the producers are coming more and more to depend on the law." It is having a great influence, just as Professor Sears has indicated. They don't know when the inspector is coming, and so the pack is more uniform than it was. I don't mean by that that all Maine apples are good, even though branded No. 1, but we are getting a more uniform pack than we had before the law, and surely there is no movement in the State of Maine, apparent in any way, looking to its repeal.

MR. G. N. SMITH: It seems to me that a law, in order to be respected and obeyed, must be founded upon justice. Now, you know that nobody respects our tax laws, because they are not just. I believe as Mr. Mann does, that we have altogether too many laws. We don't know what they are, and we can't obey them if we do, and I believe with him that we should all be given the right to do just as we please in every particular, so long as we don't interfere with the equal rights of anybody else. Now, a person who puts up a barrel of apples and puts in inferior apples and labels them No. 1, is either acting from ignorance or else he is wilfully trying to deceive the purchaser, and there I think it is perfectly right and just that the law should step in to say that he must put in nothing but No. 1, or else cut out the dishonest labeling. I think the law is perfectly right in protecting the purchaser, but when you come to cut out our right to put up apples unclassified, I think that is going too far. If I don't feel competent or haven't a sufficient number of apples or don't care, I think I should have a perfect right to put those apples in as I wish, and sell them for what I can get, provided anybody will buy them. When you say I can't do that, it seems to me you are interfering with my personal liberty and the liberty of the purchaser. I admit that there are a great many apples on the market that shouldn't be put on the market. I saw some last summer that I told the man I should be ashamed to buy. It isn't right to offer anybody

apples like that, for they are not fit to eat, but I don't know as you ought to pass a law and say anybody shouldn't buy those if they want to buy them. It goes against my nerve to see folks smoking, but I don't think I would be justified in passing a law to prevent you folks smoking simply because it annoys me.

PRES. BREED: As I understand it, this law provides for the unclassified. We all know there are certain people who can't afford to buy No. 1 or No. 2, and it is fair and right that they should be provided with fruit which they can get, and it is also fair that the grower should have an output for that quality. Perhaps ex-president Frost is in touch with the legislative work at this time and can favor us with a word.

MR. FROST: I think that the whole thing has been well thrashed out, and I can't add very much to it; but I am strong in saying that I am in favor of the bill that has been drawn up by our committee, and I feel that it is going to be a great help for the Massachusetts fruit growers. The consumer doesn't trust the producer and the producer doesn't trust the middleman at present, and as I have studied it I believe that every one of them in some cases is wrong. I don't think that the middleman is any more honest than the producer, and I don't think in some cases that the consumer is any more honest than the producer or the middleman. However, I believe a law like this is going to work out very nicely if we all trust each other, and I believe that the producer will get a fair profit and the retailer and middleman will have to cut their profits where they are making an excessive charge. I know this year some retailers are making an exorbitant percentage on the dollar that the customer is paying for his apples, and it is checking the consumption of the fruit, and I am heartily in favor of the bill.

QUESTION: I would like to ask if this law would effect the use of the flour barrel, or prevent it. As I read it, I thought it would.

DR. TWITCHELL: The flour barrel is a little larger, I

think, than the apple barrel, and this law would not in that case bar it. It simply fixes the minimum size of the standard barrel by law to shut out the small-sized barrels and establish the minimum size of apple in the package.

QUESTION: Did I understand the gentleman to say that they were about to cut out the unclassified clause in Maine?

DR. TWITCHELL: I think there may be a movement this winter to repeal that section and substitute for it a section which will provide for a lower grade than the other sections. The new law as read by Mr. Wheeler this morning provides for the fancy, A, B, and ungraded, which is practically the same as our unclassified.

QUESTION: Then it practically forbids any man from selling his apples under that law unless he brands them with some grade?

DR. TWITCHELL: I was speaking before that of Maine. If we repeal that section, we will substitute for it something which will allow a man to grade his apples. There will be nothing in our law to prevent a man packing apples just as he pleases, but he must brand them in accordance with the contents. That is all the law requires to-day.

QUESTION: You wouldn't take the inspectors from the fruit growers, but from any business?

DR. TWITCHELL: I think the fruit growers are the men who should do the work.

(Adjourned sine die.)

GRAPE CULTURE

Director Edward R. Farrar, South Lincoln, Mass.

[This paper was given at the Annual Meeting at Worcester in 1914].

For the commercial growing of grapes it is necessary to have a favorable location where the late spring or early fall frosts are not likely to destroy the crop. Cold air settles on the lower levels, something as water does, this being referred to as frost drainage, so that an elevated hill slope is best for grapes. If there is a body of water at the foot of the hill, so much the better, as the air moving down over the water is warmed, and rises, giving a current of air which will occasionally save a crop. Some of the more successful grape sections of New York take an advantage of this, and are located on the border of the larger lakes.

The slope and character of the soil should be such as will ripen the fruit early, as the price drops very materially when the New York or western grapes come into the market, making it difficult to dispose of our crop at a profit.

Wind-breaks, protecting the vineyard from the strong prevailing winds, are a help. Injury of the young leaves by the high winds cracks the outer tissues, interfering with the flow of sap, and gives favorable conditions for the entrance and growth of fungus diseases. The vines do not do as well, or spread as evenly, over the trellis, when blown about by the wind.

SOILS.

Grapes prefer a light, friable soil, one similar to what Mr. Wilder refers to as a "baldwin soil."

In one of the New York bulletins Mr. Dorsey says:—
"The grape is no more exacting, as to soil requirements.

than other fruits, but the necessity of selecting a suitable soil, coupled with favorable climatic conditions for its commercial culture, needs no stronger argument than the fact that in New York the grape growing of the state is centered in four comparatively small districts while commercial success with the grape appears to be impossible on much larger areas, which produce good crops of other products, even fruits.”

FERTILIZERS.

Fertilizers should be used that will be ample for growing the fruit, but without making undue growth of wood. Stable manure is more apt to promote fungus growth than are commercial fertilizers. Cover crops help to keep up the humus supply, and keep the land in good condition. It is well to remember, however, that a rapidly growing cover crop, in a very dry time, may seriously injure the growth of the vines and fruit.

VARIETIES.

Hedrick, in his “Grapes of New York,” has described so fully and well the good and bad points of the different varieties of grapes, that I quote quite freely from his descriptions. Agawam is the most largely grown of Roger’s Hybrids. The qualities commending it being large size of bunch and berry, rich, sweet aromatic flavor, excellent keeping qualities. Its chief defects in fruit are, a somewhat thick and tough skin, and foxy flavor. In some localities it does not yield well. It ripens soon after Concord, and can be kept much longer. It prefers somewhat heavy soil, doing better on clay than on sand. Brighton—Ranks as one of the leading amateur grapes. Its good points are high quality, handsome appearance, certainty of ripening, vigorous growth, and adaptability to various soils. It deteriorates in quality quickly after maturity, hence cannot be shipped well to distant markets, and is self sterile to a more marked degree than any other of our commonly grown grapes.

Campbell's Early.—Its good points are high quality when mature, freedom from foxiness and acidity about the seeds. Small seeds, which easily part from the flesh. Earliness of maturity, ripening nearly a fortnight before the Concord, large size and attractive appearance of bunch and berry, good shipping and keeping qualities. It falls short chiefly in not being adapted to as many soils and conditions as are some varieties with which it must compete, and in all but localities adapted to it, lacks productiveness.

Concord is the most widely grown of the grapes of this continent. It also represents the dominant type of our native species, and with its offspring, pure-bred and cross-bred, furnishes 75%, or more, of the grapes of Eastern America. It succeeds on a greater number of soils than any other variety. Its fruitfulness, hardiness, ability to withstand the ravages of both disease and insects, comparative earliness, therefore certainty of maturity, fair size of bunch and berry, good color and abundance of bloom, make it a most handsome grape. The Concord is not, however, without faults. Its quality is not high, the grapes lack richness, delicacy of flavor and aroma, and have a foxy taste disagreeable to many.

Delaware is the American grape par excellence, next to the Concord the most popular grape for garden and vineyard. It matures sufficiently early to make its crop certain, is attractive in appearance, keeps well on the vine, and in the package, ships well and is more immune than other commercial varieties to black rot. Its faults are the small size of the vine, slowness of growth, subject to mildew and the small size of the berries. It succeeds best in deep, rich, well-drained warm soils, but even on these it must receive good cultivation and close pruning. It suffers particularly from the depredation of birds.

Diamond is surpassed in quality and beauty by few other grapes. We usually accord Niagara first place among green grapes, but Diamond rivals it for the honor. The fruit

packs, carries, and keeps well, and can be grown in as great a range of latitude as the Concord.

Herbert. In all that constitutes a fine table grape, Herbert is about as near perfection as we have reached in American grapes. It is sterile, and must be planted near other varieties. It has never been cultivated extensively, but has always been a favorite with amateurs.

Moore's Early is the standard grape of its season. To grow the variety satisfactorily the soil must be rich, well drained, loose and frequently cultivated. Moore's Early is by no means an ideal grape for its season, but until something better is introduced it will probably remain the best early commercial grape.

Niagara is the leading American green grape. Much of the popularity of Niagara is due to the novel way in which the variety was sold to the public. The variety can not be relied upon where the thermometer falls much below zero. Is subject to black rot.

Salem. It is difficult to say why it is not much more largely grown for market. The two chief faults are unproductiveness and susceptibility to mildew.

Wilder is not as well known in the markets as it should be. One of the most reliable for vineyard culture of the Roger's Hybrid.

Winchel, or Green Mountain, is at once very early and very good quality. The vines are vigorous, hardy, healthy, and productive. The vines or bunches are sometimes loose, the berries small. The grapes sometimes ripen unevenly, making it difficult to pick.

Worden. Of all the offspring of the Concord, this variety is best known, and is most meritorious. It differs chiefly from the Concord in having larger berries and bunches, in having better quality, and in being from a week to ten days earlier. It is equally hardy, healthy, vigorous, and productive. Its chief fault is that the fruit cracks badly, sometimes preventing the profitable marketing of the crop.

Often, as the grapes ripen, a flock of birds hover about the grapes, picking into the sweeter and more tender grapes, causing a good deal of injury.

Professor Maynard of Amherst in 1897 gave the following rating to the varieties, 10 being the standard.

	Color	Date of Coloring	Date of Ripening	Vigor	Hardiness	Resistance to disease	Quality	Keeping quality
Agawam	Red	Aug. 12	Sept. 14	8	8	7	8	9
Brighton	Red	Aug. 10	" 16	7	8	6	10	9
Campbell's Early *	Purple	Aug. 22	"	10	10	8	8	4
Concord	Purple	" 22	" 10	10	10	10	8	4
Delaware	Red	" 16	" 4	9	9	7	10	7
Diamond	White	"	" 12	8	9	10	10	6
Herbert	Purple	" 17	" 14	10	9	8	9	10
Moore's Early	Purple							
Niagara	White							
Salem	Red	" 31	" 18	9	8	5	9	9
Wilder	Purple	" 20	" 12	10	9	8	10	10
Winchell or Green								
Mountain			Aug 25	8	10	9	9	3
Worden		" 26	Sept. 7	8	10	9	9	3

I remember hearing Mr. E. W. Wood at Horticultural Hall, Boston, twelve or fifteen years ago, speaking of varieties of apples. He told of a man who went to a Boston commission man, and told him he was going to set out 600 apple trees, and asked the varieties he would recommend. He was told to set out 300 baldwins—asked what more to set out and was told another 100 baldwins—asked what more to set out and was told another 100 baldwins. Asked what kinds he would set out for the rest, said, "well set out another

100 baldwins." I was reminded of this story when reading in the bulletin before referred to by Mr. Dorsey, that in the 30,000 acres of grapes in the Chautauqua district 90% of this acreage was set to Concord, 3% to Niagara, 2% to Worden, 1% to Moore's Early.

Several years ago, at a Grape Conference in Horticultural Hall, Boston, the interest was centering around the Brighton, one of our best quality grapes. A Mr. Kendall, I think it was, an enthusiastic grape grower, told how he enjoyed taking his friends out to his garden and have them sample the different varieties of grapes. He said he soon found he had to come to the Brighton last or he could not get them to eat any others. The impression was being given that the Brighton was almost the only grape to plant, when Mr. Chase, the veteran grape grower, stood up and said he had been following the Boston market for fifteen years and had never seen a basket of Brighton grapes exposed for sale. The Brighton needs to be grown near other grapes. If the vines intertwine on the same trellis, so much the better, as the blossoms are self sterile.

I hope more attention will be given to localities and conditions where certain varieties do, or do not do, well, and have the information available so that people when planting may have more than at present to guide them in selecting location and varieties.

VARIETIES.

For commercial uses I would suggest Moore's Early, Worden and Concord. An additional list would be Winchel, Campbell's Early, Diamond and Niagara. For the home garden, a selection might be made from the varieties already described.

PLANTING.

The ground should be prepared as for corn, or other cultivated crop. Occasionally, with special care, a rocky or steep hillside may be used. The holes should be dug about 10 inches deep, and the plants carefully set out, using either

strong one year old plants or two year old plants. The vines should be purchased of one of the large reliable firms in the grape regions of New York. The rows should be set 8 feet apart, with the vines 6 to 8 feet apart in the rows. I prefer early spring planting. Ground bone, or some other slow acting fertilizer, may be dug in where the vines are set. For the first two years light posts, with one of two wires, may be used, after that substantial posts will be needed with two to four wires.

PRUNING.

The first year the vines should be cut-back to two buds. These should be allowed to grow as long as they will. The next year the vines may be cut the height of the lower wire, and two shoots again be allowed to grow, breaking the others off soon after they start. The object of this severe pruning is to get a strong root system established, not allowing much of the strength of the vine to go to unnecessary top. The third year the best cane may be left 3 to 6 feet long, according to the strength of the vine. To get a good crop of large clusters, strong canes of well ripened wood are needed, the fruit being grown only from the wood of the previous year's growth. To obtain such, various methods are used. Probably the best way is to have one cane on the trellis run from that vine to the next, so that, when the vines are in place on the trellis, there will be on one of the wires a continuous line of bearing wood and on a wire underneath this, two canes for the next year's bearing may be grown, the best one to be used for the next year's fruiting. These shoots may be pinched off the latter part of the season, when long enough, and their side shoots kept back, so they will not grow very strong. The idea being to have the cane and buds for next year's bearing as strong as possible. This method was used for many years by Dr. Fisher of Fitchburg. Used and recommended by Prof. Maynard when at the College at Amherst. Is used by Mr. Hayward of Ashby. Any one who has seen his grapes at exhibitions can see he has some way for growing very fine bunches. Another good

method is to have two or four arms on the vines so placed that on the 2d and 4th wires there will be a continuous line of bearing wood. When this method is used a number of the poorer shoots may be broken off when young. Another way practiced considerably in New York is to have the vine along the lower wire, the new bearing shoots grown vertically, and tied to the other wires. A good way, and one that does not require much work in the summer, is to have cross arms two feet long at the top of the posts. A wire running along at each end of the cross arm, and one on the posts a little lower, on which the vines are tied when pruned in the winter. The new shoots growing are held up by the wires on either side. Another way is to have the vine grow where you want it, cutting away all but two or three buds on the stronger last year's shoots. This method is used usually where the vines grow on the side of a building, or over a trellis.

When girdling is practiced, a good way is to let a shoot grow from near the base of the vine, the next year tying it straight up, cutting it off at the top wire, allowing two shoots to grow each way, but bear no fruit until the next year. This series furnishes a strong fruiting vine for each season, and the necessary proposition of the vine that is not fruiting, that is required to keep up the vigor of the vineyard. This method was used by Mr. Frank Wheeler of Concord, one of the first, I think, in America to practice girdling to any extent. The vines pull off the wires easier when they are warm and wet. If one cares to know of other ways of trimming, he can send for Farmers' Bulletin 471, U. S. Department of Agriculture, and Circular No. 16 of the N. Y. Agricultural Experiment Station.

SUMMER PRUNING.

If the vines have wintered favorably, a number of the smaller buds may be rubbed off soon after they start, and those on wood more than one year old, unless wanted for next year's bearing. About the time the blossoms open, by pinching back the ends of the new growth, the life of the

vine is forced back into the bunches, helping them to set large clusters. The pinching back should be done so as to leave about five leaves on the cane beyond the bunch of fruit. Side shoots will start, which may be cut back two or three times during the season. The new leaves, being of a light color, are easily seen, and only the stronger growth needs cutting back. Where the new shoots hang down from the wire it tends to check their growth. Where the new shoot is upright, the circulation I suppose, is stronger, as it is in the heater in one's house.

GIRDLING.

Ringling or girdling the vine may sometimes be used to advantage. This is done by taking off the bark about an inch wide around the vine, the theory being that the sap goes up in the wood and down in the bark. By cutting the bark the sap is forced into the growth above the part girdled and by keeping the vine cut back the fruit is usually increased in size and ripens from a week to ten days earlier. The girdling should be done the first or middle of July. The part of the vine girdled dies in winter. Only one half of the vine should be girdled, as about that proportion is needed to keep up the vigor of the vine. If too much of the vine is girdled the fruit does not ripen well, and the vine is weakened.

THINNING THE FRUIT.

Soon after the fruit is set, the vines should be gone over and where there are more bunches than are needed, the smaller ones should be taken off, so the fruit the vine is able to carry will be in as few bunches as possible.

SPRAYING.

For fungus diseases spraying is a preventive rather than a cure, as after the fungus diseases are well started spraying has little effect in checking them. A good spraying with a strong solution of copper sulphate before the buds start,

covering thoroughly the vines, and also the posts often helps out very much the rest of the season. By adding arsenate of lead to this spraying mixture it will help take care of the earlier insects.

Just before the blossoms open, a spraying of Bordeaux and arsenate of lead should be used, covering the bunches thoroughly. This repels, and usually checks, the work of the rose bugs. They like to eat the grape blossoms and are one of the few insects not affected by contact or stomach poisons. Another spraying ten days later is needed, and occasionally a fourth spraying. If anthracnose is present, as much as can be should be cut out in the winter pruning, and the vines should be treated when dormant with iron sulphate solution. It may be put on with a sponge, or brush.

The chief diseases of the grape are anthracnose, black rot, downy and powdery mildew.

The chief insects infecting the grape are the flea beetle, grape fruit worm, leaf-hopper, grape-root worm, and rose-bug. These are all difficult insects to kill. By mixing molasses or glucose with the spray mixture, sprayed when the insects are feeding, it will usually control them.

The benefit of proper spraying is often more noticeable in the crop of the following year than at the time of application. The leaves staying on longer and the wood ripening up better, thus strengthening the vine for another year.

The tobacco spray—Black-leaf-40, is one of the best for the leaf hopper and should be applied when they are in the nymph stage, about the middle of July.

Lime and sulfur should not be used on grapes as it causes severe injury to leaves and fruit.

I have a spray barrel, mounted on mowing machine wheels, to which are attached a heavy pair of shafts. By having a "Y" on the end of a short rod with two angle Friend nozzles, the man driving can keep up fairly high pressure, which gives a pretty efficient spraying to one side of a row, moving along as a horse ordinarily walks.

MARKETING.

Grapes are usually disposed of, to the best advantage, by marketing as soon as they are well ripened.

Moore's Early and Winchell should be disposed of as soon as suitable as the first is liable to have the fruit shell off and the other loses tone.

The package should be such as suits the market where they are sold.

I use an 8 quart diamond basket, which holds from 10 to 12 pounds.

The smaller bunches can be picked before they are quite ripe and sold for preserving. In local markets there is often considerable call for grapes for that use.

The market could use many more local grown grapes if there was some good way to get them to the consumer at approximately the price the grower usually gets for them.

Most varieties of grapes can be kept for a limited time by putting them in shoe boxes, or some air-tight packages, one layer deep, and keeping them in a cool place.

I usually begin selling in August and my crop is generally all marketed by the 20th of September. I have had no loss from fall frosts since 1893.

The grape vine lends itself very well to training on the side of buildings, or over arbors, making an ornamental vine. There is many a sheltered nook about buildings or yard where a few vines might be grown. It is always well to keep one's family well supplied with choice fruit.

ANNUAL MEETING, WORCESTER, MARCH 11, 1914.

The morning session was called to order promptly by Secretary F. Howard Brown as the President had not appeared and the Vice President was not due until eleven o'clock from Amherst. Director Edward R. Farrar of South Lincoln gave a paper on "Grape Culture" of such value that it was thought advisable to print it in the annual report. Lively discussion followed and much practical information was brought out by Mr. Farrar and members.

At about this time the President appeared and took the chair, exhibiting a check payable to the Fruit Growers' Association for \$700, which was part of the balance above expenses on the trade exhibit and program for Springfield meeting. It was the opinion of the meeting that the President could be late at every session if he would show equal results.

Vice President F. C. Sears then took up the subject "Experiences in a Massachusetts Orchard," handling items of timely interest to the growers. Discussion was followed by adjournment until the business session which was followed by continued discussion of the morning subjects.

BUSINESS SESSION.

President Frost called the meeting to order at 1.45 P. M. Secretary's report was read and accepted.

Auditor's report read and accepted.

Treasurer's report read and accepted.

Thanks voted to the Treasurer.

Moved and so voted, that a committee of the President, Secretary and Mr. Ellsworth take steps to incorporate the Association.

Voted that sums for investment be deposited in the savings bank.

Voted that there be four vice presidents in the future.

Election of officers for ensuing year resulted as per list in front of report.

Voted that the annual meeting be held the last Wednesday in February at Worcester, which shall be headquarters of the Association; on motion of Mr. Sage.

Articles of the Constitution and By-laws as read were adopted on motion of Mr. Wilder.

Voted to loan the Worcester County library the volumes of the American Pomological Society.

Retiring President Frost reported the surplus on the Trade Exhibit at Springfield as \$700 with \$100 to come.

President Sears in the chair.

Voted life membership to retiring President Frost from funds in the Treasury.

(Signed) F. HOWARD BROWN,
Secretary.

Report of the Secretary was printed in 1914 Report.

AUDITOR'S REPORT

Worcester, March 11, 1914.

This is to certify that I have this day examined the books and accounts of F. Howard Brown, Treasurer of the Massachusetts Fruit Growers' Association, and find them correct and the balance properly deposited or accounted for.

(Signed) H. WARD MOORE,
Auditor.

TREASURER'S REPORT, MARCH 11, 1914.

Mr. President and members:—

The report of the Treasurer is as follows:

RECEIPTS

Balance in National Bank, Mar. 1, 1913	\$ 38.67	
Boston Trade Exhibit 1913		
Received from H. L. Frost	247.11	
Miscellaneous	6.30	
Membership dues at Worcester 1913	44.00	
Amherst Rally Day	17.00	
Field Meetings	22.00	
New England Fruit Show	17.00	
Institutes	31.00	
Springfield	137.00	
Secretary's Office	325.00	
		————— \$885.08

EXPENDITURES

Springfield Meeting 1914	\$227.22	
Printing 1914 Report, on account	100.00	
Salary of Sec'y-Treas.	100.00	
Postage	129.54	
Buttons	15.08	
Printing	26.51	
Clerical Assistance	13.14	
Mileage	20.00	
Annual Meeting	12.20	
Office Supplies	14.65	
Miscellaneous	61.91	
Balance in National Bank, Mar. 5, 1914	164.83	
		————— \$885.08

PERMANENT FUND

Deposit in Savings Bank		
Two life memberships	40.00	

The Boston Trade Exhibit Account as last reported showed a "balance of \$162.11 net with about \$200 still due." The Treasurer received \$85 more from President Frost but an unexpected bill cut down the rest. Hence the net total is as noted in the regular Treasurer's account.

Attention is called to the fact that without the assistance of this trade exhibit income from the Boston meeting we would not have been able to publish the report until later and as it was two reports were issued in one year or between two annual meetings.

(Signed) F. HOWARD BROWN,
Treasurer.

STANDING COMMITTEES

Massachusetts Fruit Growers' Association Inc.

BUSINESS AND LEGISLATION

W. Wheeler, Ch., I. I. Margeson, H. L. Frost.

INSECTS AND FUNGUS DISEASES

F. A. Smith, Ch., W. W. Chenoweth, W. A. Greene

EXHIBITIONS

F. C. Sears, Ch., F. Howard Brown, W. Wheeler

MEMBERSHIP AND PUBLICITY

F. Howard Brown, Ch., R. W. Rees, J. L. Sawyer

MARKETS AND TRANSPORTATION

J. Lewis Ellsworth, Ch., W. A. Munson, A. R. Jenks

CO-OPERATION

A. N. Tuttle, Ch., Robt. Lull, Fred R. Townsley

NEW FRUITS

J. K. Shaw, Ch., R. Hittinger, E. C. Howard.

FIELD MEETINGS, 1914

STRAWBERRY MEETING AT MARSHFIELD June 17, 1914.

A fine day saw members from as far west as Worcester County and as far north as Essex County assembled in Plymouth County for our first field meeting. The farm of Mr. Herbert E. Gardner at North Marshfield was headquarters and every one had a delightful as well as instructive time. Mr. Gardner conducted the party over his grounds near the house where potatoes were, where they were preparing the ground for next year's beds and where in one field of two acres were some 14000 Marshall plants, set this Spring. Fruiting beds of fancy berries were also in evidence with Marshall as the leading variety. Mr. Gardner explained that he sprays these just before blossoming as one may lose the whole crop from fungus a week before picking. Arsenate is added for the insects also.

The two-acre field was perhaps heavier soil than is used by some and he said it took twice as long to hoe those beds as it did the same areas down on the flat below where most of the plant raising was conducted and the soil was lighter and more pliable. Mr. Gardner only a week before closed his shipping season for plants and estimated that in round numbers he has sold 700000, having filled an order for 100000. Some thirty varieties are grown. He is ideally situated as regards labor, for Portugese from the Azores are available in large numbers on short notice and are very orderly and honest, conditions which are the opposite from those in most sections of the state.

The packing house and beds of Mr. Charles T. Ewell were also visited and splendid fruit was everywhere in evi-

dence in spite of the dry weather. Mr. Ewell confines his efforts to the berries alone, not selling plants, and showed a picture of twenty-four Marshalls heaping up a box. Trays are used in shipping rather than crates, trucks taking the berries to Boston each night.

After luncheon Vice Pres. Margeson introduced Mr. Wilfrid Wheeler of Concord, a large grower who spoke on Strawberry Culture, giving a very comprehensive talk on the best methods of producing the largest crop. Mr. Wheeler's father who introduced the "Minute Man" gave an interesting talk on the history of the business and Mr. L. S. Richards, pioneer of strawberry growing in Marshfield for the Boston market some thirty-five years ago, told of his early efforts.

After a hearty vote of thanks to Mr. Gardner, the members adjourned to Mr. Richards' dwarf apple orchards at Marshfield Hills and inspected his 600 trees on Doucin stock from one to five years old, and many loaded with fruit.

Many ladies availed themselves of the opportunity of attending this meeting.

CHERRY AND CURRANT MEETING AT WESTWOOD, July 2, 1914.

The preliminary date of the field meeting with Vice-Pres. Margeson at Westwood July 4th was changed owing to the dry weather forcing the season, and holiday complications. As it turned out, better weather prevailed on the original date as it was raining till nearly noon on the 2d. However, this did not deter the members from turning out in good numbers and after leaving lunch boxes in one of the tents provided by our host, the party started on the round of inspection, the dew drops being knocked off by a special advance guard. One has to be actually on the ground to really appreciate the intensive character of Mr. Margeson's work, as when he says the manure used every year has to be taken in a wheel barrow the story is only half told, and it was suggested by members that he would soon be using an

airship to pick and work from. The ground is entirely shaded but by pruning to upright canes on the currants there is really not the tangle there seems to be with the fruit on the bushes. And such fruit! It was the general verdict that they never saw such a sight before. Mr. Margeson has many varieties of currants from early to late and the blacks and white for those who really know currants. And the sight of one tree of cherries left for our special benefit as the others of this variety had been picked and already gone to market. This was the Bay State Cherry. The color and size halted one at once and inquiries were immediate as to where trees could be obtained. Mr. Margeson said he was unable to get more himself and all agreed that he ought to propogate and introduce this stock. The sour cherries showed an abundant crop.

Attention was called to a plot of grass between the currants, etc.—most of us would call it a mere strip—which had just produced a ton of hay. Certainly every available niche of ground is utilized to advantage.

After luncheon eaten in the big tent, when the host's hot coffee was more in demand than the lemonade, the speaking program was carried out. The Secretary made some announcements and asked each to pin his postal card to his coat so all could see who each one was and where he came from. With our eleven hundred membership we cannot all know each other and this is one method of getting acquainted. Secretary Wilfrid Wheeler of the State Board of Agriculture was then introduced as the presiding officer and Director J. H. Putnam, Litchfield, Connecticut, Ex-President of the Connecticut Pomological Society, gave an address on Small Fruit Culture. Mr. Putnam showed himself to be a practical grower of wide experience and gave many instances showing how he adapted his fruit growing to his conditions rather than bucking against nature in a vain attempt to get the unattainable. His location being late and early varieties merely coming at the time of the glut he uses late varieties and comes into a market all his own.

Many practical pointers all along the line were given by Mr. Putnam showing how to get around conditions which are liable to spring up unexpectedly, as well as directions for raising small fruits.

In speaking of grapes, he said more use should be made of them by storing for winter. One year he exhibited at Worcester, grapes from the same vine of different years' crops.

The Round Table which followed was very interesting and informal and many problems were discussed. After a vote of thanks to Mr. Margeson, the meeting adjourned to the adjacent farm of Mr. H. L. Crane where his strawberry beds and other fruits were inspected. His practice is to use onions between the strawberries the first year. The Barrymore was seen on its native heath and another one, the Hustler, which Mr. Crane has not yet placed on the market.

A most profitable day was spent by all and members were present from as far west as Hampden County and as far north as Essex County.

FIELD DAY AT APPLE VALLEY

The Field Day at Apple Valley held September 26, 1914, was attended even better than we had expected. Of course it was realized that this was not the most convenient season for orchardists to attend on account of the large amount of work to be done at this time. But on the other hand it was felt, that if visitors were to see Apple Valley at its best, no other time could compare with this very season when the fruit was on the trees to show what was being done there. It is certain that all who attended felt well repaid. After a basket lunch in which about 100 people participated, and at which coffee, of a very fine brand, was furnished by our hosts, the President discussed briefly the market situation, pointing out some of the more hopeful features of the outlook and some of the indirect benefits that such a season of low prices is sure to bring with it.

Prof. W. W. Chenoweth of the Agricultural College followed with a discussion of the utilization of the poorer grades of apples. He showed conclusively that much of this material which is now lost altogether or sold for very little, and which moreover, competes directly with our better grades and so reduces the prices realized for them, might be marketed in some manufactured form such as vinegar, jelly, boiled cider, etc., at a very good price.

The meeting then adjourned for a walk through Mr. Williams' orchards, which was certainly enjoyed by everyone. The orchards bore a splendid crop, and the visitors were unanimous in the opinion that Apple Valley was well named.

INSTITUTES 1914

Largely attended and interesting institutes were held at Buckland, Taunton and Hathorne, which, with the Convention at Springfield and the Annual Meeting at Worcester, covered all sections of the state.

At Grange Hall, Buckland, Feb. 27, 1914, Prof. R. H. Ferguson of Massachusetts Agricultural College, Amherst, spoke on "Co-operative Buying and Selling," and Director Fred A. Smith of the Essex County Agricultural School on "Apple Culture."

The session at Taunton the next day was with the State Grange and Old Colony Pomona, when Hon. J. Howard Hale of Connecticut spoke on "Fruit Opportunities in New England."

At Hathorne, March 11th, a joint meeting was held with the Essex County Agricultural School and an all day fruit session developed, speakers and subjects being F. A. Smith on "Planning, Planting and Care of a Young Orchard"; Wilfrid Wheeler presiding, Round Table Discussion, "Fruits Small Fruits, Spraying. Orchard Fertilizing"; Prof. J. H. Gourley, New Hampshire Agricultural College, "The Summer's Work in the Orchard."

THE DEER PROBLEM

Anyone who attended the evening session at Springfield and who failed to carry away a vivid impression that the Fruit Growers wanted the deer nuisance abated accomplished the impossible. "Strenuous" was indeed a weak term to designate that part of the session and "frazzle" was large for the remains of the opposition.

We quote from the circular letter sent out before the hearing February 20th:

"Regarding the deer problem, we believe that Dr. Fields' recommendation for a better system of damage adjustment—that the farmer may kill the deer at any time on his own or adjacent property when liable to do damage, and that the farmer may have the carcass—will have the best chance of success for the State as a whole, and I should advise all who can possibly do so to be present at the hearing at the State House, Friday, February 20, at 10.30 a. m. We believe that the bill for six weeks' open season for the State as a whole would not be passed as such, but if limited to certain counties it might go through. Write your representative and senator just how you feel about the deer nuisance, and cite specific instances."

A large number of fruit growers and others gathered at the hearing and while all agreed that something should be done, opinions differed all the way from an open season for the whole state for 365 days down to the law then in force. Even the Society with the long name did not actively oppose it, being content to say that it was on the fence.

The Committee on Agriculture of the General Court saw the view point of the farmer and the law was reported and passed giving the farmer the right at all times to kill the deer on his own, and with his neighbor's permission, on adjacent land and when **liable** to do damage. (Personally, the

Secretary has found that the deer knew when that law was passed and kept away from his orchards, only making two quick forays since that time.)

With this overwhelming sentiment among the farmers it would seem improbable that the law should be changed or repealed.

'BUY A BARREL OF APPLES' MOVEMENT

Last fall when the apple outlook was dubious, an effort was made to bring the consumer into direct communication with the producer by the State Board of Agriculture. As soon as the movement had progressed far enough to get a line on the demand, a circular letter was issued giving the names of growers near Boston, which latter point was emphasized in each inquiry. This movement without doubt greatly increased the general demand for apples due to the free advertising received; many buying in barrels who would have otherwise ordered a peck at a time.

The effort to increase the consumption of apples also resulted in the State Board of Agriculture and the Boston Chamber of Commerce selling for a nickel each a Book of 197 Apple Recipes. This is very much prized by housekeepers and we believe it can be used with fine results for increasing apple consumption. At the recent Massachusetts Agricultural College Extension School in Agriculture and Domestic Science held at Marlboro, the local members of this Association chipped in and bought these recipe books which were distributed to the ladies attending with the compliments of the Marlboro members of the Massachusetts Fruit Growers' Association.

THE ASSOCIATION INCORPORATED

APPLE DAY, OCT. 20, 1914.

Perhaps the most significant event in the life of the Association the past year was the incorporation under the laws of Massachusetts. Heretofore we have had no legal standing in the Commonwealth. It seemed most fitting to select National Apple Day, the third Tuesday in October falling this time on October 20, 1914, as our day for incorporation, and so at this time officers and past officers met at the State House at eleven o'clock and took the legal steps to incorporate. Among those present were, Wilfrid Wheeler, Edward R. Farrar, Herbert R. Kinney, F. Earland Gilson, Charles A. Wilson, F. Howard Brown, A. Warren Patch, J. Lewis Ellsworth, Willard A. Munson, Ingram J. Margeson, Herbert O. Mead, Herbert A. Cook.

When we say that before one o'clock the legal forms had all been successfully compiled with the average member may not realize how quickly and easily it was all accomplished in this case. For it was known to the Secretary that there were all sorts of legal entanglements of red tape which had made it necessary for other Associations to take as many as three separate trips to the State House before the legal requirements were complied with. Through the courtesy of President J. Lewis Ellsworth of the Worcester County Farm Bureau we were supplied with a complete guide to incorporation and everything being done ahead of time which was possible, the incorporation proceeded without a hitch to completion in record time.

FRUIT SHOWS, 1914.

INTERNATIONAL APPLE SHIPPERS.

The International Apple Shippers Association Apple Show at the Copley Plaza, Boston, Aug. 5, 7, 1914, brought fruit from all over the United States and Canada and few would have any conception of the excellence of the color and size of the fruit who were not there. Dr. J. B. Emerson of New York and Virginia easily took the sweepstakes with a splendid display both in quality and quantity. W. S. Teator, Upper Red Hook, N. Y. won first prize in our group with the highest score outside the sweepstakes.

Massachusetts was represented in single plates and collections and the Association won a ribbon with a competitive collection of 14 plates and a total showing of 32 plates. Those contributing to the Association exhibit were W. Wheeler; E. M. Bruce; W. M. Davis; L. F. Priest; Turner Hill Farm; E. R. Farrar and F. Howard Brown.

NEW ENGLAND FRUIT SHOW.

This was held at Providence with the Rhode Island Fruit Growers' Association on Nov. 9—12, 1914. The quality of the fruit was of the highest and the color was equal to that of the far famed west as we had 22 days of sunlight in October. Massachusetts fruit was in evidence in all classes and in class G. for Massachusetts only, Alden Derby won the \$50 prize and the Hardwick Cooperative Association the silver cup. Alden Derby also won the Worcester Chamber of Commerce silver cup in class H. for the best box of apples at the Show grown in Worcester County.

MASSACHUSETTS FRUIT SHOW.

This was held at Horticultural Hall, Worcester, Dec. 1—3, 1914, in connection with the other shows and the winter

meeting of the State Board of Agriculture. This was a box, plate and package show as there was not room for barrels and the class of fruit shown convinced all who saw it that Massachusetts does not need to take a back seat. Many new exhibitors were present and this is a feature which should be encouraged.

WITH THE SECRETARY

Having used the red apple and green background with various changes for the past four years, it was thought advisable to have something conspicuously different and the yellow apple of the 1915 button is the result.

Letterheads for the President and four Vice Presidents were issued by vote of the executive committee, the idea being to advertise the Association.

Anyone who has ever tried to address a thousand or more envelopes or post cards at one time knows how easy it is to skip one once in a while. This has been avoided largely by a system of checking but when the opportunity presented itself to have the addresses printed with mechanical accuracy and clearness, it was too good a chance to let pass and we are now using this method with no added expense to the Association.

In accordance with the vote of the Association, we are now life members of the American Pomological Society and reports are on file in the library of the Worcester County Horticultural Society.

The Secretary has had unusual facilities for saving money for the Association this year as in the past.

I would again call attention to the extremely peculiar condition of the Association regarding the printing of the report, the annual dues and the annual meeting. If the printing of the annual report is delayed until after the annual meeting much of the immediate value to the members is lost, especially the spraying information and such other as needs preparation before using. This was of course the prin-

principal reason why the date of the convention was moved forward from the second Wednesday in March; i. e., so members could have the full report of the meeting in time to be of use the same season.

This of course necessitated a change in the fiscal year from the old date beginning with the time of the annual meeting, which, being a movable day, brought about much confusion, as a glance over the old stub books will confirm. In fact, this confusion of "to" and "from March—" was so in evidence that since the present Secretary has held office he has used the word "for" in speaking of the year for which the dues are paid or unpaid. With the system now in force each member has a slip on which his payments are entered from the list made from the stub books and the standing of any member may be quickly ascertained.

Now the time of the annual meeting being after printing the report and after the financial year has started brings about the following condition: Reports of officers, etc., etc., are not printed until the next year, and the Treasurer's report is really a part of two years so far as dues collected are concerned. The remedy for all this is self evident and that is to have the annual meeting at the time of the Annual Convention, but as an incorporated body a legal home must be specified and that cannot be shifted as is the Annual Convention. Perhaps it would be wise to shift the time for balancing the Treasurer's books to January first instead of just before the annual meeting. This has not been done heretofore because it should be remembered that the report of the Boston Convention was issued immediately afterwards and in that way really two reports were issued in one year. Hence a financial report at that time hardly gives a correct idea of the Association standing.

In accordance with the vote of the Association the Secretary visited an out of state convention and the Poughkeepsie meeting of the N. Y. State Fruit Growers' Association, February 18, 19, 1915 was the one attended. Owing to cor-

recting proof on the report a combination trip of business and instruction was enjoyed.

Owing to circumstances beyond our control the issuing of the report was delayed and it is not available for distribution today but will be issued immediately and will contain a report of this meeting and other late information. Even now it is only six weeks after the convention and still two weeks ahead of last year.

SUGGESTIONS

With our recent increase in membership there are probably many new members who desire the recent back reports and there are some which are available. Perhaps a charge of \$2 for 3 back reports or \$3 for 4 back reports would take care of this satisfactorily.

The House-Keepers Apple Book, a 40 page booklet containing 197 apple recipes, has been used with great success to increase the demand for apples and if a reasonable supply could be kept on hand by the Association to fill small orders where local efforts are being made, it would be a move in the right direction. Any one desiring large quantities could obtain them at low cost directly from the advertising committee of the International Apple Shippers' Association which issues them.

National Apple Day, the third Tuesday in October was largely celebrated in Massachusetts this past year and other days were also locally used to boom the apple. It would seem wise to have information available for the benefit of those who wish to start something but have had no previous experience in this line.

With many minor meetings going on all over the state we believe we should concentrate more on our Convention and use institutes and perhaps field meetings merely for feeders and working up new territory.

THE ANNUAL CONVENTION,

Worcester, Jan. 13—14, 1915.

After two years swinging around the circuit the Association once more returned to Worcester. In spite of the very bad weather conditions many members were present from all parts of the state when the President called the meeting to order allowing just a little extra time for slow trains and trolleys. One point of congratulation was the fact that all speakers were present as scheduled and without the slightest delay were deep in the subject assigned. The features and discussions are already printed in this volume so no special mention of them is needed. We believe the moving picture program of "Orcharding Operations in Massachusetts" to be the first in that line to be produced at a state pomological meeting. The feature of giving away apples to those present at the evening session is one which should be continued. Questions never came faster nor was more interest ever shown at any former meeting than was evident at all times.

Worcester being so central and more available to the larger proportion of our members it was thought best to start the sessions at 10.30 rather than 10.0'clock, as very few remained in the city over night and this would allow the transients to get in at the start of the sessions. At Boston and Springfield conditions are different. Having our headquarters at the hotel gave those who remained over night an opportunity to get together at the large parlor after the session Wednesday evening and a very enjoyable time was passed till nearly midnight.

Regarding trade exhibits this year the extreme weather at Springfield last year caused such a small attendance that the trades people felt they did not care to go in again and were very emphatic about it.

Resolutions and motions were referred to the Annual Meeting for action.

ANNUAL MEETING, WORCESTER

Feb. 24, 1915.

At the morning session Mr. Everett E. Brown, member of the Connecticut State Board of Agriculture, Pomfret Centre, Conn., spoke on "Pruning". Mr. Brown showed specimens of poor and of proper pruning and gave four reasons for pruning: To form the shape of the tree; to increase the production of fruit; to open the head of the tree to let in the sun and for spraying; and last to make it easy to harvest the fruit. The greatest object of pruning is to let the sun get into the trees so the sunshine and air can give color and quality to the fruit. In cutting off a limb he said to be careful to cut close, conforming to the general lines of the part of the tree where one is cutting and then properly heal the wound that is made.

Prof. Ralph W. Rees, M. A. C., Amherst, spoke on "Apples; Choice of Varieties and Selection of Nursery Stock," showing samples of the apples and demonstrating with nursery stock on the platform. He emphasized quality as a main point in selecting varieties to meet outside competition and for nursery stock recommended dealing with reliable concerns so as to get stock true to name. Some nursery men are guaranteeing their stock and agree to pay damage if stock is not true to name.

PRESIDENT'S ADDRESS

Pres. Fred C. Sears, Amherst, Mass.

I presume that most of our fruit growers will think of the year 1914 as anything but a prosperous and successful one. And there certainly are a good many rather discouraging features of the record. To begin with, we lost our peach crop, which seriously crippled many growers. Then we had a very large crop of apples, which naturally depressed the price on this fruit. When to this natural reduction in price was added the unnatural reduction caused by the European war and the general financial depression, it brought the price of anything but the very best apples extremely low. In addition to this we have of course, shared in the general "hard times" which have affected all classes of society. So that most of us are willing that 1914 should "pass into history" and give us a new chance with 1915!

But it seems to me that there are other phases of the question which ought not to be lost sight of. We have certainly reaped some very distinct advantages from the very conditions about which we complain. Three of these benefits in particular in my opinion deserve to be emphasized.

In the first place the low price of apples, and the fear of still lower prices, aroused so much interest and apprehension among our growers and others interested, that more work was done than ever before in attempting to push the sale of apples. The "buy-a-barrel-of-apples" campaign and other similar work by single growers and all sorts of organizations has undoubtedly brought the apple to the attention of thousands who would never have known anything about such a fruit under ordinary conditions! Or who, if they **did** know of it, used very few apples. Moreover the very cheapness of the fruit will cause many others to use them this year who

would not ordinarily have eaten apples on account of their high cost, and we may reasonably hope that a good per cent of these, having now acquired the habit of eating apples, will continue it in future years even though they may have to pay slightly more for them.

In the second place the same conditions outlined under "one" have aroused us to an interest in some legal regulations of the packing and sale of apples. Under normal conditions it would have taken years to have brought our growers to the interest in this subject which this single season with its low prices and general "hard sledding" has produced. We hope and expect that the present sessions of our New England legislatures will see enacted some type of law which will regulate, with some degree of efficiency, the grading, packing and sale of apples. If this is accomplished it will be worth thousands of dollars to our New England orchard men and will far more than offset the financial losses of 1914.

In the third place I believe that this temporary depression will have a salutary effect by checking the undue interest in fruit growing which has shown itself in certain quarters of late years. Mind I say **undue** interest! We are all of us proud of the place which fruit growing has attained in the farming operations of the present day, but the very preeminence of this position has stimulated an undue interest in many quarters which interest has been still further aggravated by the many exaggerated accounts which have found their way into print of the profits in orcharding. This has led many men in other walks of life, with no knowledge whatever of the business, to turn towards fruit growing as an easy road to wealth! The past season will do much to correct this false impression. And while we may hope that our real fruit growers will continue with unabated interest in their business, we may also hope to be freed from this other class who could not but fail in the end.

What now of the year that is ahead of us? In what ways ought we to work in order that this year 1915 in par-

ticular, and other years to follow it, may see the greatest success of our industry? The following it seems to me are some of the important matters which ought to claim the attention of every fruit grower in New England.

1st. First and foremost we ought to do everything in our power to insure a good crop of good fruit. Nothing can equal the importance of this. Given all good apples and anybody can pack them honestly and almost anybody can sell them. Moreover given really good apples and the demand would increase so that we couldn't keep up with the market! But this good fruit means better work than most of us are now doing along all of the many lines which contribute to the production of a crop of fruit. It means better pruning, better spraying, better culture, more intelligent fertilizing, more and better thinning, better handling and packing and storing!

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2d. We ought to have better quality varieties. Few people realize what a difference it would make in the apple business if all our varieties were as good as the Northern Spy and the McIntosh and the best of our Baldwins. It would revolutionize the business! People would eat ten apples where they now eat one. And so I always welcome such a discussion as we had this morning from Mr. Rees on this subject. It is an old subject but ever new. And it is well worth while for this Association to keep up its interest in the subject and see that our growers have the latest and best information on all varieties, old as well as new.

3d. We ought to support in every way possible, the movement already mentioned, for uniform legislation governing the packing and selling of apples. Wherever this has been tried it has resulted in good to the industry. Canada is the most conspicuous example of its good effects and men engaged in every branch of the fruit business there are loud in their praises of the Canadian Fruit Marks Act which has standardized the Canadian apple and given it a most enviable reputation in the markets of the world. I do not be-

lieve there is a more important work before our Association today than to support this movement. „

4th. We ought to advertise. This is a subject in itself and your officers have already shown their belief in it by having a special paper on the subject at our convention in January. But it must be pushed in every way possible. We do practically none at all now. Any other business would have gone to pieces long since if treated as we have treated ours in the matter of advertising. It simply shows what a good business we have that there is anything left of it.

5th. We must cooperate in every way possible. Perhaps it isn't possible to build up such perfect cooperative machines as they have in some sections, but certainly it **is** possible to do more than we do now!

6th. We must develop more satisfactory packages. We have made a beginning but **only** a beginning in this direction. We need more thought, further experiment if we are to have as we ought to have, a reasonably cheap package that will put our fruit in the hands of our customers in better condition than is done with our present packages.

7th. And lastly we must pay more attention to our retail markets. At present most of them are entirely neglected or are given over to the western apples. Thousands of barrels of apples might be sold in these small markets if the growers in the neighborhood were alive to their opportunities.

The Secretary's report consisted of a summary of topics already printed in this report with elaboration of a few which were new to the members. Owing to the unavoidable delay in getting out this volume the report of everything up to and including this annual meeting is printed this year while otherwise it would be one year later.

AUDITOR'S REPORT, FEB. 24, 1915.

This certifies that I have, this day, examined the accounts of F. Howard Brown, Treasurer of the Massachusetts Fruit Growers' Association and find them correct. That the funds and monies of said Association are properly deposited or accounted for.

H. WARD MOORE,
Auditor.

TREASURER'S REPORT, FEBRUARY 24, 1915.

Mr. President and Members:—

The report of the Treasurer is as follows:

RECEIPTS

Balance in National Bank, March 10, 1914	\$164.83
Membership Annual Meeting, 1914	59.00
Fruit Show	5.00
Marshfield	5.00
Worcester Convention	163.00
Secretary's Office	608.00
Miscellaneous	55.00
	————— \$1059.83

EXPENDITURES

Balance on 1914 Report	\$153.55
Membership Am. Pom. Society	20.00
Life Membership H. L. Frost	20.00
Springfield Convention 1914	7.00
Secretary's Office	53.67
Postage	118.96
Printing	63.05
Addressograph Stencils	13.47
Salary Secretary-Treasurer	100.00
Buttons and Fobs	22.35
Incorporation	6.85

Field Meeting	9.25
Worcester Convention 1915	124.93
1915 Reports on account	100.00
Miscellaneous	5.00
Balance in National Bank, Feb. 24, 1915	241.75
	————— \$1059.83

PERMANENT FUND

1914

Jan. 7. Dep. Savings Bank, N. T. Kidder, Life M.	\$20.00
H. M. Burke, Life M.	20.00
	(Previously reported)

Mar. 13.	H. L. Frost, Life M.	20.00
Mar. 13	From H. L. Frost on Springfield Trade Ex.	700.00
July 15	Interest	7.80
Dec. 11	Dep. from H. L. Frost, bal. Springfield Trade Exhibit	50.52

1915

Jan. 20	Interest	15.34
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On deposite Marlboro Savings Bank Feb. 24, 1915	\$833.66
(Signed) F. HOWARD BROWN,	
Treasurer.	

UNFINISHED BUSINESS

Under unfinished business the measures referred from the Convention were taken up. Discussion on the "Apple Census," (see end of Thursday morning session, Jan. 14, 1915), resulted in the matter being referred to the Executive Committee. Discussion on "Registering Farm Names" (see end of first paper Wednesday evening, Jan. 13, 1915) resulted in a motion being carried for a committee of three to take care of this matter. Regarding the other resolution offered at the same time it was already taken care of by the regular standing committee.

The other matter was the Uniform Law for Apple

Grading and as this had been largely discussed following Dr. Twitchell's address when the session was in charge of Pres. E. W. Breed of the Worcester County Horticultural Society, the latest information regarding the status of the bill was given. Officers and members of the Association have followed this since its inception and have attended legislative and Chamber of Commerce hearings where it has been thoroughly thrashed out and minor changes made such as a tolerance on "fancy" of 3 per cent, on "A" of 5, and on B of 10.

The discussion was largely in favor of the bill and a motion was carried almost unanimously that the Association is in favor of the Law as revised by the committee and now introduced into the legislature. Support will be needed for the bill when it comes before the Ways and Means Committee of the Legislature.

ELECTION OF OFFICERS

The Nominating Committee appointed in the morning, consisting of E. A. Emerson, Haverhill; J. T. Geer, Three Rivers; R. L. Everit, Wellesley Farms; Alden Derby, Leominster; and W. A. Greene, Sutton, reported a list of officers.

Owing to the resignation of Director E. F. Copeland of Franklin County which also has two other directors and the increasing membership in Plymouth County which has no director, the committee reported the name of L. B. Atherton of Brockton as the new director. No other changes were made.

It was suggested by the Secretary that individual ballots be cast for officers down to the Board of Directors, although it was legal for one ballot to be cast for the list as read with unanimous consent.

On motion made and duly seconded it was unanimously Voted to instruct the Secretary to cast one ballot for the list as read and the following were declared elected.

OFFICERS — 1915

PRESIDENT	FRED C. SEARS, Amherst
VICE-PRESIDENT	INGRAM I. MARGESON, Westwood
VICE-PRESIDENT	WILLARD A. MUNSON, Littleton
VICE-PRESIDENT	ARCHER N. TUTTLE, Warren
VICE-PRESIDENT	ALBERT R. JENKS, Springfield
SECRETARY-TREASURER	F. HOWARD BROWN, Marlboro
AUDITOR	H. WARD MOORE, Worcester

COUNTY DIRECTORS

ESSEX COUNTY: E. A. Emerson, Haverhill; Fred Ilsley, Newbury

SUFFOLK COUNTY: A. Warren Patch, Boston.

NORFOLK COUNTY: George N. Smith, Wellesley; Charles A. Wilson, Medway.

MIDDLESEX COUNTY: C. S. Blake, Ashby; Dr. F. Earland Gilson, Groton; E. R. Farrar, South Lincoln; Wilfrid Wheeler, Concord; Richard Hittinger, Belmont.

HAMPSHIRE COUNTY: John W. Clark, North Hadley; J. T. Geer, Three Rivers.

HAMPDEN COUNTY: L. W. Rice, Wilbraham.

BERKSHIRE COUNTY: R. Henry Race, Egremont.

FRANKLIN COUNTY: Charles A. Smith, Ashfield; Wilson A. Graves, Shelburne.

WORCESTER COUNTY: W. D. Ross, Worcester; H. A. Cook, Shrewsbury; H. R. Kinney, Worcester; Edmund Mortimer, Grafton.

PLYMOUTH COUNTY: L. B. Atherton, Brockton.

OUT OF STATE: J. H. Putnam, Litchfield, Conn.; O. M. Pratt, Plymouth, N. H.

EX-PRESIDENT: Harold L. Frost, Arlington.

On motion of Ethan Brooks of West Springfield it was voted to extend a cordial vote of thanks to the Worcester County Horticultural Society for the use of the hall and the many courtesies experienced and to the State Board of Agriculture for its hearty good will in furnishing speakers and many other favors.

It was moved and so voted.

To refer the Secretary's suggestions to the Executive Committee with power.

Many questions from the question box were discussed with interest and the meeting adjourned.

F. HOWARD BROWN,
Sec'y.

CONSTITUTION AND BY-LAWS

Massachusetts Fruit Growers' Association, Inc.

THE CONSTITUTION

Article I. The name of this organization shall be the Massachusetts Fruit Growers' Association, Inc. and it shall embrace the entire Commonwealth.

Article II. Its object shall be to encourage the growing of fruits adapted to this climate, and all pertaining thereto.

Article III. Any person may become a member of this Association by paying into the treasury the sum of one dollar annually due at the January meeting for the current year.

Any person may become a life member of this Association by payment of the sum of twenty dollars at one time. All moneys from life memberships and donations to form a permanent investment fund of the Association.

Article IV. The officers of this Association, elected annually by ballot, shall be a President, four Vice Presidents, Secretary, Treasurer, Auditor; and a Board of Directors consisting of twenty-four members, two from each county or pro rata according to membership.

The President, four Vice Presidents, Secretary and Treasurer shall constitute the Executive Committee.

Article V. The Association shall hold its Annual Convention during the month of January, the time and place to be decided by the Executive Committee. Other meetings to be held subject to the direction of the Executive Committee.

The Annual Meeting for the election of officers and

Other necessary business shall be held at Worcester on the last Wednesday in February. This city shall be the headquarters of the Corporation.

A printed notice of each regular meeting is to be sent to every member of the Association.

Article VI. Twenty-five members shall constitute a quorum for the transaction of business but a less number may meet, call to order, and adjourn from time to time.

Article VII. The following order shall be observed in the transaction of business at the Annual Meeting of the Association:

1. Call to order and reading of minutes of previous meeting.
2. Reports of officers.
3. Reports of committees.
4. Unfinished business.
5. New business.
6. Election of officers.
7. Papers, addresses, etc.

Article VIII. The following Standing Committees of three members each, on the following subjects, shall be appointed by the President, to hold during his term of office:

Business and Legislation	New Fruits
Insects and Diseases	Markets and Transportation
Exhibitions	Co-operation
Membership and Publicity	

Article IX. This Constitution may be amended by a vote of two thirds of the members present and voting at any Annual Meeting, a notice of the proposed change having been given in writing to each member at least thirty days before or having been given at the previous Annual Meeting.

BY LAWS

1. The President, Vice Presidents and Auditor shall discharge the duties of their respective offices.

2. The Secretary shall attend all meetings of the Association, and keep a record of its transactions; conduct all correspondence; keep a list of the members of the Association; collect the dues and pay over same to the Treasurer.

The President and Secretary shall be ex-officio members of all committees or boards.

3. The Treasurer shall have charge of all moneys belonging to the Association; he shall keep a record of all receipts and disbursements; he shall pay out money only on bills approved by the President and Secretary; he shall report in writing at the annual meeting; at the close of his term of office he shall turn over all records and funds in his possession to his successor.

4. The Secretary and Treasurer may be the same person and shall receive for the performance of the duties of both offices the sum of one hundred dollars per year.

The Treasurer may be under bond, in such sum as the Executive Committee may designate, for the faithful discharge of his duties.

5. The Auditor shall be entitled to demand all books, papers and vouchers three days previous to the annual meeting.

6. The Executive Committee shall have general supervision of the business of the Association, filling all vacancies occurring between annual meetings, and shall perform all duties devolving upon them by any article of these by-laws or of the Constitution.

7. The duties of the county Directors shall be to bring the objects and interests of the Association to the notice of the people of their several counties; to urge their claims and endeavor to increase the membership; they shall examine and report on newly introduced varieties in their several lo-

calities, as to their quality and probable value for general cultivation. Eight members shall constitute a quorum.

8. Any member who shall neglect, for a period of two years, to pay his annual dues, shall cease to retain his connection with the Association, and the Secretary shall have power to erase his name from the list of members. Annual Reports shall be sent only to fully paid up members.

9. These By-Laws may be amended at any meeting of the Association by a majority vote of the members present and voting, notice of the change having been given each member thirty days previously.

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LIST OF MEMBERS

of

Massachusetts Fruit Growers' Association, Inc.

January 1, 1915.

☛ Notify Secretary immediately of any change of address.

LIFE MEMBERS

Kidder, Nathaniel T., Milton	Frost, Harold L., Arlington
Burke, M., Marlboro, Framingham rd	

ANNUAL MEMBERS

Abbot, Miss Mary P., Harvard	Appleton, Francis R., Jr., 32 Liberty St., New York City
Abbott, Charles S., Antrim, N. H.	Arel, D. A., No. Andover
Adams, Chapman Co., Boston 37 No. Market St.	Arthur, M. Charles, Ipswich Turner Hill
Adams, Charles R., Medway	Atkins, Mr. and Mrs. Edwin F.,
Adams, Edward E., Millis	Andrews, Henry J., R. 1, Fitchburg Belmont
Adams, Everett F., Leominster	Atkins, W. H., So. Amherst
Adams, Edward S., Fall River	Atwood, Chas. W., Watertown, Conn.
Alderman, Edwin H., R. 2, Chester	Austin, Charles S., R. D. Ward Hill
Aldrich, Frank M., Mendon	Eabcock, Philip H., Harvard
Allen, Frederick W., Reading	Bacon, Wm. H., Lexington
Allen, G. Howard, Littleton	Bagg, Edw. O. W. Springfield 1067 Riverdale St.
Allen, George L. L., Medfield	Bailey, Harold E., Byfield
Allen, Harry F., Northboro	Bailey, J. E. F., Lancaster
Allen, J. Harry, Princeton	Bailey, James, Groton
Allen, John W., Northboro	Bailey, S. I., Cambridge Harvard Observatory
Allen, W. O., Box 150, Northboro	Bailey, S. Waldo, Newburyport
Almy, Frederic, S., W. Wrentham	Bailey, Thomas W., Kingston
Ames, John S., No. Easton	Baillie, Mrs. Helen T., Boston 305 Columbus Ave.
Ames, Joseph W., Littleton	Baker, Frederick L., Worcester 22 Crystal St.
Angier, Neadom A., Natick 63 Rockland St.	Baker, James E., So. Lincoln
Amidon, Otis W., Grove, Vt.	Baker, John M., Swampscott
Amsden, Nelson W., Newton Highlands	Baker, W. W., Westwood
Anderson, Herbert W., Worcester	Ball, W. G., Hopedale
Anderson, Josiah W., Greenwood Hillis Ave.	Baldwin, John D., Worcester 19 Cedar St.
Andrews, Henry W., R. D. Essex	
Ankar, B., Haydenville, Care of E. Cyrus Miller	
Annin, Robt. E., Jr., Boston 136 State Hous	

Ballou, H. A., Worcester
 143 Main St.
 Bambury, Robert, Jr., Wrentham
 Box 185
 Bannan, John F., No. Andover
 59 Court St.
 Barber, Eldridge C., Framingham
 Barclay, John H., Cranbury, N. J.
 Bardwell, Cyrus S., Bardwells
 Bardwell, William H., Shattuckville
 Barker, Bowen, Groton
 Barker, Harry, Littleton
 Barker, John, No. Andover
 1361 Osgood St.
 Barnan, Jacob P., Wenham
 Barnes, Charles, Marlboro
 Barnes, Charles W., Box 58, Stow
 Barnes, Chester G., Bedford
 Dudley Rd.
 Barnes, J. Norris, Yalesville, Conn.
 Barnes, Ralph F., Marlboro
 R. D. Stow Rd.
 Barnes John R., Yalesville, Conn.
 Barnes, Robert D., Medway
 Barnes, Walter E., Colrain
 Barrett, Arthur W., Fitchburg
 R. No. 2
 Bartlett, Henry, Acushnet
 Barton, Walter, Weston
 Bass, Miss Lizzie E., Wilton, Me.
 Bassett, Leon H., No. Andover
 Batcheller, Fred E., Lawrence
 552 Andover St.
 Bates, Alvah O., Lynn
 304 Boston St.
 Bates, Ceylon M., Ashfield
 Bates, Stacy C., Concord Junction
 Bates, Urban S., Hingham
 Batelle, W. W., Dover
 Bauld, J. Gibson, Framingham
 Bausch & Lomb Optical Co.,
 Rochester, N. Y.
 Beal, Mrs. Howard W., Shrewsbury
 Bean, Minot A., Chelmsford
 Beauchamp, Allen A., Winchester
 Belches, Edward F., Framingham
 Belknap, Comer A., Framingham
 Bell, Ralph, R. No. 2, Chester
 Benson, Miss Ethel, Dover
 Bent, Orrin, Wakefield
 241 Lowell St.
 Bent, James R., Maynard
 Benton, Elmer J., Griswoldville
 Berger, Hjalmar, Burlington
 Berry, Charles H., Groton
 Berry, Milton W., Middleton
 Berry Samuel D., Andover
 Best, Theodore H., Dorchester
 2 Chamblet St.
 Bicknell, Charles, So. Weymouth
 Bigelow, Arthur G., E. Brookfield, Vt.
 Bigelow, Charles, Box 2863 Boston
 Bigelow, Charles A., Northboro
 Bigelow, Daniel F., Westboro
 Bigelow, Louis L., Holliston
 Bigelow, Palmer W., Durham, N. H.
 Bird, R. W., R. No. 2, Framingham
 Bisbee, Ernest E., W. Somerville
 7 Bowers Ave.
 Blake, Charles S., Ashby
 Blanchard, F. F., Boston
 141 Milk St.
 Blessing, David S., Harrisburg, Pa.
 4 No. Court Ave.
 Blevins, John, Arlington
 6 Whittemore St.
 Bliss, Ethelbert, R. D., Ludlow
 Bliss, Walter M., R. No. 2, Ludlow
 Blood, F. Lawrence, Groton
 Bly, E. H., 191 High St., Springfield
 Boardman, Frederick T.,
 Concord, N. H.
 Eogue, Nelson, Batavia, N. Y.
 Bolan, George, Gleasondale
 Borden, Clinton A., Worcester
 2 Sagamore Rd.
 Botsford, H. E., Petersham
 Bowditch, John P., Framingham
 Bowen, Everett A., Lakeville
 Bowker, W. H., Boston
 43 Chatham St.
 Boyer, Elmer E., Lynn
 30 Endicott St.
 Bradbury, John P., Waverley
 120 White St.
 Brewer, D. Chauncey, Boston
 41 Bay State Rd.
 Brickett, John C., W. Springfield
 169 Park Ave.
 Bridges, Robert S., Wakefield
 167 Prospect St.
 Erierly, Benjamin, Stratham, N. H.
 Briggs, Frank P., R. D. 2, Groton
 Eriggs, J. B., Great Barrington
 R. No. 3
 Brigham, Addington, Marlboro
 Brigham, H. W., Concord
 Brigham, Whitney G., Hudson
 Brochu, Mrs. Clifford,
 Great Barrington
 via Monterey Stage
 Bronson, Wesley H., Marlboro
 Brooks, Ethan, West Springfield
 Brooks, George A., Boston
 18 Deane St.

Brooks, I. H. & Sons, Ashby
 Brooks, Mr. and Mrs. J. L.,
 42 Monmouth St., Springfield
 Brown, Eben E., Lakewood, R. I.
 210 Atlantic Ave.
 Brown, Everett E.
 Pomfret Centre, Ct.
 Brown, F. A., Salem
 96 Washington St.
 Brown, Mr. and Mrs. F. Howard,
 Ferncroft Rd., Marlboro
 Brown, Frank N., Marlboro
 Hosmer St.
 Brown, George H., Box 151 Medway
 Brown, George, Box 23, Harvard
 Brown, Harold L., R. No. 1, Groton
 Brown, J. F., Box 86, So. Lancaster
 Brown, Lyman C., Natick
 Brown, Myron L., Chicopee
 Brown, Mr. and Mrs., Sydney F.,
 83 Prospect St., Reading
 Browne, Marcus M., Marlboro
 Bruce, Edgar M., Leominster
 Bryant, Arthur W., Harvard
 Lock Box 4
 Buckley, Clarence E., Northboro
 Buckley, Mrs. Louis H., Worcester
 5 Nelson Place
 Burgess, W. H., Nantucket
 Burgett, Leon H., Great Barrington
 Box 6
 Burnett, Harry, Southboro
 Eurt, Edward M., E. Longmeadow
 Butler, Winsor T., Holliston
 Butterfield, E. S., Brimfield
 Buttrick, Clarence A.
 Sterling Junction
 Butterick, George F., Sterling
 Byard, John L., Amherst
 Caldwell, Kirke W., Brighton
 81 Chestnut Hill Ave.
 Calkins, Arthur N., No. Abington
 Callahan, James F., Peabody
 Box 125
 Callister, G., Montague
 Campbell, C. A., Ipswich
 Campbell, J. P., Jacksonville, Fla.
 Campbell, Leonard, Haverhill
 12 Essex St.
 Campbell, Malcolm D., Still River
 Campbell, William H., Wayland
 Canlett, T. S., Bedford
 Cannon, B. B., Boston
 11 Stillings St.
 Capen, Dr. Elwyn W., Monson
 Box 67
 Carine, Batholomew,
 So. Glastonbury, Conn.

Carlson, Louis J., Wrentham
 Carmichael, George A.,
 Shannock, R. I.
 Carpenter, Charles W., Monson
 Carpenter, Gardner H., Marlboro
 Carpenter, Jesse A.,
 Valley Falls, R. I.
 Carpenter, Jesse Jr., Attleboro
 Carroll, Chas. E., Rutland
 Carroll, James T., Boston
 51 N. Market St.
 Carter, A. F., Sherborn
 Carter, George H., Hyde Park
 48 Westminster St.
 Carter, Sylvester, No. Wilmington
 Cary, Herbert F., Lyonsville
 Cash, George H., Concord Junction
 Castle, Edward H., Hudson
 Castle, F. A., Springfield
 168 Bridge St.
 Caswell, Albert B., R. D., Fitchbur
 Chadwick, Cyrus W., Cochituate
 Chadwick, J. Gilbert, Wardhill
 Chamberlain, B. M., Holden
 Chamberlain, Edson A., Worcester,
 1 Woodlawn Ave.
 Chandler, John, Sterling Junction
 Chandler, Joseph E., Boston
 31 Beacon St.
 Channing, Walter Jr., Boston
 50 Congress St.
 Chapin, Charles H., New York City
 29 W. 39th St.
 Chapin, C. S., Newton Centre.
 935 Beacon St.
 Chapman, L. R., Boston
 4 Allston St.
 Chace, Harris E., Clifford
 Chase, Harry E., Framingham
 R. D. 1-40.
 Chase, Homer N., Auburn, Me.
 Chase, Omar P., Andover
 Chenery, Charles H., Belmont
 161 Washington St.
 Chenery, David, Belmont
 Chenery, W. B., Brookfield
 Chenoweth, W. W., Amherst
 Childs, Harrison H., Medfield
 Church, George B., Shelburne Fal
 Church, Stephen B., Boston
 66 High St.
 Claffin, Frederick L., Marlboro
 Clapp, Raymond K., Westhampton
 Clapp, Albion B., Wellesley Hills
 Clarke, Charles M., Dorchester
 39 Selden St.
 Clark, Clarence W., Boston
 43 Chatham St.

rk, Elton, Framingham
rk, H. A. Belmont
519 Pleasant St.
rk, Herbert L., Ashfield
rk, J. Maxwell, No. Hadley
rk, John W., No. Hadley
rk, Richmond T., Medway
rk, Saxon D., Springfield
403 Maple St.
rk, Tyler, Newton Centre
85 Homer St.
rk, Winslow, Shoreham, Vt.
yton, Walter, Middleton
ford, J. E., Danvers
ugh, Thomas R., Groton
b, Gardiner N., Boston
U. S. S. Ranger
b, George R., Kingston, R. I.
b, J. B., Chicopee Falls
hlin, Peter A., Worcester
Box 35
ourn, Frank A., Cambridge
19 Ware St.
oy, Charles C., Hubbardston
b, E. E., Boston
186 Commonwealth Ave.
b, Mrs. Geo. B., Winchester
15 Mystic Ave.
b, Harold W., Greenbush
b, Walter, Berlin
ier, Eugene O., Groton
fort, Edward W., Winchester
ant, Wilson H., Buckfield, Me.
ion, Albert O., Worcester
Greendale
clin, John, Boston
64 W. Newton St.
erse, Frederick S., Westwood
c, Herbert A., Shrewsbury
c, H. H., Northboro
c, Howard G., Leicester
c, Lyman C., Millis
c, Walter F., W. Roxbury
2 Ruskin St.
e, Dr. William P., Boston
330 Dartmouth St
idge, George A., Hudson
obs, Edward W., Colrain
obs, Ernest W., Peabody
132 Andover St.
obs, Robert, Colrain
er, Frank I., Boston
33 Cornhill
land, Edgar F., Colrain
land, Harvey L., Colrain
y, Allan P., Dover
er, Patrick, 25 Aborn St., Salem
hlin, Joseph P., W. Acton

Couper, Henry J., Littleton
Cowper, J. E., Allston,
427 Cambridge St.
Crafts, Royal L., R. D. 2, Ludlow
Crafts, Storer F., Boston
Commonwealth Hotel
Craig, David R., Boston
69 Mt. Vernon St.
Craig, William, Boston
95 F. H. Market
Crampton, H. D., Washington, D. C.
36th & M. Sts., N. W
Crane, Henry L., Westwood
Crane, Samuel V., Blackstone
Creswell, George N., Seymour, Conn.
Critchett, Edward R., Amherst
Croft, Dr. B. F., Bernardston
Cross, Robert F., Osterville
Cullen, Matthew, Rutland
Cunningham, Fred H., Bolton
Cunningham, Paul, Box 49, Bolton
Curtis, Ellicott D., Litchfield, Conn.
Curtis, Louville, Tyngsboro
Curtis & Co., Boston
104 F. H. Market
Cushman, Miss Florence, Harvard
Cutler, Roland R., So. Sudbury
Cutler, Warren A., Bedford
Cutter, Charles B., Auburndale
Dadmun, Earl W., Watertown
193 Arsenal St.
Dakin, Arthur H., Boston
6 Beacon St.
Damon, Ralph C., Ashby
Darling, Robert, Simsbury, Conn.
Darling, S. W., Spencer
Daugherty, Allen E., Boston
218 Tremont St.
Davenport, Jonathan E., Colrain
Davenport, S. Lothrop, Danvers
252 Maple St.
Davenport, Rev. William H.
Griswoldville.
Davis, E. Norton, Hampden
Davis, Harry P., R. D., Hudson
Davis, Irving G., Brimfield
Davis, L. G., East Longmeadow
Davis, William M., Boston
93 Broad St.
Deane, John M., Assonet
Deering, Fred W., Topsfield
DeCoster, Harry W., Lynn
Box 145
DeForrest, Arthur U., Cyrus
Degen, Mrs. George F., S. Byfield
Dellea, John M., Great Barrington
Dennett, Dr. Charles A., Arlington
Dennison, Arthur L., Colrain

Derby, Alden, Leominster
 Derby, Clifton, Leominster
 Derby, E. Everett, Leominster
 Derby, John, Stow
 Diaz, Ralph M., Belmont
 Dickinson, E. F., Billerica
 Dickson, Walter A., Harvard
 Dimick, Orlando W., Watertown
 57 Russell Ave.
 Doten, Scott T., Lincoln
 Douglas, Edward S.
 Douglas Hill, Me.
 Douglass, Norman B., Sherborn
 Douglas, W. B., Arlington
 9 Brantwood Rd.
 Douglas, W. & B., Middletown, Ct.
 Downs, Thomas, Georgetown
 Drake, Nathaniel S., Pittsfield, N. H.
 Dresser, Julius S., Southbridge
 25 Everett St.
 Drew, George A., Greenwich, Conn.
 Drisko, William J., Winchester
 Drowne, George P., Morrisville, Vt.
 Drury, Frederick H., Rutland
 Drury, Lewis F., Rutland
 Dummer, Joseph N., Rowley
 Dunlap, Harry, Lowell
 DuBois, Goddard, New York City
 105 Riverside Drive
 DuBois, J. Frank, Lynn
 20 Conomo Ave.
 Ducey, David L., Framingham
 Dupuis, Bernard C., Southbridge
 Box 151
 Duren, W. C., Carlisle
 Durgin, Fred L., Paxton
 Durning, James A., Jamaica Plain
 27 Holbrook St.
 Dwight, Henry A., Adamsville
 Eager, Chas. B., Marlboro
 228 Church St.
 Earle, Thomas, Steelton, Pa.
 Easterbrook, I. Harold, Dudley
 Eddy, Jeremiah P., Providence, R. I.
 Box 343
 Edgett, Edwin F., Arlington
 200 Pleasant St.
 Edwards, F. L., Haydenville
 Elder, David, Harwich
 Ellery, William, Boston
 252 Summer St.
 Ellsworth, J. Lewis, Worcester
 Elson, A. W., Belmont
 527 Concord Ave.
 Ely, Ralph A., Holyoke
 Emerson, Charles W., Haverhill
 821 Broadway
 Emerson, E. A., Haverhill
 261 N. Broadway
 Emerson, Edward D., Boston
 49 Federal St.
 Everett, Harold C., R. D., W. Acton
 Everett, Richard L., Wellesley Farr
 Fairbanks, A. N., Barre
 Farmer, Walter B., Brookline
 75 Sewall Ave.
 Farrar, Edward R., So. Lincoln
 Farrar, Herbert G., So. Lincoln
 Farrar, Samuel, So. Lincoln
 Farwell, S. E., Boston
 55 Congress St.
 Fay, Dudley W., Auburn, N. Y.
 39 Williams St.
 Fay, John H., Danvers
 Feller, J. Foster, Linlithgo, N. Y.
 Feeney, John Jr., Westford
 Felton, Arthur S., Bolton
 Felton, Truman P., W. Berlin
 Felton, Miss Louisa C., Cambridge
 92 Brattle St.
 Felton, N. Henry, Marlboro
 Fenno, Stanley W., Revere
 50 Pleasant St.
 Ferguson, Miss Eleanor,
 Cummington
 Ferris, Miss A. Gertrude, Hopkinton
 Field, Mrs. Ellen S., Milton
 15 Brookside Pk.
 Field, G. W., Sharon
 Fish, Arthur, Colrain
 Fisher, L. L., Geneva, Neb.
 Fisk, Nathaniel B., Stoneham
 Fiske, David L., Grafton
 Fiske, O. H., Huntington
 Fiske, Ralph T., Northboro
 W. Main St.
 Fitch, George A., Sterling Junction
 Flagg, Charles V., Littleton
 Flaherty, T. F., Portland, Me.
 21 Arlington St.
 Fletcher, Everett S., Thompson, Ct.
 Fletcher, George V., Belmont
 483 Pleasant St.
 Fletcher, J. Henry, Belmont
 Flint, Albert E., Worcester
 8 Moore Ave.
 Flint, William T., Gardner
 Flower, Dr. Alfred H., Boston
 101 St. Botolph St.
 Follensby, Lyman, Cordaville
 Folsom, B. F., Gleasondale
 Forbes, D. A., East Hampden
 Forbes, William, Box 47, Weston
 Foster, George H., Shrewsbury
 Box 194

Foster, Mr. and Mrs. Harlow R.,
 Ashby
 Forest, John A., R. D., Methuen
 Lowell Ave.
 Fowle, D. H., Newburyport
 Fox, Frank B., Taunton
 26 Crocker Bldg.
 Fox, Jabez, 99 Irving St., Cambridge
 Fraser, C. E. K., So. Natick
 Fraser, William R., Northboro
 Freehan, Charles W.,
 Great Barrington
 Freeman, Henry F., Warren
 French, Samuel C., Westwood
 Frost, Arthur H., Boston
 18 Tremont St.
 Frost, G. Howard, W. Newton
 Frost, Sylvester C., Arlington
 Lake St.
 Fuller, Edward A., No. Andover
 Fuller, Horace C., Leominster
 Fuller, Howard, Shirley
 Gale, W. F., Springfield
 24 Crystal Ave.
 Gallup, B. S., R. No. 2, Westboro
 Gannon, William J., W. Medford
 15 Madison St.
 Gardner, R. O., Boston
 Care of Jos. Breck & Sons
 Geer, A. S., Three Rivers
 Geer, H. D., Three Rivers
 Geer, Mr. and Mrs. J. T.,
 Three Rivers
 Geissler, J. J., Box 144, Sharon
 German, Kali Works, New York City
 42 Broadway
 Gerrish, Miss Isabel F., Ashland
 Gibson, Fred J., Hillsboro, N. H.
 Gibson, John F., Southboro
 Gifford, John E., Danvers
 Gilbert, A. M., Boston
 810 Barristers Hall
 Gilbert, Ralph D., Box 229, Boston
 Gilligan, Sidney D., Warren
 Gilmore, Abiel P. R., Acushnet
 R. No. 1
 Gilmore, Edwin M., Marlboro
 Hosmer St.
 Gilmore, Howard P., Westboro
 Gilson, Dr. F. Earland, Groton
 Gleason, Chas. A., Springfield
 Gleason, Walter D., Pratts Junction
 Gold, Chas. L., West Cornwall, Conn.
 Goldthwait, Addison B., Bardwells
 R. D.
 Goldthwait, Roy, Bardwells
 Goodell, Everett E., Westboro
 Goodrich, Granville S., W. Newbury
 R. D. 1-74
 Goodrich, James H., W. Newbury
 Goodrich, Walter H., Hudson
 Chapin Road
 Goss, B. J., Ayer
 Gould's Mfg. Co., of N. E., Boston
 58 Pearl St.
 Gould, Walter F., Ipswich
 Gould, Mr. and Mrs. Winthrop W.,
 Pratts Junction
 Gourley, Joseph H., Durham, N. H.
 Grady, John P., Lynn
 344 Western Ave.
 Gragg, Isaac P., 27 School St. Boston
 Graham, Charles S., Holden
 Granger, Miss Helen, Griswoldville
 Graves, Arthur E., Worcester
 17 Somerset St.
 Graves, Wilson A., Shelburne
 Gray, Rev. Ora Samuel, Amherst
 Greeley, Eugene O., Derry, N. H.
 Green, Clayton R., Belchertown
 Greene, William A., Saundersville
 Greenough, J. J., Deerfield
 Grief Bros. Cooperage Co.,
 Cleveland, Ohio
 Griswold, Gilbert E., Buckland
 Hackett, A. Edward, Bolton
 Haight, Harry D., Boston
 110 Gainsboro St.
 Hale, George H., Hudson
 34 Lincoln St.
 Hale, Herbert A., Colrain
 Hale, James O., Byfield
 Hale, M., Groton
 Hale, Thaddeus, Wellesley Hills
 Hall, Chas. A., Ashfield
 Hall, Fred P., Danvers
 Hall, Rufus M., Shirley
 Hall, Russell B., Medway
 Hall, Stacy L., Boston
 100 F. H. Market
 Hallock, Francis R., Stow
 Halloran, Edward J., Roxbury
 52 Calumet St.
 Hammond, Irving C., Onset
 Hannaford, Frank H., Lexington
 Box 116
 Hansen, William, North Granby, Ct.
 Hardy, John H., Jr., Littleton
 Harlow, Harry J., Shrewsbury
 Harper, Henry, Marlboro
 Hartshorn, Dr. W. N., Brookline
 23 Warwick Rd.
 Harrington, Arthur B., Charlestown
 10 Salem St.

Harris, Roland W., No. Andover
 316 Johnston St.
 Harvey, Frank W., Cheswold, Del.
 Harvey, John T., Pittsfield, N. H.
 Hastings, Frank W., Sudbury
 Haskell, E. B., Southbridge
 Haskell, Tarbell P., Northboro
 Hathaway, Charles E., Somerset
 Hathaway, Howard W., Somerset
 Hawkins, A. C., Lancaster
 Haye, Marcus L., Westwood
 Hayes, James, Ashby
 Haynes, Daniel W., Framingham
 Salem St.
 Hazen, M. S., New York City
 51 Chambers St.
 Heald, Philip C., Greenville, N. H.
 Heath, Elmer H., Neponset
 72 Minot St.
 Heggie, James, Somerville
 102 Flint St.
 Henry, Robert J., Sherborn
 Hersey, Everell A., Westboro
 Hessell, Robert, Framingham
 R. No. 2
 Heywood, Mr. and Mrs. Ezra K.,
 Pratts Junction
 Hiestand, T. B., Holyoke
 115 Suffolk St.
 Higbee, Harry G., Hyde Park
 13 Austin St.
 Higbee, William E., Hyde Park
 21 Webster St.
 Higgins, Charles H., Arlington
 Higgins, Robert H., Arlington
 7 Swan St.
 Hill, Chas. E., Temple, N. H.
 Hill, Ernest L., Millis
 Hilton, Edwin M., Framingham
 Hinds, James, Winchester
 Hitchcock, C. F., Gilbertville
 Hittinger, Richard, Belmont
 Hodgkins, Clarence E., Northampton
 Holden, Thomas M., Newton Centre
 Holland, Charles P., Brockton
 183 Main St.
 Holway, T. E. & Co., Boston
 17 No. Market St.
 Hooper, W. L., Cambridge
 2286 Mass. Ave.
 Hopkins, Mrs. James C., Dover
 Hosmer, Wm. H., Leominster
 104 Lindell Ave.
 Houghton, Clement S., Boston
 60 State St.
 Howard, A. B. & Son, Belchertown
 Howard, Mrs. Fred C., Wakefield
 89 Gould St.
 Howard, Hall J., Colrain
 Howard, Henry M., W. Newton
 Howe, D. A., Worcester
 218 Summer St.
 Howe, Elmer D., Marlboro
 Howe, James S., Jr., So. Framingham
 Howe, Sumner L., Marlboro
 Bilton St.
 Howes, Abbott L., Ashfield
 Howes, Albert, So. Ashfield
 Howes, Alvah W., Ashfield
 Howes, Miss Gertrude E.,
 W. Mansfield
 Howes, John W., Ashfield
 Howes, Raymond G., Ashfield
 Howes, Seth H., Southboro
 Howes, Wesley E., R. No. 1, Medway
 Howes, Dr. Williard B., Rutland
 Hoxsie, Allen N., E. Greenwich, R. I.
 Lock Box 402
 Hubbard, Charles J. G., Berlin
 Hubbard, Edwin A., Ashby
 Hubbard, Jesse B., Boston
 95 Milk St.
 Hubbard, Eliot, Boston
 206 Beacon St.
 Hubbard, Robert, Middletown, Conn.
 Box 785
 Hurlburt, Dr. C. S., E. Longmeadow
 Hulst, Alfred N., Amherst
 Hungerford, Newman, Hartford, Ct.
 45 Prospect St.
 Hunting, A. I., W. Boylston
 Hutchinson, Walter K., Arlington
 Hyde, Wheeler Co., Boston
 41 No. Market St.
 Ilsley, Fred., Newbury
 Ives, E. M., Meriden, Conn.
 Jackson, Dr. Alton A., Everett
 512 Broadway
 Jackson, Dr. A. W., Worcester
 136 Austin St.
 Jacobs, Albert A., R. D., Clinton
 Jacques, Otis A., Boston
 17 Quincy Row
 James, Frank M., Haverhill
 126 Monument St.
 Jameson, George W., Lexington
 Jarvis, Chester D., Storrs, Conn.
 Jefts, George M., Stoneham
 Jencks, Fred A., Woonsocket, R. I.
 Jenkins, George E., Clifton
 Clifton Ave.
 Jenkins, Zebina H., W. Bolyston
 Jenks, Albert R., Springfield
 Massasoit Bldg.
 Jennings, Edward,
 Newton Lower Falls

Jewett, Warren C., Worcester
 Johnson, Everett M., Colrain
 Johnson, J. Henry, Leominster
 408 West St.
 Johnson, John F., Northboro
 Johnson, Richard W., Westboro
 Jones, Fred W., Boston
 50 Equitable Bldg.
 Jones, John, Attleboro
 107 Slater St.
 Jones, Nathaniel R., Billerica
 Jones, Percival W., S. Sudbury
 Jones, Warren H., S. Acton
 Joslin Dr. Perry E., Milford
 177 Main St.
 Jurek, Joseph, Colrain
 Kandle, Herbert A., Natick
 65 Rockland St.
 Keller, William F., Holliston
 Kelly, Charles P., Newburyport
 Kelly Bros., Dansville, N. Y.
 Kelsey, D. S., W. Hartford, Conn.
 Kemp, Charles J., Ipswich
 Kemp, Walter H., Colrain
 Kendall, Charles E., Milford, N. H.
 Kendall, E. Dana, Holden
 Kendall, H. Prentice, Sterling
 Keyes, Louis G., Nashua St., Woburn
 Keyes, G. Harvey, W. Boylston
 Keyes, John F., Lancaster, Box 85
 Kilburn, Joseph H., Pratts Junction
 Kimball, Alfred, Haverhill
 Kimball, Leonard H., E. Haverhill
 Kingman & Hearty, Inc., Boston
 20 N. S. Faneuil Hall
 Kinney, F. J., R. D., Worcester
 Kinney, Herbert R., Worcester
 Kirby, Ralph J., Arlington
 Kittredge, George D.
 Mount Vernon, N. H.
 Knapp, Dr. Geo., Framingham
 79 Main St.
 Knapp, George S., Groton
 Knight, Willis E., Gardner
 Knights, Arthur A., Worcester
 100 Beacon St.
 Knights, Harry W., Boston
 87 Commercial St.
 Kyes, Arthur N., Hopkinton
 3 Hayden Row
 Labouteley, Gaston E., Three Rivers
 Lamb, H. J., Pittsfield
 Lamphear, Arthur S., Gardner
 R. D. 2-50
 Lamson, Arthur C., Marlboro
 Lamson, E. M., Hudson
 Lane, Gilbert E., W. Peabody
 Langley, H. S., Saxtonville
 Lawrence Edward, Brookline
 34 Kilsythe Rd.
 Leach, C. Arthur, So. Hamilton
 Learned, Frederick H., Winchester
 22 Lebanon St.
 Learned, W. H., Florence
 Leavens, Geo. D., New York City
 51 Chambers St.
 Leavitt, Albert J., Roslindale
 37 Aldrich St.
 Lee, W. H., Box 1243, Springfield
 Leitch, W. J., No. Andover
 Leland, P. F., 31 Milk St., Boston
 Leman, J. Howard, Box 2365, Boston
 Leonard, F. M., Boston
 52 Clinton St.
 Lewis, Frank D., Groton
 Ley, Harry A., Springfield
 Care of F. T. Ley Co., Main St.
 Libbey, Chas. E., Worcester
 158 Holden St.
 Lincoln, Henry T., N. Scituate
 Box 113
 Lincoln, Wm. S. Boylston Centre
 Linton, William, Weston
 Locke, Geo. L., Winchester
 17 Ridge St.
 Locke, Howard R., Amherst, N. H.
 Locke, Isaac H., Belmont
 561 Pleasant St.
 Locke, Jas. E., Belmont
 575 Pleasant St.
 Lord, Walter E., Newfield, Me.
 Lord & Spencer, Boston
 21 N. S. F. Hall Market
 Loud, C. Oliver, Framingham
 Loud, Chas. E., Boston
 75 State St.
 Lovell, Henry, Worcester
 12 N. Ashland St.
 Luard, Richard G., Wrentham
 Ludwig, Frank P., Springfield
 70 Amherst St.
 Luke, T. A. E., Ashby
 Lull, Robert D., Hamilton
 Lumsden, James, Reading
 Lunt, Daniel A., Boston
 62 N. Wash. St.
 Lunt, Edward A., Newbury
 Lunt, Geo. W., Newburyport
 60 E. High St.
 Lyford, W. C., Natick
 Lyman, Chas. E., Middlefield, Ct.
 Lyman, Henry H., Middlefield, Ct.
 Lyons, M. E., Marlboro
 12 Belmont St.
 MacDonald, Allan, Yalesville, Ct.

MacInnes, John C., Worcester
 462 Main St.
 MacRae, Donald, State Farm
 Mack, Wallace P., Derry, N. H.
 Mackay, W. J., Springfield
 Macuen, A. T., Milford
 Macurda, W. E., Boston
 92 State St.
 Madigan, Wm. J., R. D., Harvard
 Mainland, John Y., Newton Centre
 54 Gray Cliff Rd.
 Makepeace, John C., Wareham
 Maloney, Bros. & Wells Co.
 Dansville, N. Y.
 Mann, Chas. W., Methuen
 Mann, Horace W., Stoughton
 1057 Wash. St.
 Mannion, Thos. J., Concord Jct.
 R. D. 27
 Margeson, Ingram I., Westwood
 Marshall, A. A., Fitchburg
 Marshall, Geo. A., Fitchburg
 Marshall, Jas. C., Tewksbury
 Martin, Geo. J., W. Newton
 Mason, Joseph, Newton Upper Falls
 Mason, Otis N., Box 1, Wrentham
 Mathews, Mrs. Charlotte V.,
 Brookline, N. H.
 Mathews, Edwin, Orange
 R. D., 2-79A,
 Maxam, Chas. W., Adamsville
 Maynard, L. R., So. Berlin
 Box 47
 Maynard, E. W., Springfield
 855 Belmont Ave.
 Maynard, Samuel T., Northboro
 McDonald, Chas. G., Medway
 McDougall, Allister F., Amherst
 M. A. C.
 McGarry, Miss Virginia, Grafton
 McGuire, W. H. Jr., Wilbraham
 McKay, Wm. L., Geneva, N. Y.
 McMillan, Geo., Mt. Hermon
 McNeish, Dr. Alex., Leicester
 Mead, A. & O. W. & Co., Boston
 Mead, Harlow E., N. Andover
 Mead, Herbert O., R. D., Lunenburg
 Mead, L. H., Harvard
 Measures, Daniel E., Rowley
 Mentzer, Cyrus H., Northboro
 Mentzer, Thornton E., Northboro
 Merrifield, Fred L., Colrain
 Merriam, Herbert, Weston
 Merrill, Amos A., Hampden
 Merriman, Jas. L., Bolton
 Merritt, Chas. L., So. Weymouth
 Meserve, John M., Hudson
 Midgeley, Leonard C., Westboro
 Messenger, Geo. E., Fitchburg
 Pearl Hill Rd.
 Miles, H. C. C., Milford, Ct.
 Millard, Alfred, Boston
 Hotel Bellevue
 Miller, Allan B., Worcester
 32 Westland St.
 Miller, Arthur, Boston
 46 Clinton St.
 Miller, Danforth D., Worcester
 9 Pleasant St.
 Miller, E. Cyrus, Haydenville
 Mills, John K., Northboro
 Minott, Chas. W., Hudson
 Minns Miss Susan, Princeton
 Monk, Rodney E., Pratts Junction
 Moore, Clarence A., Arlington
 81 Walnut St.
 Moore, Elliott J., Worcester
 Moore, H. Ward, Worcester
 Moore, J. L., Wayland
 Moore, Thos. A., Boston
 521 Wash. St.
 Morey, Whipple F., Box 182, Milford
 Morgan, Paul B., Worcester
 Morrell, Melville P., Stow
 Morse, Prof. A. D., Pelham
 Morse, Edwin T., Worcester
 Clark St.
 Morse, Frank E., Boston
 162 Boylston St.
 Morse, Geo. F., So. Lancaster
 Morse, Herbert L., W. Roxbury
 9 Whitmore St.
 Morse, Munroe, Medway
 Mortimer, Edmund, Grafton
 Moulton, Geo. D., Boston
 141 Milk St.
 Moses, H. A., Woronoco,
 Woronoake Heights
 Moxley, Chas. S., No. Andover
 Mudge, Everett P., Swampscott
 Munroe, Howard M., Lexington
 R. D. 2
 Munson, E. Malcolm, S. Dartmouth
 Munson, Whittaker Co., Boston
 623 Tremont Bldg.
 Munson, Willard A., Littleton
 Murch, Harry A., Sherborn
 Murdock, Harry E., Danvers
 Murray, Robt. B., Roxbury
 28 Atherton St.
 Myers, Weil & Co., Cleveland, Ohio
 670 Broadway
 Nash, Franklin W., Ludlow
 Nelson, John Walter, Lexington
 R. No. 1

N. E. Nurseries, Bedford
 Nichols, Earl M., Lyonsville
 Nichols, Dr. Estes, Hebron, Me.
 Nichols, Willard O., Elm Grove
 Norman, Alvah J., Conway
 Norris, J. Edward, W. Springfield
 988 Riverdale
 North, Wayne H., Boston
 161 Devonshire St.
 Noyes, Miss Mabel F., Methuen
 416 Lowell St.
 Noyes, Geo. W., Byfield
 Noyes, W. W. & C. R., Boston
 13 No. Market St.
 Nugent, Jas. H., Fall River
 332 Bedford St.
 Nye, Theodore H., Worcester
 19 Beverly Rd.
 Oliver, Geo. T., Boston
 30 Ipswich St.
 Openshaw, John, M. A. C., Amherst
 Orcutt, B. A., Buckland
 Orcutt, John C., Boston
 Chamber of Commerce
 Osborne, J. Warren, Middleton
 Osborn, L. T., Great Barrington
 Osgood, H. G., R. No. 1, Westford
 Overend, Walter E., Spencer
 Tafts Corner
 Packard, A. A., Springfield
 254 Union St.
 Page, John F., N. Leominster
 Page, J. Nathan, N. Leominster
 Page, Ralph L., Arlington
 21 Walnut St.
 Paine, Everett L., Berlin
 Palmer, Geo. L., Kents Hill, Me.
 Parke, Everett B., Burlington
 Parker, C. D., Worcester
 47 Fales St.
 Parker, Elmer B., Wilton, N. H.
 Parker, Fredk. H., Billerica
 Parker, Francis R., Fitzwilliam, N.H.
 Parker, Horace B., Brookfield
 Parker, Jas. F., Medway
 Parker, Walter S., Reading
 55 Walnut St.
 Parker, Wm. E., Boylston
 Parks, Wm. A., Needham Heights
 Parmelee, H. A., Williamsburg,
 R. D. 1
 Parmenter, C. I., Box 112, Fayville
 Parmenter, Ralph E., Hudson, N. H.
 Parsons, Chas. F., Framingham
 R. D.
 Parsons, Wilfred A., Southampton
 Patch, A. Warren, Boston
 17 N. Market St.
 Patch, Frenk A., Littleton
 Patten, Jas. W., Sterling
 Patten, Robt. G., R. No. 2, Amesbury
 Patrick, Henry L., Hopedale
 Paul, A. Russell, Belvidere, N. J.
 Paul, Miss Eleanor F., Sherborn
 Paul, Miss E. V., Belvidere, N. J.
 Payne, Horace, No. Jay, Me.
 Peabody, Geo., Williamstown
 Pearson, Benjamin, Byfield
 Pearson, John A., W. Roxbury
 205 Park St.
 Pease, Arthur D., R. No. 2, Chester
 Pease, Chas. F., Chester
 Peck, Austin, Shelburne
 Peckham, Amos L., Jamestown, R. I.
 Penney, Arthur S., Saugus
 199 Essex St.
 Penney, Walter H., Saugus
 220 Essex St.
 Perkins, Frank, Newburyport
 42 E. High St.
 Perkins, Henry J., Springfield
 Perkins, Robt. F., Framingham
 Perry, J. A., Newburyport
 Perry, Leonard F., Millis
 Perry, Roland, Reading
 Perry, Walter I., Newburyport
 Care of Bliss & Perry
 Peters, Austin, D. V. S., Harvard
 Peters, Frederick C., Ardmore, Pa.
 Box 546
 Peterson, Myron, Colrain
 Peterson, Ralph H., Adamsville
 Peterson, Rudolph, Concord
 Phipps, G. A., Dorchester
 605 Washington St.
 Pickard, P. W., Hopedale
 Pickard, Wm. L., Littleton
 Pickens, J. M., R. No. 2, Ludlow
 Pierce, Alfred, Lexington
 301 Mass. Ave.
 Pierce, W. C., West Boylston
 Pierce, Wm. D., Worcester
 3 Rock Ave.
 Piper, Henry N., Holliston
 Piper, Louis M., Ashby
 Plaisted, Richard, Gardner
 Platt, Norman S., New Haven, Ct.
 395 Whalley Ave.
 Poor, Jas. C., N. Andover
 Poore, Walter, Lake St., Haverhill
 R. D.
 Pope, F. H., Auburndale
 108 South Ave.
 Porter, Jonathan L., So. Hamilton
 Porter, Sylvester E., W. Berlin
 Potter, Geo. A., Great Barrington

Potter Robert, South Westport
 Pottle, Chas. L., Holliston
 Powell, Edwin C., Springfield
 Powers, Edwin U., Leominster
 Powers, John G., No. Easton
 Pratt, Benj. G., New York City
 50 Church St.
 Pratt, Henry S., Worcester
 Pratt, M. C., Middletown Springs, Vt.
 Pratt, Orestes M., Plymouth, N. H.
 R. No. 4.
 Prescott, Chas. W, Concord
 Prichard Asa B, Somerville
 City Hall
 Prichard, Reuben P.,
 State Rangers School,
 Wanakeena, N. J.
 Priest, Edwin H., Littleton
 Priest, Frank, Littleton
 Priest, Geo. L., Littleton
 Priest, Lyman F., Gleasondale
 Priest, Harold A., Gleasondale
 Proctor, Albert E., Hopkinton
 Purington, Geo., Colrain
 Purington, Nelson, Colrain
 Purrington, Wilbur M., Haydenville
 Putnam, D. O., W. Sutton
 Putnam, Earl F., Littleton
 Putnam, Mrs. H. W., W. Sutton
 Putnam, J. H., Litchfield, Ct.
 Putnam, Oliver J., Leominster
 Race, R. Henry, N. Egremont
 Raddin, Sam. H., Groton
 Rae, Geo. L., Needham Heights
 Box 393,
 Ranney, Wm. H.,
 Derry Village, N. H.
 Rawson, Geo. A., Newton
 41 Vernon St.
 Rea, F. Orris, N. Andover
 34 Rea St.
 Read, G. P., New York City
 199 Duane St.
 Read, Henry B., Barre
 Reed, Jas. O., R. D. 1, Mason, N. H.
 Rees, Prof. Ralph W., Amherst
 M. A. C.
 Reilly, Wm. J., Nurseries,
 Dansville, N. Y.
 Reynolds, Daniel W., Haverhill
 R. 2, 749 Broadway
 Reynolds, Mr. and Mrs. Edwin O.
 N. Andover
 Rice, Geo. Calvin, Worcester
 Station D.
 Rice, H. L., 20 High St., Boston
 Rice, J. L., R. D. Ludlow
 Rice, J. Wilbur, R. D. Ludlow

Rice, Lee W., R. D., Ludlow
 Richards, Lysander S., Boston
 Hotel Nottingham
 Richardson, Evan F., Millis
 Richardson, Jas. H., Thornton, R. I.
 Rider, C. W., Housatonic
 Riley, Ernest E., Needham
 Ripley, Edw. P., Weston
 Robbins, Alfred N., Norwood
 85 Walpole St.
 Robbins, Henry W., Littleton
 Roberts, Louis E., So. Lincoln
 Robertson, Chas. H., Leyden
 Robinson, Alfred E., Lexington
 Robinson, Everett, Uxbridge
 Robinson, E. D., Vineyard Haven
 Lockwell F. P.,
 R. D., Rockfall, Ct.
 Rogers, Dexter M., Allston
 344 Cambridge St.
 Rogers, Elijah, Southington, Ct.
 Rogers, F. D., R. D. 1, Monson
 Rogers, Preston C., W. Newbury
 Rothwell, Mrs. B. J., Needham
 Root, Herman D., Colrain
 Rose, Milton S., Harwich
 Ross, Walter D., Worcester
 Rowell, John, 33 Beaver St., Salem
 Russell, Fred A., Methuen
 Sabin, Leroy C., Hadley
 Sage, Chas. D., N. Brookfield
 Sanborn, Carl N., Cambridge
 19 Cambridge Terrace
 Sanborn, H. S.,
 R. D., Box 34, Nashua, N. H.
 Sanborn, Dr. Nathan W., Holden
 Sanderson, Geo. W., Littleton Depot
 Sanderson, J. Gardner, W. Medway
 Sands, Furber, & Co., Boston
 90 F. H. Market
 Sargent, Fred W., Amesbury
 Sawyer, Chas. F., Hebron, Me.
 R. D.
 Sawyer, Geo. E., Everett
 Sawyer, John F., Reading,
 8 Arlington St.
 Scheuerle, John A., Springfield
 470 Belmont Ave.
 Schworm, Chas. S., Boston
 Back Bay
 Scott, John H., Wrentham
 Scott, Walter, Cranbury, N. J.
 R. D. 1.
 Searle, O. C. & Son, Southampton
 Sears, Arthur E., Mason, N. H.
 Sears, Prof. and Mrs. Fred C.,
 M. A. C., Amherst
 Sears, Horace G., Danvers

Sears, Vinton A., Boston
 53 State St.
 Sebastian, L. A., W. Acton
 Severance, Chas. F., Greenfield
 via Lyden Stage
 Sevey, Glenn C., Russell
 Shattuck, Mrs. Bertha B., W. Acton
 Shaw, Dr. J. K., M. A. C., Amherst
 Shaw, Walter K., Boston
 18 Post Office Square
 Shaw, Silas A., Auburn, Me.
 Shea, Robt. O., Boston
 623 Tremont Bldg.
 Shearer, Jas., Colrain
 Shedd, Warren F., Wakefield
 Sherman, Ellsworth P., Marlboro
 75 Warren Ave.
 Sherman, Wm. B., Providence, R. I.
 45 Elmwood Ave.
 Shinkwin, Wm. A., Hudson
 Shumway, E. F., Belchertown
 Simons, Shuttleworth Webling Co.,
 46 Clinton Boston
 Sims, Dr. Thcs., Melrose
 119 W. Foster St.
 Slocum, Wm. S., Newport, R. I.
 Box 164
 Small, Chas. E., Berlin
 Smith, Chas. A., Ashfield
 Smith, Chas. S., Lincoln
 Smith, Fred A., 39 Pine St., Danvers
 Smith, Geo. N., Wellesley Hills
 Smith, Geo. W., Melrose, Ct.
 Smith, Hiram N., N. Andover
 Smith, John L., Barre
 Smith, Omer M., Florence
 Smith, Phillip N., Worcester
 63 Pleasant St.
 Smith, Robt. B., No. Andover
 Box 87
 Smith, Walter J., Ashby
 Southwick, Walter H., Nahant
 Sowerby, Edmund, Marlboro
 Spalding, Geo. F., Newton Centre
 Spaulding, Percy F., Ashby
 Spoor, J. A., Chicago
 1305 1st National Bnk Bldg.
 Sprague, Geo. H., Ipswich
 Sprague, Isaac, Wellesley Hills
 Sprowl, Paul & Co., Boston
 23 N. Market St.
 Stacy, Albert B., Charlemont
 Stanard, Frank W., Tyringham
 Staples, Geo. W., Hartford, Ct.
 Stearns, Chas. N., Springfield,
 244 Main St.
 Stearns, Wm. H., W. Boylston
 Steele, Burpee C., W. Acton
 Steele, Fred, Hersam St., Stoneham
 Stene, A. Everett, Kingston, R. I.
 Stetson, Archie B., Griswoldville
 Stetson, Clarence F., Buckland
 Stetson, Edgar C., Adamsville
 Stevens, Abel F., Wellesley
 Stevens, Geo. T., Groton
 Stewart, Andrew, Quincy
 177 Whitwell St.
 Stewart, Chas. A., Colrain
 Stewart, James L., Amesbury
 Stimson, Rufus W., Boston
 511 Ford Bldg.
 Stockwell, John W., Worcester,
 656 Main St
 Stockwell, O., Fitchburg
 Stone, Geo. E., Shrewsbury
 Stone & Forsyth, Boston
 67 Kingston St.
 Stone, L. L., R. D. 2, Ludlow
 Storer, John H., Groton
 Stowe, A. Byron, Adamsville
 Stowe, Geo. Burton, W. Millbury
 Stowe, Geo. I., Box 5, W. Millbury
 Stow, Harris C., Grafton
 Stratton, Edward N., Marlboro
 Stratton, Herbert, Hudson
 Stuart, Louis A., Pratts Junction
 Sussmann, Rudolph, Ashfield
 Swain, Allen N., Boston,
 623 Tremont Bldg.
 Swain, Donald N., W. Roxbury,
 95 Mt. Vernon St.
 Swain, Dr. Mary L., W. Roxburp
 73 Garfield Ave.
 Sweet, L. C., Cummington
 Symmes, Samuel S., Winchester
 Taplin, W. A., Brighton,
 35 Foster St.
 Taylor, Arthur G., Fitchburg,
 R. D. 1.
 Taylor, Geo. E., Jr., Shelburne
 Taylor, G. E., Wayland
 Taylor, Wm. R., Westford
 Teele, E. R., W. Acton
 Temple, Ed. Seth, Shattuckville
 Thayer, Herbert A., Harvard
 Thayer, John E., Lancaster
 Thompson, Alfred N., Framingham,
 R. D.
 Thompson, Jared B., Monterey
 Thompson, L. H., Elm Grove
 Thurlow, Geo. C., W. Newbury
 Moulton St.
 Tilley, Everett G., Northboro
 Tilton, J. Dana, Wellesley
 Tilton, Dr. J. O., Lexington
 1 Elm Ave.

Titcomb, Walter H., Littleton
 Toohy, Wm. J., No. Andover,
 304 Stevens St.
 Tourtellotte, L. Holbrook, Marlboro
 Towle, Dr. Geo. P., Carlisle
 Towne, Abner, R. D. Williamstown
 Town, W. N., Waltham
 229 Moody St.
 Townsend, Henry M., W. Boylston
 Townsley, Fred R., Ashfield
 R. No. 1.
 Trask, Fred R., Sterling
 Tucker, A S., Warren
 Tucker, Clarence, Readville,
 Care of Thos. Levland Co.
 Tucker, Wm. A., Sterling Junct.
 Tufts, William, Sudbury
 Turner, N. B., Great Barrington
 Tuttle, Archer N., Warren
 Tuttle, Clarence, Groton
 Tuttle, Horace F., Acton
 Tyler, Alonzo W., Peabody
 Tyler, Nathaniel P., Sterling Junct.
 R. No. 1.
 Underwood, Herbert P., Gleasondale
 Upham, F. A., Three Rivers
 Van Deusen, N. S., Ashley Falls.
 Vinton, G. N., Sturbridge
 Vose, C H., East Templeton
 Wait, Minor S., Hampden
 Waite, E. H., Amherst,
 142 Main St.
 Wakefield, Alonzo C., Orange
 Walker, Henry P., R. D., Hudson
 Walker, Herman F., Lynn
 Washington St.
 Walker, Wm. B., Pratts Junction
 Wallace, F. S., Bradford
 178 Salem St.
 Wallace, Thomas C., W. Somerville,
 83 Irving St.
 Wallace, Wm. N., R. No. 2, Ludlow
 Vallis, Winthrop L., Jamaica Plains
 Centre and Allandale Sts.
 Valton, Perry, Belmont
 Vard, A. W., Auburn
 Vare, Arthur L., Framingham,
 Box 53,
 Vare, Henry, 82 High St., Brookline
 Vare, Lyman E., Norfolk
 Varner, Goodwin, Concord Junction
 Varren, Edward, Leicester
 Varren, Henry H., Stow
 Varriner, A. A., Warren
 Washburn, Handel E., E. Freetown
 Waters, Edw. A., W. Boylston
 Watts, C. F., Holliston
 Watts, Samuel, Natick
 Waugh, Prof. Frank A., Amherst
 M. A. C.
 Webb, Chas. R., Shrewsbury
 Box 21
 Webber, H T., Harvard
 Webber, R. M., Wilbraham
 Webster, Louis A., Blackstone
 Weeks, A. H., Somerville
 52 Boston St.
 Weeks, S. C., Falmouth
 Wehle, H. B., Southboro
 Westcott, Wilmarth A., Hopedale
 Wetherbee, Mrs. A. C., Worcester
 Station A., 31 Brattle St.
 Wharton, Wm. P., Groton
 Wheeler, A. B., Berlin
 Wheeler, Chas., Framingham
 Wheeler, D. E., Leominster
 Wheeler, F. A., Bolton
 Wheeler, F. Sherman, Berlin
 Highland St.
 Wheeler, Geo. F., Concord
 Wheeler, Gilbert H., Bolton
 Wheeler, Dr. Homer J., Boston
 92 State St.
 Wheeler, Wilfrid, Concord
 Wheeler, Wm. E., Berlin
 R. D., No. 27
 Wheeler, Wm. J., Worcester
 21 Forest St
 Wheelwright, Wm. B., Boston
 95 Milk St.
 Whitcomb, Herbert A., Northboro
 Whitcomb, Levi, Northboro
 Whitcomb, Nahum H., Concord Jct.
 R. No. 1.
 Whitcomb, Ralph H., Amherst
 White, Mrs. Catherine M. E.
 Westwood
 White, F. L., So. Deerfield, N. H.
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 White, Warren, Holliston
 Whitelock, Wm. M. E., Marlboro
 10 Farm Road
 Whitney, Chas. A., Upton
 Whittier, Dr. F. F., Boston
 149 Tremont St.
 Wieren, Geo. Von, So. Framingham
 R. D.
 Wilbur, Emery S., Ipswich
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 Wilbur, Walter M., Marlboro
 Wilcox, Howell G., Boston
 18 Pearl St.
 Willcutt, Walter G., Plainfield

Wilder, Chas. L., Lancaster	Winsor, Thos. K., Greenville, R. I.
Wilder, E. B., Dorchester 90 Columbia Road	Wister, John C., Germantown, Pa. Wister St
Wilder, Fred E., Sterling	Witherell, Warren F., Winchester, 114 Church St.
Wilder, Henry J., Washington, D. C. Bureau of Soils	Wolschendorf, Geo. E., Whitman R. D. 2.
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MASSACHUSETTS
FRUIT GROWERS'
ASSOCIATION INC.



REPORT OF THE
22nd Annual Convention
HELD IN
HORTICULTURAL HALL
BOSTON
1916



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Twenty-Second Annual Convention

OF THE

Massachusetts Fruit Growers' Association, Inc.

Horticultural Hall, Boston, Mass.

January 20, 21 and 22, 1916.

First Day, Thursday, January 20, 1916

AFTERNOON SESSION

President Sears in the Chair.

THE CHAIRMAN: Now, ladies and gentlemen, I think we will call the meeting to order, if you will be seated. We feel that we have a particularly strong programme this year to present to you and are glad to see so many out at the opening session. We want to make a specialty of two or three things this year, some of which we have tried to specialize on before. One thing we want particularly is to have time left for discussion and to emphasize the questions that you people may have to ask the different speakers and to give some time specifically for the question box or for calling for a list of questions which you will find in the programme here. We hope at the end of the different sessions to be ready for anybody to call for questions on this list and to ask someone that we think is qualified for the work to answer the questions.

Another thing we intend to do, and you will find it on the programme in several places, is to give our trades exhibits people a good fair show. We think we have got an excellent exhibit here, and want to give time enough for you people to go down and see the exhibit and talk to the men

there. On the other hand, while the sessions are on here, we hope you people will patronize the speakers and come in for the sessions. We also hope that you will be able to hear all of our speakers. We are going to allow Mr. Conant, our first speaker this afternoon, to start his discussion from the floor here rather than up on this stage. We will see how that works, and if you cannot hear him, we want you to say so and we will either have him speak louder or put him up on the stage or stop the street cars, or something else, to give you a chance to hear him, and we hope at all the sessions that the discussion may be heard. Our first speaker this afternoon is Mr. W. H. Conant, President of the Oxford Bears Fruit Growers' Association, Buckfield, Me., a man with whom many of you are already familiar. Mr. Conant is also Ex-President of the Maine Pomological Society.

We feel very fortunate in having Mr. Conant to talk to us because he is a man of wide experience and one who speaks from experience, and he is going to talk to us on "Factors Which Influence Annual Bearing of Fruit Trees," an extremely important subject, in which we are all interested. If we could always be sure to get as good crops every year as we get some years, the question of profit in fruit growing would be pretty largely solved. Mr. Conant has studied this matter carefully and I am sure he has some very interesting things to tell us along that line. I have great pleasure in introducing Mr. Conant. (Applause).

MR. CONANT: Mr. Chairman and members of the Massachusetts Fruit Growers' Association, ladies and gentlemen:

It is always a pleasure for me to meet the fruit growers of Massachusetts. I have attended several of your conferences and have always got a great deal of pleasure from them. Doubtless you realize that the subject on which I am to speak this afternoon is a very complicated one, and I shall have to bring to you my observations and experiences regarding these factors which seem to influence the annual

bearing of our trees. I think the great trouble with many of us fruit growers, especially in the past, has been that we have been looking to one factor to solve all of our orchard problems. In other words, we have been extremists along different lines. We have gotten the idea into our heads that by pruning a certain way we were to get the desired results in the quality of our fruit and quantity, and then when we took up spraying, thorough spraying, it was spraying, and that was to solve all our problems, and then the question of what system of cultivation, culture or tillage should we practise, and we got the idea, from the West, possibly, that intensive cultivation would solve all the problems connected with the commercial orchard, etc., etc. So we have drifted from one to another until a great many of us have become lost as to just what we should do in the next move to bring about the desired results we have been so long working for. Now, as the President has said, if I do not make myself heard in the back of the room, I will thank you to call my attention to it. Possibly I might get on the table. (Laughter.)

So let us this afternoon consider some of the factors, of which there are a great many, but I shall only take time to cover those which I consider the most important or having the greatest influence toward bringing about this result, the annual bearing of trees. In the first place, let us consider pruning and its effect upon annual bearing, and I am going to ask you to carry in your mind, all through my talk this afternoon, the idea of maintaining a balance between fruit and wood growth, or wood growth and fruit. We know it is the natural thing for an apple tree to grow and to bear fruit, but, mind you, the growth comes first; the second consideration is the fruit. Therefore, it is important that we maintain a balance between this wood growth and fruit, or else the balance would be on the side of wood rather than fruit. So, in taking up the subject of pruning, I am just going to touch on the various orchard practises which I consider to have the largest influence in bringing about this

habit of annual bearing in the trees. I think that every orchardist has an idea of his own as to just how a tree should be pruned. Some of them cut the head of the tree about half off; others prune very lightly or not much at all. What effect does this have on the tree? Severe pruning in 99 cases out of a hundred has a tendency toward reproducing itself in wood again. You have thrown the tree all out of balance, all out of harmony by severe pruning at any one time, or in any one season. Now, this should be avoided by pruning a little every year so as to be able to maintain—keep this idea in mind—this balance between wood growth and fruit. So the tree should be pruned, as I say, just a little every year, keeping the trees thinned out so that the sunlight and air can pass through the tree, and in this way you will not affect the balance but a very little by this light pruning.

Now, the next factor would be spraying, and let me say right here that every one of these orchard practises or factors are so vitally connected or related to each other, that to neglect one of them or even carry any one of them to excess has a tendency to throw the whole proposition out of balance again; so we must consider them collectively. Provided we prune the tree properly and neglect to spray to protect it against the sucking and leaf eating insects and fungus diseases, we have probably defeated the very object with which we started out in our orchard work. I thought years ago that it would be a very good idea to eliminate the dormant spray on a certain block of trees. I wanted to find out whether it would pay, since we do not have the San Jose scale in Maine, whether it would pay to live up to this dormant spray annually, with the result that the Blister Mite, which we have to quite an extent in Maine, had defoliated those trees badly by the middle of August, which had a tendency to injure them tremendously and interfere with their bearing qualities. So it is necessary that we carry through all these orchard practices as a matter of insurance to maintain this balance between wood growth and fruit.

The next factor to take up will be that of cultivation, and this is important as affecting the annual bearing of our trees. Remember this, that these factors that I shall bring to you to-day—I am speaking from conditions in the State of Maine and those only. If some of these things, some of these suggestions that I may offer will apply to your conditions here, why well and good. By cultivating the orchards early in the Spring, here is an important thing, if we are to start out to get results, we must first grow the wood. It is very important then that we begin to till the orchard early in the Spring, as soon as the ground can be comfortably worked, and this has a tendency, by airing and lightening the soil, to force an early growth on the trees so that we will get practically all the wood growth we care to have on those trees in the month of June. Now, an orchard should be harrowed once a week up to probably July 1st, under normal conditions, when the growth should be checked; and right along with this subject let us consider the fertilization part of it, because this is a large factor in many cases. If we are going to fertilize the orchard, when are we going to do it? Now, probably one of the largest factors in this annual bearing of fruit trees is the control of soil moisture and the element of nitrogen, so it would be impossible to lay down any fast and set rules as to how we should handle this fertilization problem; it is an individual problem of every one of us fruit growers, and we should learn to consider these as our problems and try to demonstrate, under our own conditions, what is the best fertilizer and how much should be applied to the orchard. If we are to properly fertilize, it should be applied just as soon as the ground is plowed in the early Spring. This, well incorporated with the soil early, makes the plant food available to start, as I said, by tillage, the growth of the trees early.

The next important thing in connection with this fertilization problem is what kind of fertilizer are we to apply to the orchard? Let us consider what are the results

that we are after? We are after good quality, mature fruit, fruit of medium size, of good texture, firm, that will stand to be shipped to any market that we may see fit to send it to. Now, to do this means that the wood growth should be checked early enough to allow that tree to mature its fruit, and the fertilizer that we shall apply to this orchard should be in quickly available form. In our State we grow a great deal of sweet corn and every farmer who grows sweet corn knows this one thing, that he must put something under that corn to give it a start, to get it away just as rapidly as he can the first month of its growth, because he realizes that he has only 90 or 95 days to mature that growth of corn. The same thing applies to our orchard work; our seasons are short and we have only a short time to grow and mature this fruit; therefore, it is very important that this fertilizer be applied in an available form so that it will be available as plant food through the growing season and not become available in the latter part of the season when the trees do not require a great deal of nitrogen. This probably is where a great many orchardists at the present time, are falling down with their orchard fertilization. I am not here to discuss the fertilization of orchards, but it is such an important factor in influencing the bearing and productiveness of trees, that I must bring out some of the points that have been driven home to me very forcibly under my own conditions and those in my immediate vicinity. Now, then, what will be the source from which we are to derive our nitrogen for the orchard? Some will say "What about hogs in the orchard?" I would not advise anybody to ever think of putting a hog into an orchard that you are going to try to grow respectable fruit in. Another man will say "What about hens? Hens ought to be a good way to fertilize an orchard; put a lot of hens in the orchard." That is impossible under Maine conditions. It is useless to think of fertilizing an orchard with any kind of animals like that, but what I believe will work out in 99 cases out of 100 is to apply that plant food in the form of nitrate of soda and dried blood or

high grade tankage. I never would put anything in the way of slow acting nitrogen in the orchard because you will be defeating the very object for which you are working in trying to get mature fruit and as large as possible annual yields; so the fertilizer should be sown as soon as the ground is plowed, and harrowed into the soil and made available by continuous cultivation through the growing season up to, say, July 1st, with us. under our conditions, when the trees should begin to set their terminal buds.

A great many are apt to want to grow their trees too much, and I never have seen a case under our conditions where trees grew 12, 15 or 18 inches on the tips of the limbs over the trees where they could ever mature fruit: therefore, a reasonable amount of wood growth, such as can mature through the month of June by an early start in the Spring, will suffice so far as the wood growth on the bearing trees is concerned. Now, another very important thing and probably the all important factor is the conservation or the effect of soil moisture. I think that we are just beginning to get to it, to get to this idea that soil moisture is a larger factor in the growth and development of trees and fruit than we have ever given it credit for, and with a great many orchardists it is the real problem to battle with. Now, by cultivating an orchard up to the 1st of July, it should be thoroughly harrowed, especially after rains, to conserve all the spring moisture possible; that is just when the tree is probably making the greatest demands on the moisture contained in the soil, and we should conserve, under ordinary conditions, all the moisture in the soil, at least up till the 1st of July.

This, to my mind, is a very critical time with the bearing fruit tree. In a majority of cases I think it is a wise thing to check this wood growth at this time, for various reasons. One is that we have found it is absolutely necessary, in a cold climate, to mature our wood, that is the new growth of the tree, in order to avoid serious winter injury. A great many orchardists have forced their

trees along and lost a large percentage of them by trying to overdo the growth in any one season; therefore, it is very important that we check the wood growth about July 1st or July 15th, at least. How are we to check this wood growth? By sowing some sort of cover crop in that orchard. And here again is the problem for individual orchardists. There are no two conditions alike on the same farm or in the same community, and what would be an ideal cover crop in one instance would be a wrong cover crop under other conditions. It is a matter for each individual orchardist to solve according to the amount of moisture and nitrogen in the soil. If the tree is making too large a growth and there seems to be too large a tendency to wood growth, I would not hesitate to sow a heavy crop of oats in that orchard, because they are large nitrogen and moisture drawing plants. If the ground was reasonably dry and the moisture content was where I wanted it, I would sow a lighter cover crop, buckwheat, rye, or something of that sort; or, if the orchard was making too much growth, millet is another very good cover crop. I would say that under our conditions, clover does not prove to be an ideal cover crop, we cannot get stand enough from sowing it, by July 1st, to serve as a protection through the dormant season or to be of value as a humus-creating element in the following Spring when it is turned under, so I do not believe that in many cases in Maine it is policy to sow clover as a cover crop.

Now, the amount of nitrogen and soil moisture are working together to influence fruit or wood growth or to retard the maturity of the fruit then on the trees, and with a great many of us we do not quite understand whether it is an excess of nitrogen or lack of moisture in the soil; that is one of the hardest things to control and to determine, possibly, so as to know just what sort of a cover crop we should supply in the orchard in order to get this desired result or effect on the trees.

I think every man present who has fertilized and tilled trees realizes and knows beyond any question that nitrogen

antagonizes color in the fruit. Nitrogen represents growth, it is that part, that element which forces wood growth, and growth antagonizes color, so you cannot get this tremendous growth and the desired effect on maturity of the fruit that you are after. So it is to choose the cover crop that will absorb this surface nitrogen or surface moisture and to lower the soil moisture, the content of moisture in the soil, run it down low enough to serve as a severe check to the trees, that they may devote their energy through the latter part of the season to the setting of fruit spurs or fruit buds and also to mature their fruit; and this, I have said probably two or three times, but I want to drive it home as forcibly as I possibly can, that we can generalize on certain lines, but after all it is a problem for every orchardist to solve under his own conditions, as to just what system of culture or what method and what cover crop to plant to get this desired effect upon the trees. What may prove to be the limiting factor in one orchard might not in another, and so I feel that as orchardists we should begin to demonstrate, under our own conditions in a small way, and then we might find out what were the limiting factors in that orchard, and be able to apply the same system in a larger way in our orchard work and have a tendency to throw the trees into annual bearing rather than to produce a bumper crop every other year.

I think if we could have ideal conditions we should have just a fair crop every year; it would be much better for the marketing, for the distribution and the consumption of our fruit, and would mean success where, in many cases, perhaps, to-day it is a failure in orchard work.

Now, perhaps, you would like to know. Can this be done? Has it been done? Do you know of anybody who is doing it? What ground have you for this argument that you are making, etc.?

I do not want to blow my own horn, but I just want to give you the result of a little block of trees I have. I started out 7 years ago with these trees. They had had

very fair care. They were nearly in the balance when I took them, and I made up my mind that I would follow out a definite course of culture, fertilization, spraying, pruning, and this whole business, and see if I could so harmonize these various factors which have so much influence on the annual bearing and then continue this system which I set out on for a term of years long enough to establish something definite to go by, and I have had remarkable success with that particular variety.

Now, here comes the problem again: we, as fruit growers in New England, have been trying to grow about 15 or 20 and some people 30 different varieties all along the same line, looking to the same factor to solve all of our problems with these different varieties. What may prove to be the ideal system or ideal fertilization or amount of moisture for one variety will not, in all cases, prove out to be the ideal condition for some other variety, so there are all these factors to be taken into account in bringing into bearing and keeping in bearing each different variety which we grow commercially here in New England.

The little block of trees, are of the Northern Spy variety, and it has been the history of the Northern Spy, especially in Maine, that it is a very shy bearing variety, and when a nursery agent comes along through the towns to sell nursery stock and says anything about Northern Spy, you will see people shake their heads as much as to say, "Take it away, they never bear any fruit in our section." But under this system I have had six annual crops from the 54 trees in this little block.

These trees are about 35 or 36 years old now, and they are not large: they have grown slowly but steadily, they are healthy, firm and hard. The largest crop for any one season was 250 barrels, and the lowest crop was the crop in 1915, 100 barrels. The reason for this low yield was that although we had a splendid blossom and a fine set of fruit, on June 3rd we had a very heavy freeze, something we have not had for nearly 20 years in Maine, and it froze off quite

a large proportion of the fruit on these trees, so that cut the crop down this season to 100 barrels.

Now, the total yield for 6 years has been 993 barrels, or a little over an average of 3 barrels per tree for six consecutive years, and if I am not mistaken, those same trees have a handsome set of well developed fruit buds for next year's crop.

Now, about the quality, we hear that under one definite plan of working, that the quality has been allowed to go down, that it will not be up to the standard where it should be, but I want to say that with this little block of trees, up to this year when our fruit showed frost injury, it has always developed very good commercial apples. Some of you interested may say, "You are applying the tillage system and cover crop system, which are altogether opposite. I want to use some other system, the mulch, for instance."

Now, I am going to say that I do not believe it makes a bit of difference what system you adopt, if you live up to it and maintain this balance between wood growth and fruit, but if the tree is growing well and we supply some barn dressing this year and the next year we think a little basic slag is good, and the next year, if it doesn't bear, we cut off half the top—this will interfere—we cannot get results; but under any system you may adopt—even a poor system well lived up to year in and year out and the trees carefully watched is better than no system. You ought to live in close communion with your trees, watch your trees, know just what they are doing and what they need, maintaining this balance all the time, and you will get some results, if adopting some definite system of culture, spraying and pruning.

Just a word about the mulch system: I have a friend who does not live a great way from me, who has a small block of trees under the mulch system, and he was telling me a couple of years ago what splendid results he had been getting from this mulch orchard, carrying on all sorts of experiments in the orchard, and he invited me over to see

the trees and see how the fruit was coming along. I went about the first of July, when the moisture content was getting low in the soil, and it was very interesting to note the condition of those trees. That man, under his system of carrying on the mulch system, was getting the balance just as even as you could possibly get anything in an orchard; he was fertilizing very little every year into the mulch, and that conserved the moisture through the first part of the season, and his trees made a splendid growth, developed handsome foliage and bore almost annually—a great percentage of the trees had the annual habit. He had continued this system for 10 years.

After he secured his hay crop, he would go to a meadow a little distance off, take some low grade material and haul it up to these trees and mulch them, and they would mature a splendid crop. He had lived up to that system year in and year out until the trees had gotten into this habit of annual bearing.

Again we had, a few years past, a five year orchard contest in Maine. The orchards were set in 1910, if I am not mistaken, and judged in 1914, at the close of the growing season.

A man could set out nearly any variety he wanted in entering the contest; he could set out year old trees or two year old trees, as he saw fit, and there were nearly 170 orchards set, but at the judging time, by the process of elimination and otherwise, the number was reduced to about 70 orchards to be judged, and it was my pleasure to be one of the judges and go over the State and note the conditions under which these young orchards had been produced, and note their condition especially toward bearing, and there was one very interesting case that I want to tell you about.

We came to one farm where there were three orchardists in the contest, the proprietor, his wife and his sister, who lived on the farm. Two of these orchards were under cultivation and had been fertilized very slightly, planting potatoes between the trees. The trees had come along very

nicely, made a good growth, were handsome, but very few of the trees fruited, and they were two year old trees at the time of setting, and I might say that 90 if not 95% of the orchards in the contest were set out as two year old trees. The third orchard in this farm, only a few rods from the two under cultivation, was set out in yearling trees, or what we sometimes term whips, and under the sod mulch system. They were nicely set out and the mulch placed immediately around the young trees.

This man had made a study of fertilizers and their effects, and had fed those trees quite heavily with available plant food, mixing up his chemicals, as I remember it, himself. Now he had forced those trees; he had lived up to his system, he had mulched those trees annually until he had rotted the sod all up and it was very nice under this mulch.

At the fourth and fifth season he had reduced his fertilizer and allowed those trees to sort of check back a little. They had made an early growth but checked back. Some how they were not quite as large, taken as a whole, as the trees under cultivation, but set out under this system in the sod, getting the benefit of this drying out, it seemed to me that had served as a check on those young trees, set out as whips, to cause them to set fruit spurs and fruit buds at the fourth year, and they were laden with quite a crop of fruit in August, at the close of the fifth year's growth—those young trees. In fact, out of the 72 orchards judged, I think there were a larger percentage of fruiting of these young trees set out as whips and carried on under this system than in any other orchard in the contest.

After watching the behavior of trees under this system and that system, and this method and that, I have come to the conclusion that it is a very important thing, under our conditions, that the moisture content in the soil goes down to a certain point, but not so low as to interfere with the maturing of the fruit; but too much moisture works an in-

jury, both as affecting the annual bearing and also the maturity of the fruit.

Now, I have cited these cases because they are important cases in our State, and they seem to demonstrate that it does not amount to anything as to what system of culture you use, but that it is the man behind the proposition and the way he lives up to the method that he adopts that secures results. So, after all, by adopting some definite system and trying to bring into harmony these important factors that have an influence on the production or annual bearing of the trees, by pruning reasonably, properly, by spraying thoroughly, by developing a nice, strong healthy foliage on the trees to store up food and develop fruit buds, and by checking the growth of the trees at the right time, by conserving the moisture through the early part of the season and seeing that there is not an excess of moisture toward the close of the season, we will be assisting nature or our orchards to do the natural thing, namely, to grow and bear fruit. I thank you. (Applause).

THE CHAIRMAN: Ladies and gentlemen: You have all the time that you care for to ask Mr. Conant questions. We would like, as far as possible, to have these questions recorded. If you will give your name and the question, then we will put it to Mr. Conant and see what he can do for us. Secretary Brown is bringing up a special question box, and you can put into it anything that you want discussed at a later session. We would now like particularly questions that bear on what Mr. Conant has been talking about.

A MEMBER: I should like to ask Mr. Conant what he thinks of the thinning of apples and its effect on the annual bearing in our section.

MR. CONANT: I would say that so far as I am concerned, I realize that this may be a factor to a greater or less degree, but I have not had the experience, I have not proven it a factor and it is a question with a great many of our orchardists as to just what influence it may have. It

may have some influence on annual bearing, provided this thinning is done early enough in the season.

MR. COOK: You gave us a very interesting account of your treatment of a block of trees; was the system that you applied there the one you spoke of generally?

MR. CONANT: Yes sir.

MR. COOK: May I ask if you ever applied the same system to any other kind of trees?

MR. CONANT: I started in at a later date, with another block of trees, part Baldwins and part Rhode Island Greenings. Unfortunately, this freeze last Spring cleared everything off, so that I hadn't anything really worth while to give you, I have not continued the system long enough, and having lost the crop by frost this year has materially interfered with it, so that it will be a term of years yet before I have determined anything definite as regards the bearing habits of these other trees under that system.

MR. A. H. WEEKS: I would like to ask Mr. Conant—in this system of pruning every year, as I understand it, does he believe that if he had one pruning heavier one year than another, would he have it in a dormant year or a heavy bearing year? I want to know whether they should have the severe pruning during the heavy bearing year or the other year.

MR. CONANT: I would say in answer to that question that I'd rather advise pruning lightly every year, because it gets to be an annual thing. I think if you let it go over one year, you are apt to take out too much the next, but if it is an annual thing you would simply take out the small limbs and it does not affect the balance of the tree to any great extent; it is not a shock to the tree, and there is a tendency on the part of a great many of our orchardists, by letting it go over every other year, to do too severe pruning on some trees, at least.

A MEMBER: I would like to ask what kind of cover crop you used on this block of trees and whether it was plowed under the same Autumn or the following Spring?

MR. CONANT: On account of its being a dry soil, I have used a light cover crop, buckwheat, and let that go down in the Fall and hold the foliage that drops off from the tree, the leaves, which make a splendid fertilizer anyway, and creates humus in the soil, turning it in early the following Spring. I might say that we have always practised Spring plowing in Maine on account of the severe winters, we have never felt it was a safe business proposition to do our orchard plowing in the Fall.

MR. MAINLAND: Where you have some trees that maintain normal growth, 35 or 40 inches in a season, that have been pruned regularly 5 or 6 years, from year to year, cut back to about four buds of the previous season's pruning, how would you check excessive growth?

MR. CONANT: Well, that is an abnormal condition. I should endeavor to sow oats in that case, and cut out tillage entirely until I got those trees back. I would sow the oats to take up the nitrogen that there must be in the soil to force a tree to that extent. Oats are the strongest nitrogen puller you can get, and I would sow oats or anything that is a strong nitrogen puller to get those trees back to a reasonable growth.

THE CHAIRMAN: I would like to ask Mr. Mainland how old the trees are.

MR. MAINLAND: Six and 7 years old.

A MEMBER: How do you account, in a Baldwin orchard, for different trees under the same cultivation, some being annual bearing and some not, under exactly the same cultivation?

MR. CONANT: In answer to that question, I want to say that I have the same problem on my own place, to some extent, and have never known how to solve that question, since they tell us there is nothing in bud selection; we seem to have some trees which inherit a tendency or a disposition that way.

A MEMBER: I would suggest that the terminal bud seems to make a great deal of difference; the one that bears

annually does not bear on the terminal bud.

THE CHAIRMAN: You do not suggest though, what makes the difference in the terminal bud.

A MEMBER: That makes the whole fruit bud.

MR. CONANT: There is no question but what some trees inherit a larger tendency toward fruiting than others; now and then you will notice that in a Baldwin tree, but what influences it is pretty hard for any one man to determine.

MR. SEVEY: Regarding fertilization, I should infer that bone is poor for bearing trees; how is it for young trees, for starting a young orchard?

MR. CONANT: I would like to ask if you mean ground bone?

MR. SEVEY: Yes, ground bone.

MR. CONANT: Well, I know of a case in our neighborhood where a man wanted to force along some yearling trees and decided to put them out in a trench and force them along by applying nitrogenous fertilizers to them and set them out the Spring following, and he secured some ground bone, dug his trench nicely and worked the soil into the trench. He worked his ground bone into the soil in splendid shape and set out his "whips." He took them out the following Spring to transplant them, and was horrified to find that his ground bone had not even changed color. Therefore, I would not advise anybody to try to grow anything on ground bone, especially the first year. I do not know whether it would be available as plant food after the first season.

THE CHAIRMAN: I have another story, this is one of Mr. J. H. Hale's many interesting stories. He tells a story of starting a peach orchard and putting ground bone in the bottom of the holes when the trees were set, and 16 years afterwards, when he took the trees out, finding the bone there; so this story is way ahead of Mr. Conant's. (Laughter).

A MEMBER: Can a Red Astrachan be made an annual bearer?

MR. CONANT: Well, I have never seen the Red Astrachan under any definite system; yet I have seen Red Astrachans that were annual bearers for a few years.

A MEMBER: That is a terminal bearer you remember.

THE CHAIRMAN: Are there any more questions? Don't let Mr. Conant escape yet; he knows a lot more than he has told us.

MR. WEEKS: I would like to ask Mr. Conant what elements prevent clover being a success; he says it is not very successful with him. I wish to know what element he has in his location, which prevents clover being a successful cover crop. I refer particularly to Alsike and sweet clover mixed.

MR. CONANT: In a large percent. of our bearing orchards, the trees are set reasonably close together, and it is almost impossible to get a good stand of clover as a cover crop, and growing in the shade it will not develop to the extent that it serves as a sufficient cover crop. I never have seen a satisfactory stand of clover as a cover crop. Some are trying vetch, and that may prove to be a very good cover crop under certain conditions.

MR. MAINLAND: How would it answer on those trees growing so rapidly, to practice root pruning as it is done in Europe sometimes—dig a trench a certain distance from the tree, trim the roots nicely and fill the trench again? Would that affect the growth?

MR. CONANT. I am sure I am not in a position to answer that question. It is quite a problem; I would not dare to give an answer to that question. I should try to check those trees by some other means than root pruning; I believe it can be done.

THE CHAIRMAN: I suppose you would find root pruning effective but expensive. I think that Mr. Conant's notion of using heavy growing cover crops commercially would be much more satisfactory.

A MEMBER: I would like to ask the gentlemen on our right if I understood him to say that those trees had been cut back to about four buds a year?

MR. MAINLAND: Yes, I had them pruned regularly since they were set out, to about four buds of the previous season's growth.

A MEMBER: I think if you stop cutting them back, they won't grow so much.

MR. MAINLAND: I think that is likely, but I was limited for space and did not want them to grow too large.

A MEMBER: I would like to ask the speaker about using some other fertilizer besides nitrogen, whether other fertilizers than nitrogen are necessary for the bearing orchard.

MR. CONANT: That is a big question; I use a balanced fertilizer, try to balance it as near as I can, using phosphoric acid and potash, but I have been speaking of its being necessary to control the nitrogen, the other elements are harmless as affecting the excessive wood growth. Nitrogen is the element we must train or control, the others will do no harm. I doubt if you could get an all around fertilizer without some potash or phosphoric acid. However, I think we will have to get by the coming season as we are not planning to use much of any potash.

A MEMBER: I would like to ask what your idea is about using basic slag.

MR. CONANT: I never have, although I have had an opportunity to observe some results with basic slag, I must say that it is not altogether satisfactory to me for this reason, that not many of our orchards need any lime, and quite a percent. of basic slag is free lime and we can get our phosphoric acid at a lower price in the form of acid phosphate than we can by buying it in slag. Another thing, the phosphoric acid that we get in acid phosphate is more quickly available than that in the form of basic slag, and for those reasons I never have advocated basic slag as an orchard fertilizer. It may, in rare cases, be just what an

orchard wants, but a man should know reasonably well what would prove an ideal fertilizer for orchards, else he ought to use a balanced fertilizer and cut out the basic slag.

A MEMBER: I would like to ask what the speaker thinks of Summer pruning in regard to making an orchard bear annually.

MR. CONANT: I will say that in Maine we have never practised, to any extent, Summer pruning. I doubt if there is one in a hundred of the orchardists in the State of Maine that carry on any system of pruning in June, so that there is no definite information that I have to bring in regard to Summer pruning, June pruning.

A MEMBER: I would like to ask Mr. Conant if he had hen manure, whether he wouldn't use it as a source of nitrogen on the orchard?

MR. CONANT: Never in commercial orcharding. If I were growing any other crop, I would grow something else with the hen manure, I never would put it under an apple tree, but if a man had only a few trees in the garden and wanted to fertilize them a little, a very, very slight application might not do any harm, but there is so much ammonia in hen dressing that I have seen some very bad results from applying it under trees, and I never saw any good results.

A MEMBER: How would hard wood ashes do?

MR. CONANT. Well, I think in our State we are thinking more of hard wood ashes than ever before because they contain some potash that we do not have to go to Germany after, and in that case I think we would be justified in using some wood ashes this year in the orchard. It is a question with a great many; again you are up against the same proposition as in basic slag, only you have phosphoric acid and lime in your slag and you have a little potash and lime in your ashes. If your orchard is real acid and you feel it needs lime, wood ashes are a good fertilizer for one or two years, but if your orchards do not need lime, I question whether it is policy to buy ashes and pay any great price for them as

an orchard fertilizer. It may do very well this year to supply some potash.

MR. POWELL: Mr. Conant spoke of his practise of pruning; does that mean thinning out the tree or bringing it back?

MR. CONANT: It means thinning out. There are always cross limbs developing in an apple tree. I find them so under my conditions, and it is simply thinning those cross limbs out at the ends. For instance, the Northern Spy will broom out at the ends of the limbs, will get real thick; it is thinning out these broomy ends of the trees so they won't be thick and mat down one over the other.

MR. POWELL: In pruning in your orchard, do you have to keep cutting back the annual growth, or is it merely a process of thinning out through the tree?

MR. CONANT: With me that would depend quite a lot on the variety. I have a young Spy orchard set in 1912, yearling trees, and I make a practise of cutting them back every year. They are making a very rapid growth, and if not cut back, they would look like English poplars, growing right up to the sky. By heading them back and giving them a foot of growth each year, they start out laterals, and in that way I have been getting a slower, better head for an orchard than to let them run. If I had not cut them back, the laterals would come out at the end of a year's growth and have a tendency to build the tree up in the air. With some varieties it is necessary to cut them back; with others it may not be. The variety and the amount of wood growth should be taken into account in every case.

A MEMBER: Referring to the question I asked regarding thinning—it seems to me that the practise has become so general now among the large, high-class apple growers, that, perhaps, someone else here may have something to say regarding the practise, whether it should be done.

THE CHAIRMAN: I was hoping that question would come up, but it is one of our definite questions on the list, and I was not thinking for forcing it; as we have discussed

Mr. Conant's subject for an hour, we might stop and take up this matter of thinning; I feel that it is one of our important, practical questions, and it would be very interesting if we could have a few minute's discussion on the subject. We would be glad to hear from any one who has had experience in thinning.

A MEMBER: The only way we have ever been able to get Baldwin apple trees to bear annually has been through thinning, and we have not been able to get Greening apples to respond to thinning, but the Baldwin we can largely control, not only make them bear annually, but we very greatly increase the quality of the fruit, and in New York practically all the growers do more or less of it. They do it early, and it is practically a universal custom among the better growers and has been for two or three years. A neighbor of mine was one of the first to experiment with it. His trees are Baldwin, 40 years old, and bear annually from 8 to 12 barrels a year, very large fruit, highly colored, and it is a generally accepted practise with us to do it to a greater or less extent as the only way they can be made to bear annually at all.

THE CHAIRMAN: I should think that if the Baldwin could be made amenable to the practise, almost anything else could. It seems to me that the Baldwin is as much an offender in that line as any variety we have.

A MEMBER: I would like to ask the gentleman who spoke during what month they do that thinning.

MR. CONANT: In June.

MR. GEER OF THREE RIVERS: I think it is impossible to raise prize Wealthy without thinning. Our Wealthy will set as thick as they can hold if they are thinned properly; if they are not thinned they won't be worth anything at all. I think it is very important that they should be thinned, and I have had experience with other varieties too, and think one of the most important things we can do in the fruit growing business is to thin, especially where the apples hang full.

THE CHAIRMAN: I should like to endorse what Mr. Geer says and what has been said by others in favor of the practise. To my mind there is no one factor in fruit growing that needs urging more at the present time. I think spraying is more important, but more of our growers spray, while relatively few are interested in thinning. I would like to give you one or two personal experiences. We have been thinning, both at the College and down at the farm for five or six years, and we would never think of going back to the practise of trying to grow a crop of good fruit without thinning. This last year we had a very nice set of Wealthy in our six years old trees, more than the trees ought to carry. We put the boys in there and thinned them out, and along in August or the first of September there was a commission man in Boston who had a farm near there, who wrote up and offered us \$3.25 a barrel for them packed, ones and twos. Said they were the handsomest crop of Wealthy he had ever seen, said if he got them down here he would have to introduce them to his customers because they wouldn't know what variety they were. We did not accept that offer but sold them for \$4.20. We have had the same experience with the thinning of Baldwin and peaches. We have not had this gentleman's satisfactory results with the thinning of Baldwin's. The trees were old trees.

A MEMBER: I know of a block of 125 Baldwin trees, 15 years old, that originally bore double what they did the off year. They have now got down, so that they bear 225 barrels as compared with 300 barrels on the big years, done wholly by thinning, but among that lot there are some trees that it is simply impossible to make bear every year by thinning.

THE CHAIRMAN: I think the gentleman is to be congratulated if he has had that much success.

A MEMBER: We are beginning to think it is due wholly to that terminal bud. There seems to be two distinct Baldwins; you can go through the orchard and see that the second year old wood produces the bud; if there is a termi-

nal bud at the end, the terminal piece will not produce fruit the next year and only by picking off the terminal bud can we control it. All of you know the Red Astrachan; you will find that that invariably bears every other year; it grows wood one year and then fruit the next year.

A MEMBER: Have these apples been any certain distance apart to get these good results?

A MEMBER: Those were all thinned out to six inches apart the first part of June, before the June crop came, nothing nearer than six inches.

A MEMBER: The reason I asked that was we had our Wealthys six inches apart and when the apples were ripe it looked as if we had not thinned them at all, and I wondered whether we had thinned enough or not. The trees looked as if they had too many apples on them for their own good after we had thinned to six inches apart.

THE CHAIRMAN: It has been our practise to tell the men to thin all the apples off of every spur except one, leave one apple on each spur. Now, perhaps, that does not seem as though we would be getting apples very far apart, but I think you will find they will average six inches apart on most trees. We use boys about 15 years old to do most of our thinning, and we found that if we sent them in the tree and told them to thin six inches apart, they took too much time wondering whether the thing was five inches or six, whereas the simple rule of pulling all but one apple off a spur is easy to apply and in commercial practise it works out to give you apples well spaced on the tree. In thinning peaches we make it a rule to thin so that no peaches touch, and that results in the peaches being much further apart than you would think. I have no doubt that if we had experienced help, the actual distance apart might be made the crucial point.

A MEMBER: Would it be best to thin a Baldwin and a Wagener to the same distance or further apart.

THE CHAIRMAN: I should like to turn that question

over to someone else as to whether to vary the distance apart with different varieties.

A MEMBER: I should say with regard to a Wagener tree, that the fruit spur formation would be very much closer than on the other two varieties mentioned.

THE CHAIRMAN: Perhaps, if there is no further discussion on thinning, we'd better take up this other question, the growing of nursery stock, and in introducing this question I want to give a little personal experience that I think will put it fairly before us. Quite a number of you are already familiar with what I have to tell, but I think it is interesting as showing the situation on this question of nursery stock. Several years ago, when Prof. Waugh and I started our orchard, with which a number of you are familiar, we set out, among our first year's planting, 650 McIntosh, the next year 200 Gravenstein and 300 Sutton Beauty. The next year our McIntosh began to come into bearing, and when I came back from my vacation the foreman called me and said he wanted me to see them, said they were peculiar looking. I went down and found they were Wolf River. The next year, in our plantings we had set 1,000 McIntosh and out of that lot, about 75 had this practise of bearing Wolf River. When our Sutton Beauty came into bearing, we found they were Scotts Winter, a choice desert variety, about like the Ben Davis. The Gravenstein have not yet come into bearing, but we have compared the trees carefully with other known Gravenstein trees and we see they are not Gravenstein. This gives us 200 trees that are not true to name. We took the matter up with the nurseryman from whom we bought the trees, and he was very sorry for it and so were we. He was running for the Legislature at that time and his excuse for not coming to see them at that time was that he could not get away, but would come later. That seemed to us a good, legitimate excuse and we waited until after election.

After election he wrote us that he had been declared not elected and was asking for a re-count and until the re-

count was had, he did not feel like leaving the polls. That seemed very fair, and we waited awhile and then wrote him again, and he wrote back that they had had the re-count, he had been declared elected and was getting ready to go to the Legislature and would not be able to come up and see our trees. We have not been able to get him to come and see the trees yet.

We have grafted them over at an expense of several hundred dollars and some are still waiting to be grafted. That is one side of the question. The other side is represented by nurserymen who are standing squarely back of their guarantee; if not true to name, they will make the matter satisfactory to you, and if you and they cannot agree, three men are appointed and they shall judge, and that judgment shall be final. That is a business-like thing to do, and I feel that the time is coming when it will not be possible for a nurseryman to do business who does not guarantee his trees in that way.

There are a good many things about the nursery business that we fruit growers do not know very much about, and I think we are fortunate this afternoon in having a man who is going to talk to us a few minutes on the subject of raising nursery stock, from the standpoint of the nurseryman, and I have great pleasure in introducing Mr. F. J. McNeil, of the firm of Maloney Bros. & Wells. (Applause).

RAISING NURSERY STOCK

Mr. F. J. McNeil, Dansville, N. Y.

Mr. President, Ladies and Gentlemen of the Massachusetts Fruit Growers' Association:

It is a pleasure, I assure you, to be accorded the privilege of addressing an intelligent audience of Massachusetts Fruit Growers.

I come from Dansville, New York, located at the head of the beautiful valley of the Genesee, made famous by song and story, and in which valley more fruit trees are grown than in any other place in the United States.

About one hundred years ago an English horticulturist by the name of Samuel Ramsedon located at our place and immediately started the propagation of fruit trees, and it is said that he imported his scions from England. A man by the name of Pierson became associated with him in the business and they soon discovered that the soil in our locality was adapted to the successful growing of fruit trees. Maxwell Brothers later engaged in the business, and they also started the first nursery in Geneva, N. Y. Following the Maxwells came a man by the name of Maloney, who, in my opinion, and the opinion of other nurserymen at Dansville, did more to advance the growing of fruit trees in a scientific way than any other nurseryman in the State of New York; they grew for the wholesale trade only up to about six years ago and since that time Mr. Maloney and his sons have been selling their entire product direct to the fruit grower, and today there are one hundred and forty different firms growing fruit trees, nearly all of which sell their trees in car lots or at wholesale.

In the earlier history of our business we grew many of our seedlings at home. We imported the French pear seed

and Mahaleb and gathered Mazzard seed through the country from the old black cherry trees that were growing in front of farm houses (in our country) a great many years ago. The growing of seedlings in this country was not a great success except the Mahaleb which we grew as well as they did in France, but there came a time when it seemed impossible to procure any first class seed in France and that part of the industry has been abandoned.

There is one place in the United States, the Caw River Valley in Kansas, where they have been successful in growing apple seedlings. The apple seedlings grown there are grown from imported crab apple seeds, and it is claimed that the French crab seed will produce a stronger and better rooted seedling than the apple seed procured at the American cider mills.

Our stock is imported from France during the month of January, taken from the boxes, trimmed and placed in sand in our root-cellar until such time in April as our soil is in condition to plant, and we always make an effort to prepare our land by fall plowing, as then we are prepared to plant our stock early. Early planting always insures a perfect stand of stock and, gentlemen, this same rule will apply to the planting of fruit trees. I insist on the nurserymen getting the trees to you early, and if you take proper care of them after receiving them and plant them the same depth that they were in the nursery row, there is no reason why you should not have a perfect stand of trees, providing, however, that they were properly handled and cared for by the nurseryman or agent from whom you received them.

Our stock is planted in rows eight inches apart, and three and one-half feet, cultivated and worked until July when we reach the budding season, when we start budding pear and apple. The pear and apple scions ripen earlier than the other kinds, then the cherry, plum, quince and last of all the peach.

At the time of budding some member of the nursery firm, who is interested in the concern, should cut all the

buds for right here is where mistakes occur with men who are careless, and after the budders finish budding one variety and they are starting on the next, someone should look over their boxes and see to it that none of the scions are left in the boxes from the kind they had just finished budding. If one scion should happen to be left and handed out to the budder on the next row, it means that eight or ten trees will grow up in that next row, which will be a mixture, and unless they are discovered two years from that time it might mean several thousand mixed trees, as the buds will be cut from these trees. If this mistake should occur in apple, pear and cherry, it might be remedied, but in peach where they almost all look alike, it would be difficult to discover and more mistakes occur in peach than in any other kind of fruit trees. Although crooked dealers have been known to furnish the fruit grower as many varieties as he might want, out of one block. I know of one man in the business who sent out a carload of peaches that he bought in Michigan and he sold every variety that people wanted from that one car. (Laughter).

THE CHAIRMAN: I guess we had some out of that car. (Laughter).

After the budding season the work consists of intense cultivation and proper pruning; until such time as the trees are ready to be dug, and in digging season it is important that the work be done properly by getting good roots and taking care of the trees in a proper way after they come out of the ground.

I knew of a jobber who bought three car loads of trees in bulk from a nursery firm, a few hundred miles from our place. The jobber knew that this nurseryman grew good trees, but he had also discovered that a great many of his trees had failed to grow. He notified the firm that he would be at their nursery whenever they were prepared to ship. He received the notice, went to their nursery and called at their office. He was taken out to their shed and found his trees had been exposed to the sun and wind in

this open shed for two weeks; they were dried out and worthless. They took him out in the nursery and told him that they would dig his trees from another block that stood in the field. He went home, received his trees a short time afterwards in the city of Rochester; found on opening them that they were the trees that he had seen in the shed, that were worthless. They were returned to the grower by him and I don't know, of course, whether they went to the planter, but if they did and the planter knew the facts, it would explain why the trees never grew.

Now, gentlemen, I am going to suggest a proposition to the members of this Association that will protect you in the future. You have gone to your legislative halls asking for the enactment of laws that would protect you against dishonest nurserymen and agents. No law that has ever been passed in any state in the Union has ever given you the protection that you should have, but no greater injustice and wrong could be done a man than have him go to the expense of purchasing his trees, planting, spraying and pruning for a number of years and look forward to the time that he is going to have his first crop and expect his varieties are going to have the greatest commercial value.

I have been thinking over this question for some time and this is what I am going to propose to your Association—that you appoint a committee of two or three of the officers or members of your Association to make a thorough investigation of the nurserymen and agents wherever you buy your trees; come back here and prepare a small book and put it in the hands of every member of this Association, so that when any one of you gentlemen start out to purchase trees for your own planting you can refer to the book that you have received from the officers of your society. Keep that information under lock and key, and if your neighbor at any time comes to you and wants any information, tell him to send his fee to the Secretary and become a member of your Association, and he will be furnished the same information. (Applause). Some of you gentlemen may think

this may be difficult to do, but there will be no trouble about it at all. I thank you very kindly for your attention. (Applause).

THE CHAIRMAN: Mr. McNeil has not suggested to us what would happen if these good firms go out of business in the meantime; that is the trouble we might have the same as with the other firms. We happen to have one other nurseryman with us, the representative of a firm, and I thought we'd call on him for a few words and then throw this subject open for discussion. We are not going to hold you late, and I hope you will stay until the meeting is dismissed, because I have one or two announcements I want to make before the audience goes. I am going to ask Mr. Martin King, of the firm of King Brothers, Dansville, to give us a few words on this subject. It is no more than fair to give the nurserymen a chance to hit back at us.

MR. KING: This is really the most enjoyable day of my life. I've looked forward for years to the time when I would have the opportunity to come to Boston and see the Bunker Hill Monument and the exact spot that I had read about so much in history in the little red school house back in the old Genesee Valley, where the English charged up the hill, and were repulsed two or three times, and to visit Fanueil Hall and go over on horseback, if I could—and I can ride a horse—the same route Paul Revere rode that night when he aroused the farmers of Concord to repel the English, but I know that you don't want to listen to any long talk from me to-day. It's rather hard to follow Mr. McNeil, for he has the reputation, you know, of being the silver tongued orator of the Genesee Valley, and what he told you to-day, I wish to confirm in every particular, and especially I would like to call your attention to what he has to say about buying trees of reliable nurserymen. I would even go further than Mr. McNeil has done in this particular.

Up until a few years ago, the fruit grower had absolutely no protection from the nurseryman in buying trees, for all of them had in their catalogue a clause to the effect

that if the stock did not prove true to name, they would replace the trees, but outside of that they were liable for no further damage.

Now three years ago the firm of which I am a member, King Brothers Nursery, of Dansville, introduced a new guarantee that reads as follows: "Should any trees not prove true to name as represented by us, we agree to make good buyer's loss by reason thereof at any time within ten years of date of purchase. In event we cannot agree, we are each to appoint one arbiter, who shall choose the third, and the award of the majority is to be binding upon both parties."

Prof. Sears, in the issue of the Rural New Yorker of December 18th, had a long article in reference to this guarantee, and he says that if it is generally adopted by nurserymen, that it will go further than anything he knows of—I believe those were his words, or substantially his words—to eliminate errors by nurserymen in filling their orders. I will again say that I am very glad to meet the Fruit Growers of Massachusetts and to be here, and I thank you kindly for your attention. (Applause).

THE CHAIRMAN: I am sure we are glad to have these New Yorkers come over here and see a real city. (Laughter). We always enjoy getting over to their meetings.

I do not want to make this thing one sided; do the representatives of any other nursery firms here want to say a word to us? I do not want nursery experts to feel that we are giving any advantage over them to anybody else. If there are any other representatives of any other firms here, we would be glad to have them say a word to us. If not, we would be glad to have questions from the audience for these two men to answer—I don't think they both escaped. Are there any questions you want to bring up at this time on this question of nursery stock?

A MEMBER: I think there is one question that is pertinent right now. I wondered while I heard all this talk about growing fancy apples, etc., if after marketing the

1914 crop and going so far with the 1915 crop, if there is a man here so brave as to think of planting an orchard. (Laughter).

MR. MANN: We have driven stakes for several hundred trees. I don't know whether it is bravery or foolhardiness. (Laughter).

THE CHAIRMAN: Is there anyone else who is willing to admit that he plans to set an orchard this Spring? The only reason the Bay Road Fruit Farm isn't enlarging its plantations is that we haven't any land suitable just now. We are going to clear some up as soon as we can.

If there are no further questions or discussion on this subject I want to suggest two or three things before we are dismissed: As you go out, look at that big sign there, "Pay here membership dues." and heed it. We are glad to have you here on any terms, but we are doubly glad to have you if you have already joined the Association and paid your dollar, or \$2.00 or \$3.00 if there is anything coming to us from arrears.

Another thing I meant to have mentioned when I spoke at the opening of the session, and that is we are trying to make a specialty this year of opening our session on time. Some of you may know that at our session in Worcester a year ago. I think we were 3 3-4 minutes late one session, and one of the large, important and influential agricultural papers of the State took occasion to call us down severely because we did not open promptly on time. I notice the editor here this afternoon, and he came in late, after the session opened. I showed him my watch when he came in and I think he appreciated the fact that he was late.

We want to begin promptly and dismiss promptly, so you will have a chance to go home or go down and visit with our exhibitors in the Hall, which we hope you will make a practise of doing. There is no session this evening, but there will be to-morrow evening.

After the Chairman had called attention to the subjects to be discussed at future sessions, the meeting adjourned till 10 A. M. Friday.

FRIDAY, MORNING SESSION 10 O'CLOCK

Vice President Margeson in the Chair

THE CHAIRMAN: We will call on Mr. George D. Aiken, Vice-President from Vermont for New England Fruit Show, who will address us on Raspberry Culture. Mr. Aiken is a large commercial grower of small fruits and his talk will be very interesting.

RASPBERRY CULTURE

Mr. Geo. D. Aiken, Putney, Vt., Vice President for Vermont of the New England Fruit Show

Mr. President, Members of the Massachusetts Fruit Growers' Association, Ladies and Gentlemen:

The subject on which I am to talk is a peculiar one, for the reason that while I can make almost any statement regarding raspberry culture and find some one to agree with me I expect it is impossible to make any statement but what some one will disagree. There has been so little experimental work done and so few authoritative works written regarding raspberries, and the results of what investigations have been carried on have been so much at variance, that there seems to be nothing definite to go by except one's own experience.

I shall tell you, today, some things I have learned from experience in growing raspberries. However, don't take it for granted that what I may say will always hold good in your case. There are as many opinions as to how raspberries should be grown as there are growers. Some growers

differ on varieties, others on soil, others on location and still others on methods of pruning and so on. Methods suitable in one locality may be unsuitable in another five miles away. For instance; on our place the Cuthbert seems perfectly hardy while less than five miles away, on the banks of the Connecticut River, it kills to the ground every winter. In this case the difference is due to location. We are told that in certain sections of the middle West the red raspberry winter kills, so they raise only blackcaps. With us, if any winter injury is found, it is on the blackcaps. One instance of how methods used to advantage one year may not work another year is this. In 1913 and 1914 I topped some plants of Marlboro in the Spring and the size of the berries and yield was greatly increased. In 1915 I topped some more Marlboro and believe that we actually got a smaller yield than from plants not topped, while a row of Idaho less than 100 feet distant was greatly benefited by topping. So you see that the details of raspberry growing must, for the most part, be worked out by the individual grower on his own farm.

As a rule, speakers at a meeting like this, tell you how you can grow your crops successfully by their methods. This is very well, provided your conditions are like theirs. But as I have just said the cultural methods of raspberries are so variable in different localities that I do not consider this a safe rule to follow. Instead, I shall try to tell you how to fail, for the rules for failure are as easy to follow in one section as in another. And in telling you how to fail, I shall try to tell you, how, to a certain extent, you can overcome conditions that cause failure.

In order to insure a complete failure it is necessary to begin right and in choosing the location one takes the first step toward success or failure. If you are unalterably opposed to success, choose a low piece of land where water will stand part of the year at least. A good stand of witch-grass on this kind of land will usually insure a complete failure the first year.

Choice of variety should be mentioned with choice of location. It is generally considered that blackcaps do best on light gravelly soil while the red varieties are more successfully grown on medium heavy soil. Light soils, as a rule, give earlier pickings of the reds, but heavy, well-drained land gives a much larger crop. The Cuthbert will grow on poor land where other red varieties might fail but should not be planted where there is lack of air drainage, or danger of winter killing from other conditions. Marlboro, on the other hand, should be grown on very rich strong land to be thoroughly successful but will pull through the winter and spring unharmed where Cuthbert would kill to the ground. Aside from these two varieties I have just mentioned, June and Herbert seem to be the only other varieties of reds worthy of consideration for commercial planting with the possible exception of Perfection for certain sections. Cumberland and Plum Farmer seem to be the best blackcaps and Royal Purple surpasses all the other purple cane varieties. These few statements I have just made regarding choice of varieties we have found from experience to be true and I think they will hold good for the greater part of New England.

Having chosen the location and variety, the next move toward a successful failure is in the plants. There are two effective ways in which the plants we set can contribute. The first is the age of the plant. Unfortunately, many nurserymen who sell raspberry plants do not raise them and it seems to be too common practice to get plants from old fields that are past their usefulness as producers of fruit. In these old fields are plants ranging from one to eight or ten years old. All plants over two years old are, as a rule, lacking in vitality and when they are taken from an old field, even the one and two year old plants are greatly weakened.

The second aid to failure is crown gall. I once wrote a New Jersey nurseryman asking if he could furnish plants of St. Regis free from crown gall. He replied that he couldn't

and didn't believe any one else could. He also said that in his section, crown gall was not considered seriously and the growers did not think it diminished the yield. This is what the beginner in raspberry growing is up against. So long as nurserymen think, or rather make themselves believe against what common sense tells them is right, that crown gall is not injurious to raspberries, just so long is it going to be dangerous to set plants that one does not know the source of. We have been perpetually on our guard in buying plants and have refused some sent us. Yet a year ago we set a few that had evidently been infected although they did not show gall themselves. What was the result? This last summer those plants were stunted and mildewed and practically worthless. They were pulled out and the roots were found covered with galls, some nearly as large as hen's eggs. So one should not only consider the plants themselves but the field where they were grown. Probably gall is distributed by the St. Regis more than any other variety but one should look out especially for Welch, Brilliant, Perfection and others grown largely in sections known to be overrun with gall.

As we are trying to be successful with our raspberries we are now getting our plants in small quantities, setting them by themselves, and, if, after watching them a couple of years, we consider them worthy of large plantings, we have enough young plants to get a good start. If the plants develop crown gall it is much easier and less expensive to eradicate fifty plants than it is five acres.

On blackeaps we find that the only serious disease is anthracnose and that can be controlled by keeping the affected plants cut out. We had some anthracnose but we kept it cut out two years and this summer I was not able to find an affected cane.

The two principal insect enemies of the raspberry are, first: the cane borer which attacks the young canes and is easily controlled by cutting off the top of the cane below the double row of dots between which the egg is laid.

Second: the crown borer which is the most difficult of all to control. If the plants, after starting all right in the Spring, are seen to wilt and die, it is a pretty sure sign that a crown borer is at work. The only remedy is to dig him out. Other enemies of the raspberries are the tent caterpillar, brown tail and gypsy moth, in infected sections, and the red spider which was quite troublesome this last summer. There are other lesser enemies but these are the most important.

Now, before we continue with our rules for failure, let me describe our methods of starting new fields and care during the first season. Too much emphasis cannot be placed on thorough preparation of the land. We do not believe in plowing the fields between the rows after the plants are set so the preparation of the land for the plants has to do for several years. A field of raspberries set in a lumpy or baked soil is generally unprofitable. Better put them in well prepared greensward than in poorly fitted old ground. We set our plants with a spade, with which method you are doubtless all familiar.

The plants of the reds are set three by six feet so there is ample room for filler crops the first season. The most practical fillers are beans, cabbages, turnips and other root crops. The principal objection to beans is that during a rainy season they are injured by the cultivation the raspberries need. We use cabbages altogether and find them a very satisfactory crop to raise, though not always so profitable as they might be. In 1913 when they were \$20 to \$30 per ton the cabbages raised as a filler crop paid several times the expense of the whole field. This year they probably paid for the seed used. By setting a row of cabbages between two rows of berries and a cabbage plant between every two raspberry plants in the row, about 7000 can be set on an acre. The cabbage stumps and leaves left in the fall catch the first snows which protect the field from winter injury.

During the first season cultivating is done at least every two weeks till Sept. 1st and later, if necessary to keep the

weeds down. We do not stop cultivating in September because we are afraid of winter killing as we have never seen any winter injury caused by late cultivation.

As soon as we get to it after the picking season is over the old canes are cut out as we believe their room is preferable to their company. The new plants seem to do fully as well where the old canes are cut early and there is usually more time to do this in the fall than in the spring. The California type of pruning shears is used for this work.

Now, to return to our rules for failure. Having brought the field to full bearing age we go out some morning and find the bushes literally covered with green berries and some all ready to pick. What is it worth to us? To be sure it is some satisfaction to know that we have brought about the wonderful sight we see. There is nothing more beautiful than a raspberry field loaded with green and ripe berries but the admission fees we could collect from people willing to pay for the privilege of looking at it, would hardly justify the expense of raising it for that purpose. The field has no pecuniary value unless the crop is harvested and marketed to the satisfaction of the grower.

In the harvesting of the crop is a grand chance for partial failure. I would suggest this rule. Get your pickers, having about an equal number of boys and girls. Give them baskets and carriers and send them into the field to work when and where they see fit. A few trees of green apples near by will aid greatly in making the marketing problem easier, and one apple properly thrown may save you the one and one half cents it would cost to pick a pint of berries. From experience I have found the Twenty Ounce most suitable as it is quite large and solid at this season. By following this rule one can lose a goodly percentage of his religion as well as his berries.

Now, the way we get at the picking problem is this. Of course we haven't got it down to perfection yet but we find it a fairly successful method. Long before the season begins we look for girls, preferably High School girls. They

generally do much better work than boys but it is better to have all girls or all boys for pickers than both. Now, as you all know, there are different kinds of girls and not every girl makes a good berry picker. The girl who thinks she wants to pick berries for the fun of it, fails to see the funny side after 10.30 the first morning if the mercury happens to be 100 or more in the sun. The girl who is picking because her parents make her is liable to prove grouchy and stir up trouble. The girl who talks too much while she works is not wanted either. As you may know, some girls talk most of the time and some talk all the time, and it is these latter who are objectionable as berry pickers. The girl who is too timid has no place in our berry field.

We had some this last summer who complained that the air came right into their tent and one night they were found drawing in the edges of the tent and placing sticks of wood on it so the frogs couldn't come up from the pond and get them while they slept,—if they should sleep. These girls would get so scared nights that they couldn't work days so they went home before a week was over. We find that the best pickers are those who are working for the money and who also enjoy living out of doors.

Each one is asked to bring her own bedding but we furnish tents and cots and board them for a nominal price, and pay them by the quart for picking. We ask that they get up early and pick till 10 A. M., at least. They are not expected to work during the hottest part of the day, unless there is some special reason but picking begins again about 3.30 P. M.

All girls are supposed to be in their bed by 8.30 P. M., unless they have special permission to do otherwise. Swimming and tennis are the most popular forms of recreation and these with various other forms of entertainment tend to make a happy family and a happy family does the best work.

In the fields each row is numbered and each picker is assigned her row at the packing shed. Usually two pickers

work on one row, one on each side. A chart of the rows is made out and after each number are the names of the girls supposed to be picking it. If the row is not finished, a note is made of the fact and by simply looking at the chart we can tell at any time just what part of the field is picked, and what row or parts of rows to assign the girls when they finish the ones they are at work on. In this way we can tell just what kind of work each picker is doing by simply looking at her row. This method of numbering the rows is also a great help to the pickers. In fields of forty to sixty long rows, where one brings a carrier of berries to the packing shed, it is almost impossible when she returns to the field to tell where she was picking unless the row is numbered.

Four quart carriers are used almost exclusively. These hold six oblong pints and only six baskets are given to each girl at a time. When these are full she has to take them to the nearest packing station before she can get more. In this way there is no loss from baskets left in the field. As each girl brings in her baskets she presents a card which is punched to show the number of quarts for which she is entitled to receive pay.

Berries picked in the forenoon are, as far as possible, disposed of the same day. Those picked in the afternoon are placed on shelves and crated the next morning. We give them plenty of air and keep them as dry as possible to prevent them from moulding. The way in which they are picked has a tremendous influence on the keeping qualities of raspberries. We try to encourage the use of three fingers in picking so as not to break the skin of the berry. If the skin is not broken, very little loss from mould will result. Over ripe berries are thrown on the ground or in a separate basket. After picking, the berries are handled as little as possible.

Now, having done the picking, one has the last and best chance to make a failure. In fact, many who are otherwise highly successful fail in the disposal of the crop. No rule is necessary for failure here. We have done our best to find

the most profitable ways to market our crop successfully and are still a long way from having a perfect system. There are several ways which are offered for the disposal of raspberries. Of course it is best to market them as quickly and as near home as possible. If one has only a small field, perhaps it is most profitable to retail them from house to house. The next course is to sell to the local merchants. We find this quite satisfactory.

Just at the beginning of the season we put a small advertisement in the local papers advising the public that our berries are on the market and at what stores they may be obtained. We arrange with one or two stores in each nearby town to handle our berries exclusively, and in order that the public may know that they are getting our berries we stamp our name and address on every box and also the date when picked. By having the date when picked on the basket we avoid getting the blame if the grocer keeps them too long.

We make daily trips and on each trip take the orders for the next day. Thus we know each day just how many are sold and if the day's picking is much in excess of the orders we try another fairly satisfactory method of disposal. This is telephoning grocers of several more distant cities or the merchants in small towns that use only a few crates in a season. Or perhaps we have a few orders from private parties which can be filled whenever we have a surplus. We arrange with grocers in more distant towns, whereby we send them so many crates daily.

Very few of our berries go to commission men but it should be borne in mind that raspberries, as well as other produce, sent on commission should be in standard packages. Two years ago in one New England city a well known commission house was selling raspberries in quart baskets for 32 cents and in pint baskets for 9 cents.

A still further and very promising method of disposal is putting up canned raspberries, shrub and jam. This last summer when it rained practically every day during the

Cuthbert season and we could not ship them at all, we put up nearly a ton of berries that would otherwise have been a total loss. A not very well known fact is, that, with raspberries at 20 cents per quart and strawberries at 12 cents, it costs about 50% more to put up a quart of strawberry preserve than of raspberry.

Lastly, I might mention the sale of raspberry plants which is sometimes quite profitable. If one can furnish strong, healthy plants of standard varieties he should be able to dispose of a considerable number from his field without lessening the production of berries to any great extent. (Applause).

THE CHAIRMAN: I am sure, ladies and gentlemen, that we have enjoyed the talk Mr. Aiken has given us this morning. We cannot help but acknowledge that he has solved many problems in connection with raspberry growing, but there may be some problems he has not solved. He is here and you can ask questions.

MR. WHITCOMB OF AMHERST: What about fall planting of raspberries?

MR. AIKEN: We find that is safe providing you do not leave any hollow ground around the plant for the water to settle in and then freeze.

MR. WHITCOMB: Do you practise it?

MR. AIKEN: We practise it some. We have neighbors who set out large fields and nearly every plant came through next summer, just as many as if they had been planted in the spring. We find that fall planting seems to be perfectly safe providing there is no hollow left around the plant for the water to settle in and freeze during the winter.

A MEMBER: How does anthracnose affect plants?

MR. AIKEN: I have a few questions here that Secretary Brown sent me and asked me to answer after I finished the talk, and one of them is, "Give a slight description of anthracnose for those who may not know it." Well, it begins with the white spots on the cane, and as it grows

sometimes it splits the cane and looks very much as it does when two canes rub together, but the white spots are the first things to look for.

A MEMBER: How does it affect the foliage and the fruit?

MR. AIKEN: I have never noticed that it affected the fruit. We have had it two years, and when it got started we cut out everything in sight and we have not seen it since, so we have not had as much chance to study it as we might have.

A MEMBER: Two or three years ago I sent a sample to Amherst and they thought it might be that or something else, but the foliage sort of curled and turned an off color, and some of the berries, after they set, would begin to harden and a few would turn red, and I lost quite a lot.

MR. AIKEN: Did this happen over the field generally?

A MEMBER: No, mostly on two rows. I had one short row that I was setting out 50 long; it is nearly gone now, and the other rows are starting. Starting at one end, though you will find it occasionally through the row, but principally on one end.

MR. AIKEN: Are those black caps?

A MEMBER: No, they are Cuthberts.

MR. AIKEN: I should sooner believe that the red spider got into those leaves. I don't think it is anthracnose.

A MEMBER: The only thing I could find on the leaves was some of these very small white flies, about as big as the head of a pin. I could not satisfy myself that that was the cause of it.

PROF. WOLFE OF NEW HAMPSHIRE: I will say that in our plantings at the State Farm we had very similar trouble this summer. We had our entomologist examine the leaves carefully, and he found that the trouble was the red spider.

THE CHAIRMAN: Do you know any treatment for this trouble?

PROF. WOLFE: No, the standard treatment I think

for the red spider is dilute lime-sulphur, but it did not seem practical on the raspberry in fruit. Perhaps, we could have controlled it if we had sprayed earlier.

MR. AIKEN: The only remedy I know of is to spray and do a lot of it.

A MEMBER: Did you try a good spray of lime-sulphur? Don't you think that would be efficient?

PROF. WOLFE: Not having had any experience I cannot say.

PROF. PARROTT OF GENEVA: I was very much interested in this discussion regarding raspberry diseases. In the Hudson River Valley we have two diseases of raspberries, which are very destructive. One is anthracnose and the other, which I surmise that gentleman is troubled with, is known as raspberry yellows. It is a physiological trouble and there is no remedy for it, as I understand, and I make this suggestion to the gentleman, that he collect some of his plants and send them to the plant pathologist at the Experiment Station at Amherst, to get the trouble identified. Now this discussion is especially interesting to me at this time because the red spider is brought into it. In the Hudson River Valley there is a common opinion that the red spider is responsible for raspberry yellows. Our plant pathologist claims that while the red spider is numerous on raspberries they are not responsible for the unsatisfactory condition of the plant, that this disease, raspberry yellows is the causal organism which produces that disorder of the plants.

THE CHAIRMAN: We are very glad to have the remarks by Prof. Parrott.

PROF. WOLFE: If you saw the red spider by the hundreds to the square centimeter, you would say that that was a case of red spider?

PROF. PARROTT: It might have something to do with it.

A MEMBER: Would it have to do with the curling of the leaves?

PROF. PARROTT: It might have something to do with it.

A MEMBER: Not necessarily.

PROF. PARROTT: It may not be responsible for the condition of the plant which the man describes, namely, the curling of the leaves and the dwarfing of the fruit. Those are all symptoms of raspberry yellows. I am not saying that is the cause, but I know if I had that plant, I would get information.

MR. E. C. BARBER OF FRAMINGHAM: I have noticed some growers turn their canes down to cover them for the winter: is that necessary?

MR. AIKEN: If we had to do that we would not raise raspberries, but still, in the Lebanon District of Colorado one of the largest raspberry sections in the United States, they raise the Marlboro there almost exclusively and they lay it down and cover it for the winter. We have had 40 below zero and the Marlboro was unharmed.

A MEMBER: There are certain varieties that have to be laid down, as the Ward, for instance.

THE CHAIRMAN: This is one of the growers from the Hudson River district: he says that some of them have to be laid down.

MR. AIKEN: We do not find it commercially practical to raise any varieties that have to be laid down. Do you raise those varieties commercially?

A MEMBER: I do not raise them myself commercially but they are raised very extensively, particularly one known as High, and they have to be tacked down.

THE CHAIRMAN: They would be very tender when they go in the winter, I suppose?

A MEMBER: Yes sir.

MR. AIKEN: This variety mentioned, the High, I understand is identical with the variety that one nurseryman gives away as premiums and calls it Jumbo. The Department of Agriculture at Washington found it identical with the High.

MR. GRATTAN: Most of us want to grow something that is successful commercially, and yet some of us like to grow fruit that is especially fine, regardless of whether we can sell it or not, and I have a few berry bushes of the old fragrant orange variety, almost extinct, and I find that it is absolutely necessary to lay it down to prevent freezing, in order to get it through the winter.

MR. AIKEN: I think that all the European varieties are not considered exactly hardy. I do not think the High is an European variety. I think that is an American variety. We set a dozen plants last spring, and they may be dead next spring.

THE CHAIRMAN: There have been a few questions asked by those not present, which I will read. "When should the old canes be cut out of the raspberry field?"

MR. AIKEN: I said in my paper that we cut them out in the fall. This is not exactly necessary, but we cut them out then because we have more time than we do in the spring.

A MEMBER: Do you raise them on sticks or wires?

MR. AIKEN: We raise mostly Marlboro that do not need tying up. Cuthberts—we should have all of them on wires. We set up a post in the middle of the row, set these posts two rods apart and put on a cross arm like a telephone cross arm and run two wires with the canes coming up between the two wires. The bearing canes can be tied to one wire and the young canes to the other wire, or the bearing canes can be tied to both wires on both sides and the young canes allowed to come up through the middle.

THE CHAIRMAN: I think Mr. Palmer might give us a word as to how they grow them in the Hudson River Valley. I have been at his place and would be glad to have a word along that line.

MR. PALMER: We grow them on stacks largely, and my raspberry bushes are about 6 feet square and they are cultivated both ways. This is not the ordinary practise and I do not know that I would recommend it. However, we

expect to do it ourselves. We go through and cut out the old canes as soon as the picking is over, and we then tie them up, about 2 strings loosely; I say loosely, not quite as tight as we do in the spring, but still fairly snug and we leave them that way till spring, and then we go through in the spring and tie them again, leaving the original strings on and then making them secure.

THE CHAIRMAN: One stake right in the center of the hill?

MR. PALMER: In the centre of the hill, and they grow very high with us. We raise nothing but Perfection, and we have six foot stakes, and they are tied very firmly to these stakes. The advantage of having them so far apart is this: we claim that we can get as many plants to the acre of berries five or five and one-half feet, on the square, cultivated both ways.

THE CHAIRMAN: And cultivated almost every day, aren't they, Mr. Palmer?

MR. PALMER: Every day during the picking season and twice a week during the spring until the time we pick them. They are about six feet tall and the first two years they are in bearing they are not cut back at all. This applies only to the Perfection raspberry, and is not a good practise on many other varieties that I can mention. The Perfection throws out a very large arm two or three feet long and they need room, and on a measured acre in comparison with a neighbor who usually had them closer together, I found that I was picking a great many more berries to the acre than he was. The main advantage, however, is this: we have found that the condition of the berries when they reach the market is vastly superior if they have had plenty of room and air and sunshine around them. I had that illustrated last year very strikingly. The man who was buying those berries every day came around one day and told me that the market was very weak and that he could not pay me within 3c. of what he had the day before, and I told him I was very sorry but he could

not buy any berries from me, and he said there was a neighbor of mine where he could buy the berries for this other price and that his berries were just as good as mine, so I said, "You'd better buy them." He had been buying every day all through the season, and we felt rather badly about it, and I said, "You go down to the other man and buy 50 crates of these berries for 7c."—he wanted 60—"and I will sell you 10 crates at 9c. and you ship them to your man"—they were going to Worcester—"and you write him and tell him what you have paid for the berries and see if you get a letter back telling you you have paid too much for mine, or that there was 2c. difference in the berries." He agreed to that, thought it was fair, and we shipped them. Then I got in my machine and ran down to the other man's place and looked at his berries, and I must confess they were just as good as mine and a little better, and I felt very foolish about it, but the man wrote back that my berries were worth the 2c. more, although when they left there my neighbor's berries looked better than mine, and the reason I believe that was so, is that mine had the room around them so they could mature and had the proper conditions.

THE CHAIRMAN: Mr. Palmer has brought to our attention the fact that he believes fruit is more hardy if it has plenty of air and sunlight and cultivation.

MR. MILLER OF AMHERST: I do not raise raspberries, I buy them. Last year I bought some splendid large St. Regis, and they kept very well for a day and then softened, more or less, and I found that a large berry has less flavor and less substance than the smaller berry. Is it because the berries were raised on bushes that had a very heavy foliage and the sunlight did not get to them?

MR. AIKEN: I know of some fruit last year when it was raining all the time that wasn't hardly fit to eat, but when it stopped raining it got back to the usual flavor.

THE CHAIRMAN: Did you receive the berries at the same time?

MR. MILLER: Yes sir. The plants with the heavier

foliage had the larger berries; they looked like a perfect berry, as large as your thumb, and yet when you tasted them they lacked the flavor that the smaller berry had. I was trying to find out whether it was cultivation or lack of sunshine and air.

THE CHAIRMAN: I think it might be both. We will take up a few more questions. "Is it necessary to grow several varieties to insure pollination of the blossom of red raspberries?"

MR. AIKEN: No, I do not think it is. In blackberries they may have to raise several varieties; in raspberries I do not know of any variety but what is self-pollinated.

MR. WHEELER: I would like to know what he would use for fertilizer.

MR. AIKEN: We put on almost anything or nothing. We raise practically all of ours on new land and do not fertilize them at all. About the only rule to follow is to look out about getting on too much lime and potash; you can be too good to them in this respect, I think. We had a test a year ago of acid phosphate and muriate of potash and nitrate of soda, and they would grow nothing until the rainy season began. We could tell the row that had the nitrate of soda as far as we could see, but after the rainy season began you could not tell it from the other three rows.

MR. H. A. HUSTON OF GERMAN KALI CO: I have been trying for some years to find out something bearing on that point, and I think I wrote Mr. Wheeler the other day that I might come up and discuss the matter a little, and if you wish it I can give you the results of some of that work.

What we are after is a systematic fertilizer test conducted just as they are conducted at any experiment station, and one of these happens to be on a raspberry place up at Montague. The plants were set in 1912 on very thin soil and the work continued in 1913 and 1914. Now, the system is this; the base of it is a complete fertilizer, so called, which carried 3% of nitrogen and 8% of phosphoric acid and 10% of potash. We leave out an element in turn to deter-

mine the effect of that element, and also have a check to see if any of them are doing any good. Now, on a check plot, the first bearing year is small, 287 pints to the acre. The second year there are 1200 pints. On the fully fertilized 1790 pints the first year and the second year 6,100.

Then if we leave out the potash, and to save your time I will give you only the averages—against 3,945, if the potash is left out you have 1,400. If you leave the nitrogen out you have 1,500. If you leave the phosphoric acid out, you have 2,700. Now this is quite in harmony, I think with the results of your own experiment station in regard to this matter.

This land is thin and porous, but we can take one out in the Hudson River Valley. This happens to be in New York, but it is just beyond your line over on Miller Brother's land. This land is prepared by heavy manuring and clovering, and as you will see by some of the yields it is pretty good land. He has an average here 4400 pints, but this is the first bearing year of 1200 that enters into the average, but the second bearing year he got 6753. Then the question arises, is this thing profitable.

Now the fertilizer situation, as you are aware, is quite peculiar just now. Everybody says you cannot afford to use potash because it is so dear and phosphoric acid has more than doubled in the last six or eight months, and, perhaps, the same question may come up in regard to that, while nitrogen is 40 or 50 per cent. higher. Now, I calculated what the value of a ton of potash was in these things, because that is the thing that has advanced the most, and based on the return—and we are only figuring these raspberries at a farm value of 4c. a pint, so the farm value is not excessive.

The ton value on Miller's is in the three years. \$392, and this last year \$1008; that is, if he had paid \$1008 a ton for the sulphate on there he would have come out even. On the Montague place it works up to \$1480. They are charging \$5. a unit for potash. I think that is about all I care to take up your time in this connection.

THE CHAIRMAN: This discussion will appear in our annual report, and those who are members will get it in the report. It only costs \$1. for membership. We have another question here, "How can snow be prevented from breaking down raspberry canes in the winter?" Can you say anything on that, Mr. Aiken?

MR. AIKEN: I do not know that there is any sure remedy for that. That is one reason why I do not like to prune the green plants because they send out branches, and these side branches suffer from snow. I do not know that there is any rule you can go by unless you set them where the snow does not drift. If the snow does not drift on them, they are not very apt to break down.

A MEMBER: By leaving the old canes all the winter that will tend to prevent the breaking of the new ones.

MR. DAVENPORT: I want to know if you consider the St. Regis a commercial variety.

MR. AIKEN: I do not think it is, as a rule, not if you can raise other varieties. If you set out the St. Regis, in the fall you get quite a nice lot of berries, but not enough to pay for raising that kind for fall berries. When it comes to next spring, your St. Regis will come in bearing about a week before the Marlboro, in June, right in the middle of the strawberry season, and when the Marlboro does get ready it is so much larger than the St. Regis that you can hardly afford to pick the St. Regis.

THE CHAIRMAN: Does it pay to pinch back the new growth of red raspberries in summer?

MR. AIKEN: We do not believe in pinching back the red raspberries in summer, because they send out the lateral branches and get a whole lot more fruit buds and a great many more berries than if there is a single cane, but these berries are a great deal smaller, and if you pinch them back in the spring or cut the tops off in the spring, they will send out these laterals which will be fruit spurs instead of branches, and you will get much larger berries on rich land. In practical growing I do not think it pays to spend time in

pinching them back, anyway.

THE CHAIRMAN: The question has been asked, what about heading back in early spring. Can you answer that, Mr. Palmer?

MR. PALMER: The way we have found it is this, the first two years they are in bearing, we do not cut them back at all, and the reason for it is not that we do not think they will do better if they are cut back, but with us the price we get for our berries depends largely on the season they become ripe. We start about the 10th of June, and for the first week or ten days our prices are generally around 12c. or 15c. a pint in large quantities on the farm, and by not cutting back and letting them grow about 7 or 8 feet high, they will bend over so they can be picked, and of course, as anyone knows the first berries will come where they are not cut back. We take those berries at 15c. a pint, and think by doing so that we lose a few of the later berries, worth about 7c. a pint. However, when the hill gets over 2 years old we find that it is better to head them back. We head them back to about 6 feet, and this variety, Perfection, will throw out about 30 arms, perhaps a foot or 18 inches long from the top of the stack up, but that is our method.

A MEMBER: What have been found to be the best varieties of black caps?

MR. AIKEN: There is a difference of opinion as to that. Commercially, I think the Palmer and Cumberland. Perhaps, the Gregg is very well for home use. I think it is better than the Kansas. I do not find the Kansas all that is claimed for it. The Black Diamond is the sweetest.

MR. DAVENPORT: I would like to know what you consider the cause of winter killing of red raspberries.

MR. AIKEN: I think probably three-quarters of the cases is lack of air drainage and then the other quarter is water standing on the ground.

MR. DAVENPORT: Do you not consider then that canes growing late in the fall would have a tendency toward winter killing?

MR. AIKEN: No. You would think it would, but raspberries often make a second growth, and you will find that second growth just as well off the next spring as the first growth.

MR. DAVENPORT: I know that in most publications, or the older publications, practically all of them state that canes that grow late in the fall are usually the ones that winter kill, but I notice in our own experience that young shoots coming up in the fall are usually the ones that go through. We have had winter killings, but it was on very dry land, and at the same time I considered that air drainage was good because they were on an elevation, yet two seasons out of seven we got some winter killing, principally on the Cuthbert and Herbert and Marlboro, and there were also some London.

MR. WHEELER: I think in that question a good deal depends on the location.

MR. AIKEN: Yes, in a country where they have plenty of snow and possibly with the late fall growing there would not be quite so much danger as down here. Last spring a great many of the raspberries in this section were killed in March, when it was very dry and cold, and I think the dry ground conditions had as much to do with it as anything else. Also the very cold nights, which evaporated the moisture more rapidly than the cane could make it. I think there is danger in a climate where there is no snow, where the vines grow too late in the fall. Mr. Davenport has said that the new shoots that start up in the fall near the ground go through. I think they go through from the fact that they are covered with snow or some other material, rather than that they grow late in the fall.

MR. KINNEY: It seems to me that this audience has no right to consider the Marlboro, which has been discarded here long ago. It is not in the same class at all with the Cuthbert and Herbert.

MR. JENKS: I think that Mr. Kinney's point is just right for our Massachusetts conditions. I think the Marl-

boro was good until we had better varieties. I think the Ruby is better. I do not consider the Marlboro good enough for our present conditions. We are growing the Ruby and the Cuthbert and trying out the June for a very early variety.

MR. PALMER: One of the most important points we have found in raising raspberries has not been touched on, and that is the matter of hoeing. We hoe our raspberries three times a year, and have found there is no money spent on the farm for labor from which you get as much return as you do from hoeing raspberries.

THE CHAIRMAN: I have been at Mr. Palmer's farm and you won't find any weeds on it; it is all clean cut cultivation. He cultivates his raspberries continually during bearing time and the bushes are eight feet apart.

MR. WHITCOMB: I am especially interested in finding out more about the Perfection. I visited a New York State section, where it is considered a great berry, and I want to hear any reports either from the Chairman or Mr. Aiken on the success of the Perfection.

THE CHAIRMAN: We would like to hear about growing the Perfection raspberry in this district. We will not call on Mr. Palmer for that. We know he is successful. We will call on Mr. Aiken.

MR. AIKEN: Our experience with Perfections only set a year ago has been rather disappointing. The fruit seemed to be of poorer quality than most varieties, more like the King than any other, and the canes do not seem to make the growth that they seemed to make in Southern Connecticut. The reason we raise Marlboro is that we can send them into Massachusetts and get 3 or 4 cents a quart more for them. With their bright color they will sell for three or four cents more than Cuthbert.

THE CHAIRMAN: Personally, I cannot speak on it. I only set a few plants last spring. I am trying a few of them. I think it would be well not to plant very many here until

we know more about it; it might not do the same as in the Hudson River Valley.

We are now going to have the Secretary of the State Board of Agriculture, Mr. Wilfrid Wheeler, talk to us on apple grading and packing. The Grading Law is going into effect next July, and Secretary Wheeler is going to be the one to enforce this law, he will tell you what you will have to come up to. Secretary Wheeler. (Applause).

THE NEW APPLE GRADING AND PACKING LAW

**Hon. Wilfrid Wheeler, Boston, Secretary of State Board of
Agriculture**

Mr. Chairman and friends:

Before I speak of the apple grading law as it will be carried out this year, I want to bring to your attention one other matter which really has some bearing on this whole subject, and that is the bill which has gone into the House this year to provide for a Department of Markets under the State Board of Agriculture. As you know, the question of producing crops in this State and all over the United States has been pretty thoroughly discussed; there is enough material on how to produce most every crop we grow. If a person wants to follow directions they can get all the material they want on production and most farmers realize that it's not a very big problem to produce crops if they put their whole attention to it; but one of our biggest troubles is in disposing of the crops after we have raised them, and we are trying this year to work out a system in co-operation with the United States Department of Agriculture and the Departments of other States, which will provide for a De-

partment of Markets in this State that will have the necessary information concerning distributing crops centralized at one point in the State, where farmers, consumers, buyers and everybody else can get it.

There was passed last year a law that provided for cities and towns of over 10,000 inhabitants to establish market places where farmers and others could sell their crops. Certain cities in the State have complied with that law, and I think it is a good thing that all cities and towns of over 10,000 inhabitants should have open market places where we can distribute our crops to better advantage than by sending them all to the Boston market or other large markets.

In order to make that law really workable however we must have some department in the State which can give the consumers and farmers the necessary information about the movement of crops, not only in this State but in the United States. Now the government has done something along this line; it has done some standardization work and has distributed information on the movement of certain crops, like the strawberry crop, during the season.

It maps that crop and follows it up, and shows every day its distribution in different markets, the number of car-loads and where they went and the condition of the market; so there is some information on that subject in the Government Department, which is of value to persons shipping a long distance.

We want to give the State this same power, and this man who will be appointed by the Board of Agriculture, will have power, if this Bill is put into effect, to establish grades and standards for the bulk of our agricultural products.

Now, this Bill which we are going to discuss this morning was a Bill which started out in the same line but which took one particular crop. We do not want to go to the Legislature every year and ask for a Bill to establish a standard for every particular product; we want to have

some responsible Department which will have the power of establishing grades and standards in agricultural crops, whatever they are. We want sometime to have a grade or standard of potatoes, cucumbers and various other crops in this State. Those are simply examples. I believe eventually we can grade and standardize all of our agricultural crops, and then and then only will we be able to distribute large quantities of these crops.

This proposed Department, will have this power to fix the grades and standards only after hearings at which person who are interested may appear. For example, if it is decided to grade and standardize potatoes another year, that fact will be published and every person who is interested in the standardization or grading of potatoes in three or four or five grades, or whatever number it may be, will be given an opportunity to be heard on that subject, before Standardization of Potatoes becomes a regulation of the Department.

The Department of Markets will also have the power to confer with cities and towns which are thinking of establishing market places, in order to assist them in choosing the proper location for that market, and also assist them in getting in touch with the farmers around the city, in order that the farmers may come into that city and sell their goods.

Now, it may seem a simple proposition for a city to set aside a market place and have it patronized, but when you consider that no one knows anything about this beyond, perhaps, a few persons interested and very few farmers know anything about it, you will see that you must have some Department or some organization or some individual who is going to be able to send that information around among the farmers and consumers. I am confident that this thing will work out very satisfactorily, and aid us in the most important problem the farmer is facing to-day, the better distribution of his crops.

Now, this apple packing law which was passed last year was passed on the initiative of practically everybody

who was interested in the production and distribution of apples in this State and in the New England States. It was an attempt to get a universal law established all over the New England States and New York, and the past winter three of the New England States passed this law. New York has almost identically the same law, and Maine has an apple law which grades its apples, only instead of grading them as "Fancy," "A," "B" and "Ungraded," it grades them as 1 and 2 and Ungraded, so while we differ a little there in denoting the grades, the grades practically correspond. We hope in another year that New Hampshire will follow suit, so that the law will be practically the same all over New England, as New England is very much alike in the production of its apples.

Last fall after the passage of this Act we started a campaign to familiarize people with packing apples under this law after it goes into effect, which is the first of July, 1916, and I want to say at the outset that there was a distinct understanding among the persons interested that the enforcement of this law would be a very gradual thing. This first year or two it will be simply an educational measure, and we will try to do all we can to get people familiar with the packing and grading of apples under it. We will not attempt in any way this year to enforce the law, so that there will be any hardships worked upon any person unless there be flagrant violation, and this gradual process is in my opinion the only way in which we can make the law workable.

I am going to read just a brief statement of what the law really contemplates, or what it does: "The law fixes a standard for barrels which is the same as the United States standard, and a standard for boxes uniform with standards of the principal apple-growing States; it defines a closed package; it establishes three standard grades and provides that all apples sold in closed packages not conforming to these three grades or, if conforming, not branded in accordance therewith, shall be deemed "UNGRADED" and so

marked; it requires every closed package of apples packed or repacked within the State to be marked in a conspicuous place with certain information as to its contents; it specifies that closed packages containing apples packed or repacked without the State to be sold within the State as of a Massachusetts standard grade shall not be falsely marked; it authorizes the secretary of the State Board of Agriculture to make and publish rules and regulations for carrying out the provisions of the act; it empowers the said secretary and deputies to enter any building or other place where apples are packed, stored, sold or offered or exposed for sale and to open any closed package, and, upon tendering the market price to take samples therefrom." There is also a penalty attached to it.

I think the first important thing is to define or get familiar with what a closed package is. We are near our markets in this State and are used to sending our apples largely in open packages, that is, the open Boston bushel box, open basket or some package which would not come under this law, and, except for export trade or large barrel trade, where apples are packed in a large way, there will not be a great many people affected by the law. The barrel, as we construe it, is only a closed package when it has both the heads in tight, or when it is covered with a tight burlap cover through which the apples cannot be seen. The covering of a barrel with a net would not be considered as a closed package, but when you get a tight cover like a closed burlap we consider that as a closed package.

Our ordinary Boston box, would only be considered a closed package when it had a tight head in it, so that the contents could not be seen. This box can be used as an open package when it has a paper cover and three slats across the top. This year we are not going to require that this slatted box shall be marked in accordance with the law: eventually if the farmers begin to use this paper heading and put on more slats, we may have to define it as a closed package.

Then the question of a basket which can be used under

this law ought to be understood. Now the ordinary peach basket which is used in some markets as an apple container, and which can be used to very good advantage would not be considered a closed package if it has merely a slatted head. If you have a tight head and that head is sealed in some way so that the seal cannot be broken without being destroyed, it will be considered a closed package. A carton will only be considered a closed package when it is sealed with mucilage or when tape or string which ties it up has a wax seal which cannot be broken without destroying the seal.

Those, in brief, are the packages which would come under the definition of this law, the tight barrel with its ordinary wooden head or tight burlap head, the bushel box or the regular apple box (that is the box standardized by the law, the Western box), and any basket or carton which has a cover through which the apples cannot be seen or through which the apples cannot be gotten at without breaking and destroying the seal. I think that fairly well defines the question of a closed package.

Now, there have been a good many questions raised this last year about the actual grading of the apples themselves. Some persons have thought that the grading of the apples was accomplished, according to the law, if they were run through one of these apple graders, so called, which you probably will have a chance to see in the other hall. The grading machine is a splendid thing, and I think most of us have got to come to using them if we are going to comply with the law cheaply. I know that people who have been trying to grade apples by hand have found it fairly expensive while I think it will pay any group of farmers that have got apples enough to send to market, to buy a machine and send them to the market graded. It must be remembered that the machine should be looked at simply as a sizing machine, and the actual grading of apples themselves for color and defects, etc., will have to be done by the eye as it has always been done in the past. Our work this

fall, following up what we did last year when Prof. Sears and our other people went around the State to try to illustrate the use of the law, will be to get the men who will actually be inspectors at work in the orchards at the call of any persons who may need them. These men can go to an orchard to give the necessary information or help the farmer in packing his apples under the law. This year we believe that it will be far better to do that than to attempt to inspect all the apples at railroad stations or city markets, although this will be done to a certain degree if our funds hold out. In fact the whole work of the law this year will depend a great deal on what appropriation the Legislature grants this year for the work.

We have no definite appropriation for the law until after the Legislature acts, and we have asked for \$2,000, and hope that will be enough to keep five men in the field from the first of September to the first of December. As I have said our policy will be to keep those men in the field at the beck and call of the farmers or persons packing apples. Then we plan also to issue a series of cloth posters, which can be had by applying at our office, giving in large type information which will be required under this law.

The question of sizing the apples themselves has been raised a good deal, and I have brought here to-day a few apples, which I considered would be ordinarily included in the grades which we would know as "Fancy," "Grade A," "Grade B," and "Ungraded." Now, before I show these I would just like to answer one or two questions which have been brought up regarding the law itself.

Very recently the question was brought up to us about over-facing. The law does not provide at the present time against over-facing a barrel. As the law stands to-day, you can put Grade A apples on the face of the barrel and Grade B underneath, or Fancy Apples on the face and Grade A underneath, or even Grade B underneath. We are therefore asking this year for a change in the law so that the face of the barrel shall truly represent the contents, but

allowing a tolerance of 15%, that is, you can over-face up to 15%.

There has been another question brought up. Inasmuch as two and one-half inch Baldwins look pretty small in the barrel, a question has been asked whether or not you can put a quarter size over on the face and still mark your barrel two and one-quarter. We have been attempting to get away from a lot of these old tricks whereby apples have been overfaced in the past. Nobody buys apples in our market without knowing that they are overfaced, and we want to get away from that and make this law work out so that the face of the barrel will really represent the contents if it takes ten years to do it. So I think we will cut out, even this year, any attempt on the part of persons to over-face, even in that question of size.

I realize that great difficulty will be encountered in any efforts to carry out this law on the question of color. There are certain years when color will be higher than other years, and for that reason I think we ought to have this law elastic enough so that it will give us a chance to make regulations or rules concerning different years. For example, if in one year we found the color was low, we could have a rule that year that the color on apples should be 15% lower than in a high color year, or something of that sort. This variation in color according to the season is a fact which we must and will take notice of in enforcing the law.

When we come to the question of facing apples, of course, we have defined in the Fancy Grade the limit of size, and those of you who last fall got the circulars, of which we printed something like over 30,000 and sent them over the State, got the rules and regulations relative to the minimum sizes which can be allowed in Fancy Grades. It was provided in the law, that the Secretary of the Board of Agriculture, after hearing, should have the power to fix the minimum sizes of apples which would go into the Fancy Grade, and we have put these in four groups.

The first group with a diameter of two one-half inches

includes Golden Russet, Red Canada, Roxbury Russet, Williams, Yellow Transparent. The second group, diameter two and three-quarter inches, includes Baldwin, Ben Davis, Hubbardston, McIntosh, Oldenburg, Palmer Greening, Red Astrachan, Sutton, Wagener, Wealthy, Yellow Belleflower, and you will notice that the minimum size of Baldwins is two and three-quarter inches in the fancy grade. In the other grades you can put them down as low as you want to, provided you mark the barrel with the minimum size. The two and one-quarter inch Baldwin can go into the "A" Grade, provided it has freedom from imperfections and the necessary color.

The third group, diameter three inches, includes Fall Pippin, Gravenstein, King, Northern Spy, Rhode Island Greening, Rolfe, Rome Beauty; and the fourth group, diameter three and one-quarter inches, includes Twenty Ounce, and Wolf River.

I have here some Baldwins which are rather oversized, but give a fair idea of what the color should be in a fancy apple. As we have got it in our regulations now, color shall cover more than one-half the surface normally colored and shall be more than one-half the usual depth. For instance, while an apple might be said to be colored it may be way below the depth of color, having a dirty kind of greenish red instead of a real bright red. What we want in a Fancy Apple is something really fancy, not only in color but depth of color.

In the Grade A we have got a great deal more latitude; color shall cover at least one-third the surface normally colored and shall be, at least, one-third the depth, with the other provision, and in Grade A apples you can put in two and one-quarter inch apples up to three and one-half or even larger. However I would advise everybody packing under this law to grade their apples as near to a size as possible.

It is perfectly possible under this law to pack the small and large apples in the same barrel, provided you put on the barrel the minimum size, of the smallest apples. All your

apples would be sold, if you put them in a barrel mixed, on the basis of the small apples and not the large ones, so it is to your advantage to size your apples as evenly as possible.

In Grade B the color may be practically way off; the color would be hardly considered in B Grade apples. In ungraded apples those of you who care to look in the small hall can see them—ungraded simply means ungraded. The sizes are not considered, defects are not considered. Anything can go in the ungraded class that would not be considered in the graded classes. You can pack your B's and A's, if you don't care to pack them in accordance with the requirements of the law, in the ungraded class. Now, I should be very glad, Mr. Chairman, to answer any questions.

THE CHAIRMAN: Mr. Wheeler has explained to you the law as he thinks it might be helpful. Now, he will be very glad to answer any questions or have any discussion.

MR. HUTCHINS: I would like to ask Mr. Wheeler if the over-facing of apples is allowed under the apple laws of the other states besides Massachusetts?

SECRETARY WHEELER: The New England States are just the same as we are. The over-facing can be done in New England; it cannot be done in Nova Scotia. In New York the law is the same as ours, you can over-face.

MR. HUTCHINS: Do you think there is any reason why the New England States should be less honest than Nova Scotia in the packing of apples?

SECRETARY WHEELER: I do not, and for that reason I have introduced an amendment to the Bill asking that the apples be not over-faced that is allowing 15% over-facing, which I think is a fair amount.

MR. HUTCHINS: I think we ought all to be grateful to Mr. Wheeler that he has introduced that amendment; it is a matter of honor.

MR. DAVENPORT: I would like to ask Mr. Wheeler to explain what he considers is the normal color of the Baldwin.

SECRETARY WHEELER: Well, my idea of a normal

color when we wrote that pamphlet was that color that covered half the apple would be considered normal.

MR. DAVENPORT: Then under that, if you consider that half the apple must be colored to be considered normal, it would only be necessary for the apple to have a little color, one-fourth color, to go into the Fancy Grade.

SECRETARY WHEELER: I agree with you that the wording is wrong; we are going to change that this year.

MR. POWELL: I would like to ask Mr. Wheeler what he is going to do about the color in regard to a Greening, Yellow Transparent or Golden Russet?

SECRETARY WHEELER: We shall consider in grading such apples that color shall not be considered at all. We want a green greening; in some places it is all green and in others it has a pretty pink, but in judging fruit in our shows we have to eliminate that question of color, and we shall in the packing of the apples do the same thing.

MR. BARBER: We all like to see a high colored Baldwin. Can Mr. Wheeler tell us why it is that sod ground will produce a better color than cultivated land?

SECRETARY WHEELER: I am answering questions on the apple grading law, and I'd rather somebody else would answer on cultivation.

THE CHAIRMAN: The Chairman is growing apples under high cultivation, no sod, and is not getting the color we are getting in sod, and I think in the law it would be well to consider the man that is growing apples and using a good deal of stable manure and not getting much color, but getting a large apple and a very satisfactory one.

MR. WILLARD: I would like to inquire what disposition is going to be made of the man that has a good keeping strain of Baldwins that color while they are in storage. I was thinking of one lot of fruit put up so green that it could hardly be marked A Grade, and yet when they were opened later they acquired color so they could go in the A Grade.

SECRETARY WHEELER: We have got another change in the law that we are asking for so that we shall

have power to make rules and regulations governing apples put in the cold storage. They will be inspected when they go in, so that you could pack them as "A," because when they came out they would have the "A" Grade color.

MR. WILLARD: This particular lot that I referred to was kept in cold storage.

SECRETARY WHEELER: I think the question of color would be just the same, they would probably color up.

MR. WILLARD: I mean about inspection; they would not be inspected when taken to the shipping point.

SECRETARY WHEELER: No. There is one question I mean to speak on. It has been raised several times, and that is the question where the law says "practically free from," and certain persons have tried to construe that as meaning individual apples in the pack. When the present law speaks of diseases and fungous injury; it says under "A" Grade "practically free from," and again under insect injury and bruises "practically free from." That has reference to the contents of the barrel, not the individual apples in it.

PRESIDENT SEARS: Aren't you giving just the wrong impression? You say the whole barrel has to be practically free from blemish; it means the whole barrel, every apple in it could be slightly blemished and still be all right.

SECRETARY WHEELER: I do not agree with you there, in that case, every apple can be injured somewhat and have a defect in it.

MR. WOLF: I would like to ask how this might apply to apples shipped into Massachusetts and for sale in Massachusetts from neighboring states. Of course, we are going to try to follow suit, we tried to get an apple grading and packing bill similar to the Massachusetts law and the New York law through the last Legislature in New Hampshire, but the bill failed to pass. It is going to be tried again, and we believe that it will be an advantage to our State and the apple interests of our State, just as it is going to be an advantage to yours. Now, I am going to ask how this is going

to affect New Hampshire growers and out of State growers in shipping here for sale? One of the big growers of the State is sitting right here beside me, Mr. Hall, and I might make just one other remark; the speaker said he did not believe that there were any apples in storage in the markets here that were not overfaced. Now, I want to make this statement, that I believe that there are or were 2500 barrels grown by the gentleman on my left, which were machine graded and which were put into the Quiney cold storage market last fall without being over-faced.

SECRETARY WHEELER: I am glad to know, that, Mr. Wolf. I never happened to come across them. (Laughter). The question that Prof. Wolf asked was, "How the out of State apple will be affected under this law?" It will be simply this way, that we have no right whatever to pass a law that affects the fruit from other States, but when other States pack according to the Massachusetts standard and so brand their apples in this State, they will have to come under the provisions of this Act.

MR. JENKS: I would like to ask Mr. Wheeler when greenings will be judged or inspected. Take greenings up in our country packed at harvest time, put in storage and put in so that the scab content is below the requirement, but scab develops in the storage, also storage scald, so that when those greenings are taken out of storage they are no where near as good as when they went in; when are those greenings to be inspected?

SECRETARY WHEELER: At the request of the grower. If he wants them inspected before they go in we may do it.

THE CHAIRMAN: I'd suggest that he had better have them inspected then. (Laughter).

MR. O'BRIEN: I would like to ask Mr. Wheeler what about enforcing that law on out of State shipments. If they brand their apples according to this law and don't come up to it, is there going to be any way to prosecute?

SECRETARY WHEELER: The only way we can do in

that case is to deal with the person who receives them.

MR. MITCHELL OF NEW YORK: Say a grower packs greenings and they are inspected, sold, put in storage, having been inspected and packed, when they are taken out of storage they are badly scalded and fungous has developed and they are not up to the standard when they were stored; who is responsible? Must they be re-graded and re-branded? What would be the adjustment in a case like that?

SECRETARY WHEELER: We probably would have to re-brand apples that had gone so badly as to be affected in that way; I think there is going to be a great deal of difficulty in enforcing this law on those particular varieties that are likely to scald in storage, but I do think there is a possibility of putting greenings into storage so they will not scald. I know that several growers are doing it so they don't scald. I think it may be a defect in the way they are put into the barrel, and that can be avoided, but if it comes to a question of our inspecting those, we can do it at both ends if necessary, and also put a statement on the barrel that at the time of inspection when they go into the storage they are free from scab or scald.

MR. MITCHELL: I raised the question particularly because in New York State a great many apples have gone through that particular trial, and in our market quotations in New York City the apples are now quoted as Fancy, Grade A and Grade B and unbranded, so that the shipper and grower can tell from the price current what each grade is selling for when the apples are coming out of storage; sometimes a barrel of apples marked Fancy has degenerated until it is as bad as Grade B or Ungraded, and that quotation is put into Fancy Grades, so that it militates against accurate market reports for the grower, and those points are so fine and hard to regulate that I wanted to see if the different officers and states that are enforcing these laws can get together and enforce these laws so that we get accurate market reports.

SECRETARY WHEELER: The law now reads, "Ap-

ples which have been in cold storage shall not be sold or distributed, or offered or exposed for sale or distribution, in closed packages until they have been inspected in accordance with rules and regulations to be prescribed by the secretary of the state board of agriculture, unless a statement of the length of time during which the apples have been kept in storage shall be plainly marked upon the package." We are asking that that last statement be stricken out so that we will have a chance to make elastic rules and regulations for that inspection. I realize that it is one of the most difficult questions in handling this whole law.

MR. MANN: I would like to ask what standing a barrel of apples packed under the Sulzer law would have in Massachusetts?

SECRETARY WHEELER: Apples grown in Massachusetts for sale in the State must be packed under the Massachusetts law. If for shipment interstate they may be packed under the Sulzer law.

MR. MANN: What if they are packed outside the State under the Sulzer law and shipped into Massachusetts?

SECRETARY WHEELER: We have nothing to say about them, that is inter-state commerce. I have some stencils here which show the order in which the marks on the packages will be required; if any of you care to come up I will be glad to show them to you. The marks on the package will be required to be put on in this order, "Massachusetts standard." are the words at the top, then the grade, then the minimum size, and in order to comply with the Government requirements we have got to put on all our packages the fact that it is a standard barrel, if it is a standard barrel, then the variety, and then who it is packed or repacked by. That order of stencilling will be adhered to.

MR. GEER: We use a good many peach baskets in our packing, and I would like to know if it is necessary to stamp the quantity or weight on each package of those peach baskets.

SECRETARY WHEELER: In order to comply with the Massachusetts regulation of weights and measures, you have got to put the quantity of the contents of that package on it. If you are using a 14 quart peach basket it has got to be stamped on it.

MR. GEER: When we buy them they are stamped.

SECRETARY WHEELER: If you are selling at retail you have got to put the weight on.

A MEMBER: I would like to ask Mr. Wheeler if an apple that is absolutely green could go into the B grade.

SECRETARY WHEELER: Yes.

MR. H. A. WEEKS: I would like to ask Mr. Wheeler if apples that come to storage and have depreciated while they are there, when they come out for sale who is expected to ask for a second grading?

SECRETARY WHEELER: Why, the owner, the person who has bought them can re-pack them, but he has got to put on the barrel the fact that he has re-packed them.

MR. WEEKS: What constitutes re-packing?

SECRETARY WHEELER: Simply looking them over and re-packing into barrels again.

MR. WEEKS: If the barrels are full?

SECRETARY WHEELER: Do you mean simply gone slack a little?

THE CHAIRMAN: Do you refer to color or quantity?

MR. WEEKS: If they get storehouse scald, etc. Not necessarily that the barrel has gone slack, but they have deteriorated in regard to color; they may be perfectly sound; who is it up to to ask for re-inspection?

SECRETARY WHEELER: It would be up to our Department to re-inspect them.

MR. WEEKS: Who is expected to ask for it?

SECRETARY WHEELER: The owner, whoever he is.

MR. WEEKS: Is he obliged to ask for it?

SECRETARY WHEELER: If you own them, yes.

MR. WEEKS: The commission man is obliged to ask for it.

SECRETARY WHEELER: You mean if they are put in on consignment.

MR. WEEKS: Yes.

SECRETARY WHEELER: You would not own them then.

MR. WEEKS: No.

SECRETARY WHEELER: I should think the man that owns them would be the one to ask for it; the owner is responsible because his name is on there.

MR. WEEKS: I say the purchaser when he comes to buy them, says they show some seal, who is to ask for it?

SECRETARY WHEELER: I cannot see anything but that the man who owns them is the one that has got to ask for re-inspection.

MR. WEEKS: What if he doesn't have that opportunity?

SECRETARY WHEELER: Well, then you would claim that you owned them as a commission man. If you claim that you own them you would have to ask for it.

MR. WEEKS: When they come out, some barrels show a little discoloration and some might show none; the purchaser when he examines them might find some little fault, they might be an eighth or a quarter off in size; is there any law that compels the commission man to ask for a re-inspection of these apples.

SECRETARY WHEELER: If the person who receives the apples can prove they were received by them in good condition at the time he received them, he would not be responsible for it; no, that is in the law.

MR. WEEKS: Who is responsible for this deterioration that is going on?

SECRETARY WHEELER: I should say that the apples were. (Laughter).

MR. WHEELER: I would like to ask if there is any law in regard to stamping the weight of apples on the barrel or box, either in the State or to be shipped out of the State?

SECRETARY WHEELER: No, there is no law about

the wholesale handling of apples in either barrels or boxes where you have got to put the weight on. You have got to put the weight on if you are handling by retail at the rate of 48 pounds to the bushel, but not wholesale.

MR. WHEELER: The weight of the barrel—has that got to go on?

SECRETARY WHEELER: No.

MR. COGSWELL: If you are selling by the bushel it is 48 pounds, but if you are selling over your counter there is no specified weight there. You may sell by the dozen; you are simply selling this as a package of apples, and there is no required weight there or no required number. It is simply a package of apples.

SECRETARY WHEELER: That is true.

MR. FROST: Is there any other way a barrel can be branded except by stenciling? For instance, a small grower who only has a few barrels, has he got to have a stencil or can that be put on by typewriting and tacked on, or any other way?

SECRETARY WHEELER: Yes, it can be put on free-hand, marked by ink pot, provided the lettering is not smaller than half an inch.

MR. COGSWELL: Has it got to be on the head or on the side?

SECRETARY WHEELER: No, it has not necessarily got to be on the head.

MR. ROBES: The question of the weight that was asked seems to apply to parcels sold direct from the grower to the consumer, and is really a retail proposition; must the weight be put on the box or package or barrel in that case?

SECRETARY WHEELER: You mean where you are selling directly from your farm to a consumer?

MR. ROBES: Yes.

SECRETARY WHEELER: Yes, you are likely to get into trouble with the weights and measures department if you do not; you are selling at retail.

MR. ROBES: Is it specified in the weights and measures acts?

SECRETARY WHEELER: Yes.

MR. MANN: In selling at retail by parcels post, must you put on the number of the apples?

SECRETARY WHEELER: You can put on the number of fruit in place of the weight, it is either weight or numerical count.

MR. MANN: Would that apply to a standard box of apples?

SECRETARY WHEELER: To a standard box? You put on the numerical count and that's all right.

A MEMBER: On the barrel when it is ready for shipment the head can be covered by the stencil, as required by law?

SECRETARY WHEELER: The stencil would not cover the entire head. This happens to cover most of the head, but at the bottom there is plenty of room for address. The only thing the law requires is that the letters shall not be less than one-half inch letters; the necessary marks on that barrel with a half inch letter will only cover a small portion of the head.

THE CHAIRMAN: I think the time is about up for discussion. We would like to go back to one point this morning. Mr. Aiken made a statement that I do not think any of us understood, and I would like to have Mr. Aiken explain why it costs more to put up strawberries than raspberries.

MR. AIKEN: Mr. Brown wrote me and asked me if I could tell why it cost more to preserve strawberries at 12c a quart than it did raspberries at 20c. a quart. I brought these along as an illustration. There is a can of raspberries and there is a can of strawberries. The cans were filled with fresh fruit and then syrup put on and they were cooked for I don't know how long I didn't put them up; when they were done cooking the can of raspberries was almost full, as you can see, and the can of strawberries, the

berries were all up in the neck; and besides taking more berries, a great many more berries to put up a quart, it takes longer to put them up, because they have to be hulled and that took—I don't know, someone else can tell better than I can how long it takes. After I got Mr. Brown's letter I didn't have time to get in touch with the young lady who has charge of our canning, so I cannot tell what the figures are.

THE CHAIRMAN: I think this is a good point that Mr. Aiken has brought out.

A MEMBER: I want to ask Mr. Wheeler when retail ends and wholesale begins. (Laughter).

SECRETARY WHEELER: I would like to ask someone here that question. I have been working on that for a long time to find out from the Department of Weights and Measures where it does. Their law says "when sold at retail." I don't know what retail means more than sold from over the counter in a store or direct by you as a producer to the consumer. I suppose it is simply meant to eliminate the sales that people would make in the market or through commission men or through a middle man. That is as near as I can get at it, but that is the way that the law reads "when sold at retail."

THE CHAIRMAN: I am sure you have all enjoyed the morning and some of you have left your dollar in the corner for membership. I hope that those who have not done so will leave it after this meeting, and I hope you will not forget our trade exhibit.

After calling attention to the programme for the following sessions, the Chairman declared the meeting adjourned.

AFTERNOON SESSION 2 O'CLOCK

President Sears in the Chair

THE CHAIRMAN: Now, ladies and gentlemen, I think we will call our session to order. As I told you yesterday, we are trying to make a specialty this year of beginning on time. According to my time we are a minute and a half late already. We do not want to offend any worse than that.

We have this afternoon, I think, one of the most important subjects that we are going to discuss. You know we are always fond of telling you that everything we happen to be talking about at the time is the most critical and important thing for discussion. I think I told you that yesterday, but I really think I am telling you the truth today.

I do not believe there is any one thing that would do more to make our fruit business what it ought to be than for everybody to get hold and spray their trees and spray them well, because while pruning is important and ought to be done, the man who does not prune his trees is frequently going to get very good results.

Then take the matter of cultivation, earing for the soil in the orchard; a man who has his orchard in sod or in cultivation or has it half way between frequently gets excellent results, and any of the other operations in the orchard he may neglect considerably and still come out all right, but on the average the man who neglects spraying gets left and frequently gets left badly, so I think we can less well afford to neglect spraying than anything else.

I am particularly glad that we are to have the speaker

of the afternoon address us, it is a thing I have been looking forward to a long while, to get Professor Parrott here to talk to us on this subject. I would like to tell you something more about him and blow his horn a little bit, but he is a modest man from Kansas, like myself, and I am going to forbear entirely on that account and let you judge him by his own speech, by what he has to say to us.

I have great pleasure in introducing Prof. P. J. Parrott of the Geneva, New York, Experiment Station, who will talk to us this afternoon on spraying. (Applause).

RECENT DEVELOPMENTS IN SPRAYING PRACTICES

P. J. Parrott, Entomologist, New York Agricultural Experiment Station, Geneva, N. Y.

The problem of spraying commercial orchards is a subject of great practical importance. A perusal of the reports of this Society shows that this topic has received its due share of attention at the regular annual meetings. In discussing the subject as announced it is my purpose to consider certain spraying problems that now confront the fruit growers of New York. Some of our practices are doubtless of interest, if not of direct importance to orchardists in this state. However, it is far from my intention to give specific recommendations as to what constitute good spraying practices in Massachusetts. Instruction along these lines may well be left to your experts who, by reason of an intimate knowledge of your individual circumstances, should always be consulted when advice is needed.

The propositions along the lines of spraying now

seriously attracting the attention of orchardists in New York may be discussed under the following heads:

1. Plant Lice Injurious to Apple Foliage and Fruit.
2. Insects that Factor in the Grading of Apples.
3. Insecticidal Properties of Various Sulphides.
4. Compatibilities of Common Insecticides.
5. Spraying as an Item of Expense in Apple Production.

PLANT LICE INJURIOUS TO APPLE FOLIAGE AND FRUIT

Notwithstanding the admitted belief that the insects are susceptible to various remedial measures, there is no extensive body of evidence, which is positive and proven, showing what can actually be accomplished in a practical way towards the prevention of losses by the various species of aphides that are injurious to bearing apple orchards. It therefore seems worth while to direct attention to certain experimental results which bear on the susceptibility of these creatures to spraying mixtures. The matter is an important one because of the increasing shrinkage in apple yields in consequence of the injurious activities of these pests and the extreme difficulty of controlling the aphides by the measures usually advocated, some of which are strikingly at variance with experience and practice.

In order that there may be clear understanding of the present situation with respect to these pests, it is desirable to briefly consider a few of the principles involved in the control of the apple aphides, the different species injurious to apple foliage and fruit, life histories during early summer on this host, and present status of spraying practices.

The foliage and fruit of apples in New York are subject to attack principally by three species of plant lice:—The rosy apple-aphis (**Aphis sorbi** Kalt.), the green apple-aphis (**Aphis pomi** De Geer) and the oat-aphis (**Aphis avenae** Fab.) It is safe to say that these insects have to be

considered in the upkeep of apple orchards in Massachusetts.

While these species show differences in habits and structures, they display, from the standpoint of orchard economy, marked similarities in their injurious activities, which are briefly epitomized as follows:—The eggs of these insects are laid principally during October and November on succulent twigs, in crevices in the bark or at the bases of buds. In this stage they pass the winter. The following spring, principally during the latter part of April, the eggs hatch and the young aphides make their way to buds in the most advanced stages of development and later work into the interior, seeking protection in the hairy growth of the unfolding leaves and rudimentary blossom structures.

These creatures, commonly called stem-mothers, mature about the time of the blossoming of the trees. After producing several generations, the oat aphis first, and later the rosy aphis, leave the apple trees and seek their summer host plants. The green aphis may live on the apple trees all the year, breeding continuously during the summer, preferring water sprouts.

The work of the aphides during May and June is especially destructive since it occurs during the period when fruit buds are forming and when the vigor of the trees is also required for the development of the young apples of the current season's crop. If favorable conditions exist during this period for rapid increase of the pests the leaves become curled and the development of young fruit is checked. With a prolonged outbreak, the injured leaves turn brown and drop, causing more or less extensive defoliation. The fruits fail to increase in size and cling tightly to the twigs, forming clusters of small, deformed fruit, commonly known as "cluster apples."

During some years a good proportion of the crop may be affected, which usually entails a great financial loss. The chief interest of apple growers in these insects is how

to reduce to negligible amount the number of cluster apples, which are principally the work of the rosy aphid.

And now as to control measures! During the progress of their life cycle the apple aphides are at various periods more or less vulnerable to applications of spraying mixtures. As a result several methods of spraying have been developed which are based on susceptibilities of certain stages of the insects to particular insecticides. The chief points of attack in the life of the aphides to which most attention has been directed are:

1. In the winter or egg stage.
2. As eggs hatch and the lice are assembled on the green ends of the growing buds.
3. At time of maturing of stem-mothers and first appearance of their young.
4. At time of appearance of fall migrants and egg-laying females on apple trees.

The problem of controlling the aphides by spraying directed against any of the foregoing stages has proven exceedingly difficult. In order to secure data applicable to New York conditions the Geneva Station has been and is conducting a series of spraying experiments in apple orchards in various parts of the state. The work so far points to the destruction of the aphides on the expanding buds as the most important step to avoid injuries by those pests.

From a practical as well as a scientific standpoint this method of control requires additional study and experimental effort. For this reason it has seemed important to those who have had the planning of these experiments that they continue over a series of years in order to eliminate as far as possible inaccuracies due to unknown and uncontrollable conditions and thus secure accuracy of results from which conclusions may be drawn. The experiments have now run for two years, and the work of the past season has strongly corroborated the position we have taken. The possibilities of combating the rosy aphid by this treatment are indicated in the accompanying table, which summarizes

the data of a spraying experiment in an orchard of Rome apple trees, with some interplantings of other varieties.

Table 1. Summary of Experiments Against the Rosy Aphis

Number of Trees	Variety	Treatment	Centers of Fruits Leaves Infestation Injured Curled		
			No.	No.	No.
18	Rome	Sprayed	46	33	172
16	Mixed	Sprayed	8	0	29
7	Rome	Not Sprayed	319	279	1323
Average per sprayed Rome			2.55	1.83	9.55
Average for all sprayed trees			1.93	1.17	7.17
Average per unsprayed Rome			45.57	39.85	189

Results similar to the foregoing have been obtained in other experiments. In years when the rosy aphid is superabundant it may perhaps be necessary to make a supplementary treatment either before or after blossoming. As to its value, and when it should be made, if needed, are questions on which we are concentrating our attention. Aside from the protection given to the trees from the rosy aphid, thorough spraying of the opening buds with lime-sulphur and nicotine solution, or soap combined with nicotine solution, will completely destroy an associated species—the oat aphid.

This treatment also affords temporary relief from the green apple-aphid. Owing to the fact that the latter species lives on the apple the entire year several applications of a contact spray at intervals of three or four weeks during the growing season have usually been required in order to keep this aphid under control.

INSECTS THAT FACTOR IN THE GRADING OF APPLES

The New York Apple Grading and Branding Law specifies among other things that the "Fancy" grade shall be free from insect and fungous injuries. A tolerance of five percentum below certain specifications on a combination of all defects or two percentum on any single defect is allowed.

It also provides that standard "A" and "B" grades shall be practically free from blemishes by insects and diseases, and that not more than ten and fifteen per centum respectively of the fruit shall fall below specifications on a combination of all defects or five per centum on any single defect. Apples not conforming to foregoing specifications are branded as "ungraded."

The enforcement of the law during the past two years has clearly shown the necessity on the part of our orchardists of a more careful discrimination of fruit with respect to their imperfections. As was expected, some confusion exists as to what really constitute a "defective" apple within the meaning of the law; and practices of farmers in the grading of their crops with respect to their imperfections have differed greatly, some being more discriminating than others—a condition which will be gradually remedied as the law is better understood and more efficiently enforced.

One conspicuous result from the attempts to grade fruit more closely has been an unusual demand by both commercial orchardists, as well as commission men, for information as regards the nature of the agents that are responsible for the disfigurement of apples.

In order to raise the maximum amount of fruit free from defects, it is obvious that there should be a clear understanding of the destructive activities of the principal orchard pests, since not all of them are susceptible to the same repressive and remedial measures. Methods that succeed against the codling moth are of no avail against apple-puncturing capsids, and injuries by the latter will continue so long as spraying operations are directed solely against the former pest. Such illustrations could be multiplied. The point is clear and further emphasis is hardly necessary. A more intelligent appreciation of these facts has unquestionably been developed as a result of the passing of the packing law. More and more growers are realizing that their spraying practices, successful as they have been, are

faulty in certain respects, and that new destructive insects, which have been overlooked or confused with other pests, cannot be fought economically or efficiently by the methods employed in the past.

The imperfections that commonly occur on mature apples in New York vary greatly in character and degree of intensity, ranging from stippling with red to the occurrence of pits, scars, corky areas and blemishes of one sort and another which, if permitted to continue, must with a strict enforcement of the new packing law have a great influence on the character of grading, if not on the financial returns of some orchards. Recent studies have shown that a number of insects, as well as some plant diseases, are responsible for these blemishes. The scarlet tell-tale marks of the San Jose scale are too well known to need description. Quite similar in outward appearance and very prevalent during some seasons is a reddish stippling of apples, which is due in most cases to slight or superficial infections by fungi, probably in large part by the apple scab. It is believed that quite similar discolorations may attend the puncturing of the epidermis of apples by such insects as plant lice or the apple fruit-fly.

It goes without saying that the codling moth is largely responsible for wormy apples. Too few growers appreciate the fact that this pest is largely responsible for the "pin holes" during early summer, as well as during late summer or fall. Apples showing such blemishes are regarded as defective, and during some seasons such injuries are responsible for serious shrinkages in the yield of the higher grades of fruit. It is not generally known among orchardists that the codling moth is not wholly responsible for "side-wormy" apples. Some of the blemishes that occur on the cheeks of maturing apples are the work of the plum curculio.

In orchards of mixed fruits it is not a rare experience to find almost as many apples showing "pin-holes" and other imperfections by this insect as by the second brood of

the codling moth. The cureulio injures the fruit by puncturing holes through the skin with the snout, both for egg-laying and feeding. The egg punctures are made when the apples are small, while the feeding punctures may be produced at almost any time during the summer. This latter point perhaps explains why some growers are unable to find "worms" in the so-called "side-wormy" apples.

One class of deformed fruit that is the cause of grave concern on the part of our commercial orchardists are pitted and misshapen apples, which have recently been found to be the work of red bugs. These insects have been very abundant in many orchards in Western New York and in the Hudson River Valley. Complaints of their ravages have also come to us from Connecticut, Pennsylvania and Virginia. They are evidently widely distributed and it is certainly strange that more is not heard about them in Massachusetts. These pests, in quite recent years, have come to the front as one of the most serious fruit-deforming insects. Their rise to such prominence in orchard economy has necessitated a change on the part of many fruit-growers in their methods of spraying, as the mixtures now commonly applied to apple trees in foliage are wholly ineffective against the creatures. They are small, reddish, sucking insects that destroy or deform young fruit during the course of their feeding operations. The punctures of the tissues by the pests cause the apples to drop or shrivel upon the tree or become dwarfed and gnarly. The eggs of the red bugs are inserted in the bark of the young wood and they hatch the following spring. The nymphs begin to appear soon after the leaves of the fruit buds open, and hatching is practically completed by the time the blossoms open. The young nymphs feed upon the leaves until the fruit sets, after which they attack the fruit. The first indication of their presence is minute, reddish spots on the terminal leaves, which are caused by their feeding.

Of the various sprays which have been used against the pest, nicotine solution has proven the most efficient and

satisfactory. The amount commonly recommended is one pint of nicotine solution (forty percent) to one hundred gallons of water. The addition of three to five pounds of soap enhances the adhesive and spreading properties of the spray. If the insects are not numerous the nicotine solution without the soap may be added to lime-sulphur solution and arsenate of lead, forming a "three-in-one" mixture. Thorough applications should be made just before the blossoms open and after the petals have fallen.

Defects of an entirely different character to the foregoing are large, irregular cavities in young apples which, in healing, form yellowish or brownish corky patches or areas in the mature fruit. These are the result of the activities of various caterpillars known as leaf-rollers, green fruit-worms, tussock moth and the palmer worm. The fruit-tree leaf-roller especially has in certain communities done much damage to the crops of some orchards.

THE INSECTICIDAL PROPERTIES OF VARIOUS SULPHIDES AND POLYSULPHIDES

Recent years have witnessed the appearance on the market of a large number of spraying mixtures which derive their efficient properties from sulphides and polysulphides of sodium, potassium calcium and barium. Most of these are in liquid form, but preparations in a powdered or granular state, containing sulphides of the foregoing bases, are offered for sale or can be obtained for experimental purposes. The amount of sulphur in proprietary insecticides containing sulphides and polysulphides of the different bases varies greatly, ranging for the sodium preparations from 1.79 to 58.92 per cent; potassium, 2.39 to 38.72 per cent; calcium, 3.97 to 26.40 per cent, and barium 16.54 to 44.0 per cent.

The variation in amounts of sulphur in the commercial mixtures reveals a need of definite information as to the comparative insecticidal properties of the foregoing sulphides as a basis for safe and specific recommendations. To obtain data as to the relative merits, experiments have been

conducted for the past two years in which the compounds have been tested on the basis of their sulphur content, the sulphides and polysulphides of the different bases being used at varying strengths to give similar ratios of sulphur respectively in the dilute mixtures.

In experiments against the San Jose scale, using the compounds at the rate of four and three-fourths ounces of sulphur to a gallon, there were variations in effectiveness on individual trees, especially in apple orchards, which were, however, fairly distributed among the various plats. As gauged by blemishing of fruit, production of young scales and infestation of new wood, it was difficult to perceive that one preparation had any appreciable advantage over another. If the compounds do really differ in effectiveness, these results suggest that the differences in efficiencies are not great and apparently are such as could easily be overcome either by thorough spraying or by slight additions to the sulphur content of the dilute mixtures or by the incorporation of inexpensive substances to increase toxic properties.

The work in general so far points to the conclusion that the strength of a preparation with regard to its sulphur content is a more important consideration than the nature of the base of the sulphides and polysulphides. On the assumption that the compounds of the different bases are equal or nearly equal against the scale, the chief factors that enter into a choice of a proprietary insecticide are safeness to foliage when combined with arsenate of lead, and economy, in which respects the advantage appears to lie with the calcium and barium sprays, the former being less expensive of the two.

In tests to determine their values as stomach poisons, none of the compounds alone, apparently, including those of barium, were harmful to various species of leaf-eating caterpillars or beetles. In most instances arsenate of lead with the sulphides and polysulphides of sodium and potassium was somewhat quicker in manifesting its toxic

properties than when combined with the other compounds, which may be explained by the formation of soluble arsenic in the reactions between the poison and the sulphides. Because of the chemical reactions, the sodium and potassium sulphides, while more rapid in their poisonous effects upon insects, were generally more liable to cause injuries to the foliage of fruit trees than the calcium and barium compounds in combination with arsenate of lead.

According to their nature and mode of action, various substances are incorporated in spraying mixtures to give penetrating and adhesive properties. The agents that are commonly used are silicate of soda, saccharates, soap, glue, gelatine resin, and commercial oil emulsions. Tests show that glue, soap, glycerine, sodium silicate and oil emulsions of various formulas may be combined with the sodium and potassium sulphides, and that similar combinations are possible with the calcium and barium sulphides except in the case of soap, oil emulsions and sodium silicate. As to the influence of such combinations or effectiveness, no marked results have been observed, except when soap and oil emulsions were employed with the sodium or potassium sulphides against aphides, or oil emulsions with the same sulphides for the control of the San Jose scale. The principal gain in the latter case appears to be in an increased rate of toxicity. The destructive action of the sulphides alone on the scale is apparently slower, and while prolonged over a more extended period may, however, prove no less efficient.

Taking all factors into consideration, especially economy and safeness to trees, there appears to be little reason for discontinuing the use of lime-sulphur for preparations containing sulphides of other basic elements. In spite of certain defects, no spraying mixture so well meets the need of the commercial orchardist as lime-sulphur solution.

COMPATIBILITIES OF COMMON INSECTICIDES

Many pests of fruit trees pursue their injurious activities at similar periods of time, and some of them are jointly susceptible to a single application of an insecticide or to the same combination of spraying materials. As the expense for insecticides is usually much less than the cost of labor and team, it is desirable from the standpoint of economy of time, to reduce the number of applications to the minimum. One means to this end is to employ combination mixtures or, as they are popularly called, "two-in-one" or "three-in-one" sprays, according to the number and nature of constituents contained in them. However, not all substances that enter into the composition of insecticides may be mixed together indiscriminately without danger of mutual destruction. This raises the point that insecticides show great variations in degrees of compatibility. Following the outline by Gray (Monthly Bul. Cal. Hort. Com. III, pg. 265, 1914) the results from mixing the more common insecticides may be briefly stated as follows:

Better results by mixing—Paris green with bordeaux mixture; arsenate of lead with bordeaux mixture; tobacco with emulsions or soaps.

Properties not changed by mixing—arsenate of lead (acid) and tobacco; arsenate of lead (neutral) with bordeaux mixture, or tobacco, or soaps; lime-sulphur with tobacco; tobacco with soap or oil emulsions.

Efficient, non-injurious—arsenate of lead (neutral) with lime-sulphur; soap and tobacco.

Inefficient, non-injurious—lime-sulphur with soap, or alkalies or acids.

Dangerous—Paris green with lime-sulphur, or soaps, or oil emulsions; lead arsenate (acid) with soaps, or emulsions, or alkalies; emulsions with lime-sulphur; zinc arsenate with lime-sulphur, soaps or emulsions. Dangerous combinations that are being tried by some growers today are arsenate of lead or paris green with crude carbolic acid emulsions or

with the commercial powdered sulphur preparations containing sulphides of such bases as sodium or potassium. Also soap or oil emulsions combined with soda or potash sulphides have caused serious injuries to fruit trees.

THE COST OF SPRAYING IN THE UPKEEP OF AN APPLE ORCHARD

From the standpoint of the permanent prosperity, extension and normal development of fruit-growing in New York, one can hardly fail to be impressed with two facts: (1) the increased planting of apples trees, and (2), the growing necessity of more frequent and thorough applications of spraying mixtures. The past decade has witnessed the setting out of new orchards at an unparalleled rate; and in spite of threatening setbacks, considered temporary in their nature, the end of such activity is not yet in sight.

With the average farm, the former standard of approximately ten acres of apple orchard to ninety acres grown to other crops has been largely abandoned and more land proportionately is being devoted to the growing of fruit. Nowadays a twenty-acre orchard is a common adjunct to many a farm, and plantings of fifty to three hundred acres are numerous and have ceased to elicit a great amount of surprise or much comment.

One effect of this increased acreage of fruit trees is that the care of orchards frequently overshadows all other farm operations, resulting in many instances in an unbalanced state of farming which some men find difficult to correct. Then again, the extensive and intensive culture of the apple has apparently produced conditions that are proving very congenial to insects, certain of which during the past de-cennium have acquired great vigor and assumed a very dangerous character. Formerly efforts were largely concerned with scab, scale and codling moth. In addition to these, it is now the lot of many orchardists to have to contend against fruit-puncturing capsids and leaf and fruit-infesting aphides; and spraying for these has become a

regular part of the routine prescribed by the latest and most approved spraying schedule.

The cost of spraying is gradually increasing as new pests often require for their repression extra treatment or special combinations of insecticides, which add to the expense of such operations. Formerly lime-sulphur and arsenate of lead—a two-in-one mixture—sufficed for the principal ills that the apple is heir to, but now the grower must needs use a “three-in-one spray”—lime-sulphur and arsenate of lead plus other substances; and according to present usage nicotine is the most popular **third** constituent in the combination of spraying materials.

Individually and collectively the growers of New York are confronted with what may prove to be a great economic problem. In addition to the necessity of maintaining a high state of culture at increasing expense, they are apparently facing a period of diminishing returns. As a result more serious thought than ever before is being given to a study of methods of producing maximum yields of high-grade fruit at minimum cost. A partial solution of the dilemma is to improve spraying practices, at least as to the character, if not number, of the treatments. In spite of present methods, injurious insects are responsible for great reductions in financial returns.

Moreover, in addition to direct losses, failure to maintain a high level of spraying practices may have the effect of neutralizing, if not actually destroying any benefit by other standard operations, as pruning, thinning, cultivation, etc., so essential today for the upkeep and profitable production of the orchard. The objection to such a proposition by the average orchardist, at first thought is, I fancy, that of cost; it being urged that most growers are already putting more into this operation than can be afforded, and one which in addition to other objectionable features calls for a cash outlay.

A study of orchards under control of the Geneva Station suggests that the problem is in reality not so much a

matter of cost as a matter of time,—to find time to spray the trees thoroughly at each critical period and yet not neglect other orchard operations or other crops when they demand proper attention.

As to expensiveness of spraying, the Auchter orchard, now in its fourth decade, has yielded the Geneva Station during the past decennium a net profit per year of \$120.60 per acre. On the cost sheet for a barrel of apples are nine items of expense, amounting to \$1.29, which covers the growing, harvesting and delivery of the fruit to the railroad station.

In order of importance as regards expense, spraying ranks as fifth on the list and amounts to only 7 1-2 per cent. of the whole cost involved in producing a barrel of apples for the market. This orchard, by reason of its isolation and the careful attention that it receives in all respects has, during the past five years, required only two sprayings during a season. The practices in this respect are unusual and perhaps not a safe guide for many orchards, even in the same community. If one or two more foliage treatments were made the cost, on the basis of past experiences, would be approximately 9 1/2 to 13 per cent of the expense of raising a barrel of apples. None of these amounts seem large compared with the benefits derived from spraying.

Considered in the light of the productiveness of the above orchard and the losses sustained by many growers in their plantings from injurious insects and plant diseases, it appears that more money could well be invested in intelligent spraying. Some growers would undoubtedly derive great financial benefit by having more spraying rigs and additional crews of men, if conditions exist so that both men and horses could be profitably employed when their presence is not needed in the orchard. Others would find opportunities for economizing time during spraying operations and for developing higher standards of work by using machines of larger capacity and power than are frequently employed. In this connection it is to be hoped that the

efforts to develop the efficiency of dust sprays for apple scab will succeed, as any economy of time or reduction of expense in this particular would permit of greater attention to certain injurious insects which need more serious consideration. (Applause).

At the conclusion of Prof. Parrott's address, a photograph of the audience was taken.

THE CHAIRMAN: I hope this break in the proceedings will not interfere with the questions.

MR. WASHBURN: I would like to ask whether one spraying for plant lice was sufficient or whether additional sprayings during the season are required?

PROF. PARROTT: As I stated in my talk, there are three species of plant lice that appear on apple foliage and fruit, the oat aphid, the green aphid and the rosy aphid. If the speaker had in mind the rosy aphid, we believe that the one application, when the buds are breaking, is the important treatment. Now, owing to the fact that the leaves are being curled by this species even before the opening of the blossoms, we are not certain as to the benefit derived by a supplementary treatment. To the solution of that point we shall devote considerable attention from now on. From our studies of the habits of the insect, if a supplementary spraying is given, the application should be made before the blossoms open.

MR. WASHBURN: Does it apply also to the green aphid as well as the rosy aphid, or not so much?

PROF. PARROTT: The spraying of the opening buds affords protection from all three species. Owing to the fact that the green aphid works the entire season on apple trees, it frequently happens in the case of nursery trees, or young apples, that it develops in injurious numbers during July or August. In that case I would spray again as soon as I noticed the insects in injurious numbers, because it is a question of protecting the foliage and terminal growth. The importance of spraying early for the rosy aphid is to

save the young apples from dwarfing by the insects. In all of our work we are using spraying machines of great power and we prefer rather coarse nozzles, because the increased power gives us in this case a driving misty spray. If you do not have sufficient power, then it seems to me that for most of the spraying of your fruit you should use nozzles with fine apertures. As for the plant lice, there is little question that a driving spray is more efficient than a "misty" spray.

A MEMBER: How much power?

PROF. PARROTT: The question is asked as to how much power one ought to have to kill plant lice. The amount of power depends of course on the size of the apertures of your nozzles. In all cases it should be sufficient to cause the spraying mixture to strike the insects with considerable force.

A MEMBER: What does the pressure gage register?

PROF. PARROT: In most of our orchard spraying we use from 200 to 250 pounds pressure.

MR. FROST: What size opening in the nozzle?

PROF. PARROTT: Rather coarse apertures. For ordinary orchard spraying against scab and codling moth 125 to 150 pounds is of course sufficient, but owing to the fact that we have such a large acreage and are now fighting such insects as plant lice and red bugs, we use machines of great power and nozzles with large apertures to get over the trees quickly and do effective work.

A MEMBER: Wouldn't it be more reasonable to think that a mist spray striking the back of your aphid would hold on rather than a heavy stream driven to it like a fog and covering it over?

PROF. PARROTT: Unfortunately it is not the spray on the back of the insect that kills him, it is the material that reaches his breathing organs. A good volume of spray applied with considerable pressure leaves no opportunity for an insect to escape a thorough wetting by the spraying liquid.

A MEMBER: I mean to spray solid.

PROF. PARROTT: If you cover the insects with the liquid that is all that is required, but a simple mist spray that lodges on the back of the insect might not be sufficient as it may not strike him at a vital spot or reach other insects beneath it.

A MEMBER: He has got to be drowned. (Laughter).

PROF. PARROTT: Not necessarily, enough liquid to thoroughly cover the insect.

THE CHAIRMAN: When you ask your questions, if you will rise and give your name, it will help the stenographer.

A MEMBER: I would like to have Prof. Parrott tell us about the pear psylla.

PROF. PARROTT: How many growers here are pear growers, or grow pears extensively? Judging from uplifted hands, there are quite a number. You will be interested to know that in New York more pears than ever are being planted because during the last fifteen years so many trees have died as a result of pear blight and pear psylla, and it seems if there is one line of fruit growing that has a promising future, it is the growing of pears. Unfortunately the pear has two serious pests in most pear growing sections, and these are the pear blight and the pear psylla.

In the lower Hudson River Valley we have in addition to these two, the pear thrips, a pest recently established in New York.

It is a difficult matter to devise a system of spraying of a pear orchard that will control both insect pests. Leaving the thrip out of consideration we lay a great deal of stress on the importance of disinfecting the trees of the psylla flies during November or December or at this season of the year, selecting bright sunny days when the temperature is not above 40 degrees F.

As you know the pear psylla winters on the pear trees in the fly stages, seeking preferably the cracks and crevices of the rough bark on the trunk and bases of the larger

branches, and during the days when the temperatures rise as high as 40 degrees, F., it is not an uncommon thing to observe these flies on the sunny side of the tree in great numbers. You have probably observed them under those situations.

Now then we are recommending that in orchards that are badly infested, that one go into the pear orchard during November or December, after a period of cold weather, when temperatures are rising a little, about 40 degrees F., and thoroughly spray the trees, preferably with nicotine and soap. We recommend this mixture because it is absolutely safe at that season of the year.

Now the object in advising that treatment is that the flies are then out in great numbers and are in positions where they can be thoroughly coated with the spray. If the spraying is well done, very few of the flies are left to make their appearance on the tree in the spring. We consider this spraying the chief step in the control of the pear psylla.

There is one other treatment that one can make which does not constitute an extra operation in most pear orchards where San Jose scale exists, and that is delay your spraying against the scale until the cluster buds, or the blossom buds are beginning to separate at the end. I am referring now to those little green blossom buds, when they are about ready to open up and form a cluster. However, spray before they have separated at the ends, using lime sulphur solution at winter strength, one to eight. You may think if you spray thoroughly to control the scale you would injure the blossom structures, but our experience shows that there is very little danger of injury.

You may ask, why delay the treatment until that time? The reason is this: In most years, by that time, the pear psylla has deposited all of its eggs and the eggs of the pear psylla are then very sensitive to a thorough spraying of the lime sulphur solution. These are two treatments that I

advise a pear grower who is seriously troubled with the pear psylla, to make every year.

A MEMBER: I don't know what the psylla fly looks like.

PROF. PARROTT: A great many of our pear growers in New York are having the same trouble, but just as it is with aphides, so it is with the pear psylla, efficient control depends more on knowledge of habits of insects than on a choice of spraying mixtures. I do not believe any pear grower or any apple grower will ever control pear psylla or aphides unless he grasps thoroughly the whys and wherefores of the treatments. If a man does not know the psylla fly, does not recognize it when it appears on the tree and is not able to judge the exact conditions for making the treatment, then certainly he is seriously handicapped as far as effective spraying work against such a pest is concerned.

A MEMBER: No matter how thoroughly I spray, if I have got a neighbor who does not spray, there are enough insects over from his trees to re-infest mine.

PROF. PARROTT: That is a serious difficulty and is one of our great problems in western New York, especially in the region near the Niagara River, where extensive plantings adjoin each other. All you can do under those circumstances is to encourage co-operative spraying. I do indeed feel sorry for the owner of a pear orchard who has neighbors that pay no attention to spraying and neglect their trees with respects to the pear psylla.

MR. PERKINS: I would like to ask if soluble sulphur is a substitute for lime-sulphur under those conditions? Also if you use Black Leaf 40 with arsenate of lead?

PROF. PARROTT: Are you referring to spraying for aphides or to treatments for the pear psylla?

MR. PERKINS: Well, both the Black Leaf 40 in connection with the aphid and the soluble sulphur in connection with the psylla.

PROF. PARROTT: This soluble sulphur is not a lime-sulphur preparation but is a sodium sulphide. As I said in

my preceding remarks, sodium sulphides especially when combined with arsenate of lead, are much more injurious to green tissues than is lime-sulphur. You certainly cannot afford to make the combination with arsenate of lead and I would not advise a very heavy spraying with sodium sulphide at winter strength upon pear buds or apple buds in those stages of development, or when green tissues appear. When buds are only a little developed and are still protected by the winter bud scales, you can apply the soluble sulphur at that time, but if you wait until the green tissues appear and use the soluble sulphur at full winter strength you may seriously injure the green tissues.

A MEMBER: Do you always apply lime-sulphur with the driving spray?

PROF. PARROTT: I hope you do not misunderstand me when I speak of a rather coarse driving spray. It is not one of those solid stream or drenching sprays such as you hear recommended in the western states. We use a misty nozzle with a rather large aperture. Now then we use lime-sulphur solution entirely for all our spraying during the dormant season of our fruit trees, and it is applied under pretty high pressure.

A MEMBER: I use the Misty Junior nozzle; would you use the same disc you use for the coming months?

PROF. PARROTT: If it gives you satisfactory results by all means continue to use it. I use nozzles with large apertures in our work since by their employment we are able in a given time to apply a large volume of spray, and have at the same time a little more driving power. We have such a large acreage to spray that we have had to secure a greater output of the spraying materials. For ordinary spraying in small plantings I would prefer fine apertures for most applications, the exceptions are when fighting such pests as aphides, red bugs or psylla flies.

MR. JENKS: As the matter of soluble sulphur has been brought up, I would like to be put right on the matter. The Chairman brought out the fact that these things ought

to be figured on a basis of sulphide. As I figure it soluble sulphur is guaranteed 58%, or if you purchase a hundred pounds for \$7, you get about 58 pounds for \$7. If you purchase a barrel of lime sulphur weighing 451 pounds, you will get about 130 pounds of sulphur for the same price; therefore it looks to me as if the lime-sulphur is twice as valuable as the soluble sulphur.

PROF. PARROTT: Your figures are approximately correct. In selecting spraying materials, one should consider efficiency, safeness and convenience. Leaving out the question of convenience and putting your selection on the basis of economy and safety I should personally prefer lime-sulphur solution to a preparation that is composed of sodium sulphides.

A MEMBER: Did you refer in your answer to me to the combination of Black Leaf 40 with arsenate of lead?

PROF. PARROTT: Yes, in our spraying against the rosy aphid or pear psylla or other species of plant lice, a very common combination is lime-sulphur, arsenate of lead and nicotine solution.

A MEMBER: What proportion of each?

PROF. PARROTT: It depends on whether you are making a winter spraying or a summer spraying. For a dormant treatment, use lime-sulphur at the rate of one gallon of the concentrate to eight gallons of water, and to every hundred gallons of that add three-fourth of a pint of nicotine solution (40%). For summer spraying we add one gallon of lime-sulphur to forty gallons of water and to every 100 gallons, add three-fourths of a pint of nicotine solution (40%).

A MEMBER: I understood the Professor to say he would spray about the time that the leaf buds started, lime-sulphur, nicotine and arsenate of lead. Now, I would like to ask him if he would do away with winter spraying with lime-sulphur and whether this would take the place of it. In other words, I want to ask him the sprays he would

recommend to control the scale, aphid and codling moth, and when he would recommend those sprayings.

PROF. PARROTT: In other words, you want to know what, in New York at least, is the common spraying schedule. Most of our leading fruit growers make at least three applications during the year in the treatment of their apple trees, quite a number make four applications. The times of making these applications are as follows; the **first** one is the winter spray which is made when the buds are breaking and are showing green at the ends; the **second** treatment is just before the blossoms open. The **third** spraying is when the petals drop from the trees, and then, as I have said, some of our growers make the mid-summer spraying during the latter part of July and early August. This is our common spraying schedule. Is that clear?

A MEMBER: The point I want to get at is whether we can do away with the winter spraying for scale and substitute the spraying you recommend, using one to eight lime-sulphur when the buds begin to start?

PROF. PARROTT: Certainly, for varieties of apples susceptible to rosy aphid, as the greening, delay the spraying of the apple trees until the buds are green and the tips of the leaves of the most advanced buds are one-fourth of an inch out.

A MEMBER: Then you do away with winter spraying?

PROF. PARROTT: Yes, especially on varieties of apples like the Greenings, which are very susceptible to attacks by the rosy aphid.

A MEMBER: I would like to ask how many sprayings you would recommend for peaches and whether the leaf curl of the peach is caused by the aphid?

PROF. PARROTT: In our peach belt, there is one application that the thinking peach grower always makes, and that is early in the spring as soon as he can get on the ground, he applies lime-sulphur solution at the rate of one to eight to free the peach trees from San Jose scale and to

hold in check the leaf curl. That is probably a common practice here is it not?

THE CHAIRMAN: Yes.

PROF. PARROTT: The leaf curl is not caused by an aphid, it is caused by a fungus. There is much about the life history of the fungus that has not been worked out, but we do know that the attack by leaf curl comes on early in the spring at the time when we get the first high temperatures following winter and the buds begin to break. The object in making that early treatment is to prevent infection of the buds and if that infection is stopped, there is little danger of injury to the foliage from the disease.

Now then, the other sprayings; a great many of our peach growers do not make subsequent applications, but in those sections susceptible to attacks from plum curculio and from peach brown rot, they either make an application of arsenate of lead when the petals drop from the trees, using the lead alone, or they apply Scott's self-boiled lime-sulphur, eight pounds lime and eight pounds sulphur to fifty gallons of water. To every barrel there are added two pounds of arsenate of lead. Another application is made when the husks drop from the young fruit. The poison of course destroys the curculio while the sulphur controls the rot. When both pests exist use the combined spray.

A MEMBER: In spraying for the peach curl do you wait for the green to appear?

PROF. PARROTT: No, we spray in New York just as soon as the freezing temperatures are over and it is safe to drive on the ground, that is as soon as you can safely move about the orchard following the thawing and melting of the snow. The object in spraying so early in the case of peaches is to prevent that early infection of the leaves by the disease-producing organism. One ought not to wait until the buds are green, because there is great danger of infection in the meantime.

Now then, just one more point; In making my outline for a talk here I really intended to tell you of what has been

done in New York during the last two years in the matter of fall spraying to combat leaf curl. I am not making any recommendations regarding its merits, but you will be interested to know that owing to the difficulties experienced by some of our peach growers who spray their peach trees in the spring to get the treatment done in time, experiments have been made both by growers and experimental workers to determine what could be derived by way of protection by fall spraying. Quite a lot of experimentation has been done along this line and for two years now excellent protection has followed the fall spraying of peach trees.

MR. LEWIS: In spraying for green aphid when it appears in July or August on young trees, what solution do you use?

PROF. PARROTT: There are a number of mixtures that can be used to fight green aphid on young trees. For instance, soap twelve to twenty pounds, to 100 gallons of water, or nicotine solution, using three-fourths of a pint to 100 gallons of water and four pounds of soap.

MR. LEWIS: Is it preferable to use the two?

PROF. PARROTT: In the case of nicotine solution, I would always use soap in order to give it adhering and spreading qualities. Nicotine solution itself does not adhere and spread well over the insects.

A MEMBER: I would like to ask a question right there; would you use soap with the lime mixture, arsenate of lead and nicotine?

PROF. PARROTT: No, this is a case of incompatibility of spraying materials; if you add soap to lime-sulphur solution there is danger of nasty paste-like mixture which prevents the discharge of the spraying material through the nozzles owing to the clogging of the suction strainer.

A MEMBER: Does the same apply to arsenate of lead?

PROF. PARROTT: Arsenate of lead can be mixed with lime-sulphur.

A MEMBER: But do you get the clogging solution from the soap with arsenate of lead?

PROF. PARROTT: Not so much that, but you may have soluble arsenic which may burn the foliage and cause considerable injury.

MR. WALKER: Can you tell us whether dusting of apple trees has arrived at any feasible stage?

PROF. PARROTT: One of the discussions at our recent meeting of the New York State Fruit Growers' Association that aroused a great deal of attention was the report dealing with dusting from the standpoint of the control of insects and plant diseases of the apple orchard. I would say that in the main the problem is yet in the experimental stage, but sufficiently encouraging results have been attained to warrant a continuation of the work. Some growers are going to use a dust spray for the control of apple scab and the codling moth, using a material composed of 85% of finely divided sulphur and 15% of fluffy arsenate of lead.

They will probably make two applications, one before and one after blossoming to protect the trees from apple scab and codling moth. From the standpoint of the treatment of a commercial apple orchard one great defect of dust spraying is this, that nothing has been devised that will control the San Jose scale, plant lice, red bugs and other insects of that character, so at present our fruit growers have got to use liquid spraying machinery and liquid sprays and what is done along the line of dust spraying should be regarded as supplementary to our usual practices.

A MEMBER: How would you combat the railroad worm?

PROF. PARROTT: I am sorry to say that I have had no experience with that pest. One of the remarkable things regarding apple growing in New York is that the control of the railroad worm is not an important question in western New York. In the Hudson River Valley, in occasional years, it does some damage. During 1915 it was more injurious than ever before in the 16 years I have been in New York.

Now, those who have worked on this problem in New

Hampshire and Vermont recommend the picking up of the drops and wind falls or pasturing of the orchard with hogs, sheep, etc., to consume the fallen fruit. We have one entomologist in New York who claims that the best way of fighting the railroad worm is to spray the trees with molasses and arsenate of lead, and he is recommending this method. Have you tried that? It seems that in western New York systematic cultivation of the trees and thorough spraying of the orchards has exerted some influence on the pest; if not, then why is not the apple maggot more in evidence.

THE CHAIRMAN: Suppose we call on Mr. Frost over here for a discussion on this question and rest Prof. Parrott just a minute.

MR. FROST: I believe that the arsenate of lead is helping to control the railroad worm and the reason they are not troubled with it in western New York is because the spraying is so very general. I recommend, where I find it, the destroying of the fruit on the ground and also very thorough spraying of all the trees.

THE CHAIRMAN: Is Prof. Wolfe in the audience? Can you tell us about that?

PROF. WOLFE: Why, I consider that the arsenate is helpful in this way, it keeps the fruit on the tree. I think that has a lot to do with it, not that it kills any of the insects directly, but indirectly helps to get rid of them. Prof. Jenks has done this work principally and he found they did not get very definite results by using the molasses solution and lead arsenate. I think one of the recommendations where a man has poultry is to keep it in the orchard. I think with 200 or 300 hens to the acre they get pretty nice results.

THE CHAIRMAN: I heard Mr. West of Vermont speak on this subject last year at the Vermont Horticultural Society Meeting. He had been quite successful in controlling it and said his method was to spray in July with arsenate of lead to which he added a gallon of maple syrup. I sug-

gested that was a sacriligious use of maple syrup, but it seemed to be quite effective.

A MEMBER: I would like to know whether that can hurt our bees?

THE CHAIRMAN: We will call on Prof. Parrott to answer that.

PROF. PARROTT: You probably know that in New York there are large plantings of the sour cherry and we have two species of flies with similar life histories and habits, that attack cherries in much the same manner as the fly is very injurious to apples in the New England States. It is a fact that a great deal of protection is derived by applications of arsenate of lead and molasses in the case of cherry orchards, and while I have made no study at all of the apple maggot. I have never been able to understand why if the treatment is of value against cherry maggots, it does not exert some influence against the apple maggot.

A MEMBER: I had supposed that that would control that insect because I have been for a great many years interested in the control of the fruit fly, watching the literature and the results of the work carried on in South Africa, and I know they have had very remarkable results with that sweetened lead arsenate mixture, and I had supposed we would get similar results with this similar species.

PROF. PARROTT: I know Prof. O'Kane had not obtained satisfactory results and that is the reason I handled this question so cautiously. I have had no experience with the apple species but there is no question at all that in the case of sour cherries, much benefit is derived from the sweetened spray. With regard to the honey bee, Prof. Caesar of Ontario who developed the methods for protection of sour cherries states that he has noticed no ill effects of such application on bees.

A MEMBER: Why do you use the arsenate of lead?

PROF. PARROTT: The question is, in making that last spraying, when the buds are breaking, using lime-sulphur, nicotine and arsenate of lead, why you use the arsenate of

lead. In a great many cases the arsenate of lead is not necessary, but in those sections where one is troubled with bud moth, case bearers and green fruit worms, the addition of arsenate of lead is desirable in order to control such pests.

MR. FROST: Previous to the very general spraying with arsenate of lead the railroad worm was very abundant in eastern Massachusetts, but during the last five or six years I have hardly seen a railroad worm in eastern Massachusetts. However, I find any quantity of them in the western part of the state and in Maine and New Hampshire, which are not in the areas where the spraying is very general, and I drew my conclusion more from that fact than anything else. But aside from that there is a point that I would like to call to the attention of the people. We hear so much talk about these worms and aphids, but there is one other trouble we are having here in New England that is doing more damage than all of the bugs put together; whether it is caused by spraying or not spraying is a question I would like to have someone answer. I refer to the scald on the apples. Apples placed in storage in perfect condition in October come out in February looking like rotten apples, although it is only skin deep. I have never heard of anybody speaking of that except to cite the fact, but no one tries to account for it. If Prof Parrott can give us any information on that subject, I would like to have it.

THE CHAIRMAN: This evening we are to devote to the subject of marketing and will have a number of commission men here at that time and will probably have more people in the audience who can answer satisfactorily at that time.

A MEMBER: What form of arsenate is used, powder or paste?

PROF. PARROTT: In New York both forms are being used. I think by most growers preference is given to the paste form of arsenate of lead, although every year increasing numbers of our growers are using the powdered arse-

nate of lead. One of the astonishing features at our last meeting at Poughkeepsie was the fact that growers in the Hudson River Valley seemed to be against powdered arsenate of lead, when in previous years they were in favor of it. It seems as though their attitude toward powdered arsenate of lead in that case was developed by the fact that they had been using during that season one or two grades of powdered lead which were rather coarse, apparently settled quickly; in other words the material was a coarse powder. You do not wonder that after an experience of that kind with powdered arsenate of lead, they returned to the use of paste arsenate of lead. Now when it comes to relative efficiency, I think there is no question at all that one is just as efficient as the other. If you are going to use powdered arsenate of lead, secure one of those grades of the finely divided, fluffy sort and avoid those grades in which the powder is coarse and shot-like.

A MEMBER: I would like to ask Prof. Parrott if he can give us anything on the new arsenate spray or arsenate of lime?

PROF. PARROTT: Well, there are two arsenical preparations that have come to the front in recent years, calcium arsenate and zinc arsenite. When you consider cost and economy and safety, neither are to be preferred to arsenate of lead, at least for fruit trees.

A MEMBER: I understood that the lime arsenical is a cheaper form.

PROF. PARROTT: It is somewhat cheaper and yet for the spraying of orchards it is not regarded quite as safe as the arsenate of lead. In the case of potato spraying, I believe calcium arsenate or zinc arsenite might be preferred to arsenate of lead, because their toxic properties are manifested more quickly than that of lead arsenate, but for orchard use I think preference is still to be given to arsenate of lead.

A MEMBER: The sinuate borer has become a considerable pest.

PROF. PARROTT: The questioner comes from New York and as has been previously mentioned, the borer is a pest hardly known to Massachusetts growers.

THE CHAIRMAN: We will be glad to help him out, though by your answer even if the gentleman is from New York. Go ahead.

PROF. PARROTT: A recent survey by the Geneva Experiment Station has revealed the interesting fact that three new pests are being established in New York, namely the sinuate borer, the leopard moth and the citrus mite. The sinuate borer is a boring insect, which works in much the same manner as the round-headed or flat-headed borers. It is established in five of the fruit growing counties, contiguous to the Hudson River, but it does not exist in western New York. The leopard moth ranges over the same territory while the citrus mite, a common species in Florida and California, has now made its appearance about Rochester. This is the first record of its appearance east of the Rocky Mountains as a pest of apples, pears and plums.

A MEMBER: I would like to ask if you have had any experience in dipping or spraying fruit after gathering, before putting it in barrels?

PROF. PARROTT: There is such a practice in California where citrus fruits are treated before being packed, but as to a treatment of deciduous fruits, I do not know of such a practice.

A MEMBER: Harrison suggests it and adopts it.

PROF. PARROTT: It is a common practice with lemons and oranges, I believe, but if there is a treatment for our common fruits I have evidently overlooked the fact.

MR. JENKS: How many pounds ought we to use of sulphur in 50 gallons of water to control the San Jose scale, and also what means have we of determining the dilution we should use in lime-sulphur? Apparently the old Beaumé test is not accurate.

PROF. PARROTT: That is a difficult question to answer, because there is no definite standardized strength

of solution to control San Jose scale. You can use lime-sulphur at various strengths and yet get very satisfactory results in controlling that pest. We figure that about 27 to 28 pounds of soluble sulphur to 50 gallons of water gives you about the same amount of efficient sulphur as $5\frac{1}{2}$ gallons of lime-sulphur solution. Now then, as regards the testing of lime-sulphur solution, I do not know of any test other than that one of using proper amounts of sulphur and lime according to approved formulas or to employ commercial concentrates of guaranteed densities. You may have some other tests in mind that I know nothing about.

THE CHAIRMAN: Aren't you pretty safe if you buy from reputable dealers, on the Beaumè test?

PROF. PARROTT: Yes, in New York we find as the result of our inspection of fungicides and insecticides, that our commercial solutions are very even in their strength. They are conforming to the standard of about 32 to 34 degrees Beaumé, and the amount of sulphur in them ranges in the neighborhood of 130 to 135 pounds. In New York we no longer test the commercial concentrates.

MR. JENCKS: Would you recommend making your concentrated lime-sulphur at home? There has been a slight movement in that direction in Massachusetts.

PROF. PARROTT: Well, I would say as far as the Experiment Station is concerned, we make our own concentrate. Quite a number of fruit growers are doing the same thing. Five or six years ago there was more of a tendency on the part of the fruit growers to make their own lime-sulphur solution, but in recent years, owing to the low price of the commercial product, I think fewer orchardists, comparatively speaking, are making their own preparations.

MR. JENCKS: Can you make as good a solution and is there a saving?

PROF. PARROTT: I do not think there is a great saving by making your own preparations. Our reason for making our own preparation at the experiment station is that we have the equipment and do make a satisfactory product, at

least as far as the control of San Jose scale and various other pests are concerned. As stated, I do not think there is very much economy in making your own preparations.

A MEMBER: Oft times, in the spring of the year, spraying is delayed on account of weather conditions. If that spraying was delayed until the leaves showed green, would you use the dormant spray as late as the time when the leaves show green?

PROF. PARROTT: If the San Jose scale is in your orchard, and rather than omit the treatment, I would spray with lime-sulphur solution winter strength, taking the chance of slight burning of the foliage. Leaves can stand considerable burning without any ill effects on the crop. I know growers in New York who spray lime-sulphur solution at winter strength when you can see the pink in the blossoms and there is sometimes some burning of the leaves. But when the leaves are fully expanded the little burned area of the unfolded leaf is very small as compared with the whole leaf area.

A MEMBER: What time would you spray for the apple scab and is more than one application necessary?

PROF. PARROTT: Yes, more than one application is necessary. In New York there is an increasing tendency to make more applications for apple scab and the principal treatments are just before blossoming and after blossoming. If we have a period of low temperature and considerable precipitation for the third or fourth week after the dropping of the petals, quite a number of our growers slip in an extra spraying at that time.

A MEMBER: Can you tell me what causes the so-called water core in April, not exactly water core, but it extends from the skin to the core and is more prevalent in the King apple?

PROF. PARROTT: I cannot answer that question. It is a physiological disease and I do not think the nature of the trouble is well understood. Apparently we know no method of preventing the trouble.

MR. SMITH: With regard to the railroad worm, it seems to be settled that because there are fewer railroad worms where the arsenate of lead is used, that therefore the arsenate of lead has killed the railroad worm, but that does not necessarily follow. It may be assumed just as well that they have been killed by more complete culture. I cannot see how the arsenate of lead is going to kill the fly unless it eats some of it which I believe it does not. A great deal has been said about this spray nozzle; if you are going to do some spraying, you cannot do as much with the disc nozzle as you can with the Bordeaux nozzle.

A MEMBER: Mr. Smith thinks you are likely to give too much credit to arsenate of lead rather than to better culture and apples picked up.

MR. DAVENPORT: I wonder if using lime-sulphur at winter strength when the buds are breaking would not be sufficient without adding the nicotine?

PROF. PARROTT: It is a belief by some workers, especially a number located in the Pacific Coast states, that the application of lime-sulphur at winter strength is fatal to the eggs of the apple lice. In New York, where we have sprayed for eight or ten years extensively with lime-sulphur solution, thorough sprayings with that mixture have not given us protection from the plant lice. For that reason we have been working on a different system of treatment and have come to the conclusion that it is better to make a combination of lime-sulphur and nicotine as I have previously explained.

MR. DAVENPORT: I think you have missed the point a little bit; if you delay your scale spray until after the buds have broken at that time the eggs are hatching, and if lime-sulphur is applied when the eggs are hatched or hatching, would it destroy them without the use of nicotine?

PROF. PARROTT: Lime-sulphur is not a very efficient spray for the eggs or young nymphs of the apple plant lice. If you make the combination of lime-sulphur and nicotine

you get a very efficient mixture for both scale and plant lice..

A MEMBER: I would like to ask have you ever tried soluble oil for San Jose scale?

PROF. PARROTT: Yes, soluble or so-called miscible oils are among the recognized efficient mixtures for the control of San Jose scale. Quite a few growers are using them but the mass of our growers are relying on lime-sulphur for several reasons. In the first place, there is no danger from lime-sulphur as far as the trees are concerned; then again lime-sulphur has fungicidal properties and lastly you can combine lime-sulphur with arsenate of lead and nicotine. In the case of these commercial oils, they are all right as far as the control of the San Jose scale itself is concerned, but they may prove injurious to the trees in case one is delayed in his spraying operations and has to spray the trees when the buds are breaking and the green tissues are showing. In the case of peaches, there is no fungicidal properties in miscible oil to control leaf curl, or to prevent scab on apple trees. I class miscible oils among the efficient sprays for the scale but one ought to understand their limitations to know how to use them satisfactorily.

I would like to ask have you ever tried them for green lice?

PROF. PARROTT: The question is can you rely on miscible oil to destroy the eggs of the plant lice. We have only one experiment. and while there was a certain percentage of the eggs of the aphid killed by miscible oil and by various home-made emulsions, we did not get complete protection for the trees.

A MEMBER: I would like to know the best method for controlling the tent caterpillar, the brown-tail moth and the gypsy moth.

THE CHAIRMAN: It is too much for Prof. Parrott and he turns it over to Mr. Frost.

MR. FROST: I think Prof. Parrott might answer that question. It is pretty difficult. anyway, because you take

three insects that cover a long season. The arsenate of lead will kill any one of them if it is applied at the right time. I think if you follow Prof. Parrott's suggestion for dormant spraying just before the cluster buds open, you will reduce the tent caterpillar to a great extent. I should not advise anyone to leave the control of the brown-tail moth to the spraying, because you will want to put your spraying off until the proper time for the codling moth, the gypsy moth and the canker worm, and it will be too late to save the trees from the work of the brown-tail moth. If you have those three insects, my suggestion would be that you remove all the brown-tail moth nests in the winter by cutting them from the trees and burning them. Spray with a dormant spray just before the leaf buds open and spray very thoroughly with a strong solution of arsenate of lead just after the petals have fallen; add whatever mixture you use for fungus control.

A MEMBER: I would like to ask Mr. Frost what he calls a strong solution, how many pounds of arsenate of lead would he dare to use with 40 or 50 gallons of water.

MR. FROST: That is to control the brown-tail moth?

A MEMBER: Yes sir.

MR. FROST: I would suggest that you do not depend on the spraying for the brown-tail moth. The brown-tail may be killed much easier than the gypsy moth. I spray my own orchards which are in a badly infested gypsy moth area, using arsenate of lead of the strength of one pound to ten gallons of water at the weakest. I should prefer to use one to eight.

A MEMBER: I would like to ask if the brown-tail moth and the tent caterpillar do not work about the same way.

MR. FROST: They do, they work together, but if you spray for the tent caterpillar and the brown-tail moth, it will be necessary to spray before the foliage is all out and when the gypsy moth hatches you have got new foliage that has not been covered by the poison. After these insects have reached a certain size, they will eat quite an amount of

foliage that has been covered with spray before they are killed. To illustrate what I mean in that case, my rules for the gypsy moth spraying are: to commence with arsenate of lead at the rate of one pound to eight or ten gallons of water, and every ten days I increase the strength by reducing the amount of water two gallons, but you will have trouble if you try to control those three insects with one spraying. In fact, if the infestation is bad, I do not believe you can save your foliage.

A MEMBER: I would like to ask a question about the control of the pear psylla. Mr. Parrott says it is easy to control it with oil.

PROF. PARROTT: Miscible oil and nicotine and soap are two of the treatments we recommend for the winter spraying of trees to destroy the flies that may be on them. After the green tissues appear you cannot use miscible oils. Use miscible oils in the usual proportion, about 1 to 15 or 1 to 20, to destroy the flies that happened to be on the trees in the dormant state; when the green tissues appear, use nicotine and soap.

A MEMBER: I would like to ask Professor if he has ever used Sealcicide for the pear blight?

PROF. PARROTT: No.

A MEMBER: I think I have been helped a good deal by the use of this in my orchard.

PROF. PARROTT: We have had no experience with that mixture for combating that disease.

A MEMBER: I would like to ask the professor if he knows of anything that will help stop the canker, in apple trees especially.

PROF. PARROTT: The method they are following in New York for fighting apple canker and pear blight is to encourage fruit growers to examine their trees during the late fall and spring for hold-over cankers on the trees and cut them out and disinfect the wounds with corrosive sublimate or copper sulphate solution. In case of fire blight of blossoms it is advised that the pear grower go through

his orchard at the time of blossoming and examine his trees from week to week for the appearance of blight in the clusters. If they are turning brown or blackish, and gradually dying back, remove such and destroy them. Every time a saw or knife is used, one should disinfect the tool with corrosive sublimate before cutting into another area of the tree.

A MEMBER: I would like to ask if fruit raised on the tree with canker affects the apples any?

PROF. PARROTT: As far as I know, the fruit is not generally affected in the same way as the wood is, but fruit infection does occur. There is another disease, sphaeropsis malorum, or New York apple canker, which causes cankers on trunks and limbs, and rotting of the fruits, but it does not produce canker of the fruit. Does that answer your question?

A MEMBER: What does that disease look like?

PROF. PARROTT: Well, the disease in the case of the trunk and the larger branches causes great roughening of the bark, depressed areas and swellings, followed by death of the tissues. In the case of the apple itself, it is a sort of a fruit spot which causes rotting of the apple. If there is a plant pathologist here, he could describe this more accurately.

A MEMBER: Have you noticed honey bees, whether they scatter the germs from blight and fungus in the orchards or not?

PROF. PARROTT: Prof. Waite, one of the authorities on pear blight believes that they are instrumental in carrying the bacteria that produce the disease. It is believed also that other insects, especially winged sucking insects like aphides, leaf-hoppers and psylla of one sort and another, convey this disease. I believe that epidemics of this disease often follow in the wake of outbreaks of insects of this character. During the past year we have had more fire blight than usual in pear plantings and in apple orchards and there is good reason for believing that plant lice and

leaf-hoppers have infected apple and pear fruit with the destructive organism.

A MEMBER: What would be done to overcome strawberry leaf spotting?

THE CHAIRMAN: Has anyone here had experience? Mr. Margeson, what do you do for it?

MR. MARGESON: I am not an authority on it.

THE CHAIRMAN: Our custom is to spray once before the blossoms come out and once right after the blossoms, in bad cases; usually that will control it perfectly. If you live in a section where it is especially bad, it might be necessary to increase the number of sprays.

A MEMBER: Spray with what?

PROF. PARROTT: Bordeaux mixture.

A MEMBER: In disinfecting wounds in the winter, what do you use?

PROF. PARROTT: I cannot answer the question because our New York fruit growers are not so ambitious as to desire to do such work in orchards during freezing weather.

A MEMBER: The reason we do that is because we do not have so much to do then as in the spring.

A MEMBER: Put 15 or 20 per cent. of alcohol in your mixture.

A MEMBER: We tried alcohol and it burnt bad, I did not think it was practical on that account.

PROF. PARROTT: I do not think in the 16 years I have been in New York, that that question has ever been asked, but as a matter of fact most of our growers are not so ambitious as to want to doctor their trees in that kind of weather.

A MEMBER: Is not one gallon of lime-sulphur and four pounds of arsenate of lead to fifty gallons of water too strong for peaches to control leaf curl?

PROF. PARROTT: In New York we would not dare use that combination, or concentrated lime-sulphur solution on peach foliage. Some growers once attempted to use one

gallon of lime-sulphur to fifty gallons of water, but where treatments were made at that strength, injury to foliage usually followed. It is my experience that if you have failed to make that early spraying with either the lime-sulphur solution or the Bordeaux mixture as the buds are commencing to swell, you have missed your opportunity to combat that disease. I do not know of anything you can put on the trees when the disease is thoroughly established in the foliage which will afford any protection to them. I would not recommend your formula for spraying as you suggest when leaves are expanded.

A MEMBER: Is formaldehyde an equally good disinfectant?

PROF. PARROTT: I think it is used, but the treatment of cankers is out of my field. I have heard our plant pathologist recommend corrosive sublimate and copper sulphate solution.

A MEMBER: Have you had any experience with clover mite on apple trees?

PROF. PARROTT: I have not had a great deal of experience with the pest. I was especially interested in this discussion this morning regarding the presence of mites on raspberries, since we have several species of red mites, including the one you mentioned that attacks both bush and tree fruits. As regards apple orchards, I have always said that the man who sprays thoroughly with lime-sulphur solution at summer strength ought to have no trouble with clover mites, providing he sprays thoroughly, covering the upper and lower surface of the foliage. In the Hudson River Valley they claim it is impossible to protect raspberries from mites by that spraying, and yet in western New York in apple plantings I have been as thoroughly convinced as any man could be that spraying with lime-sulphur, using one gallon to 50 gallons of water has protected apple foliage, providing one sprays thoroughly and covers all surfaces of the leaves.

THE CHAIRMAN: Now, friends, we have kept Prof.

Parrott on his feet for about two hours and a half, steady. I don't know but what we ought to consider that we have got our money out of him. Naturally, after we adjourn, a lot of you will come up with individual questions, and if we are going to keep him talking at the table, we might as well have the questions public and all get the benefit of them. If any of you have questions that you think ought to be answered, let us have them, don't let him escape, but I think we ought to be as merciful as we can.

A MEMBER: How do you control sooty blotch?

PROF. PARROTT: There was more of this disease than usual in New York on account of the extensive precipitation during the late summer. It was very abundant in the sections along the Hudson River Valley and in the fruit growing belt near Lake Ontario. Thorough spraying with lime-sulphur late in the summer controlled the disease very satisfactorily.

A MEMBER: We sprayed July twenty-sixth, but still we did not control it.

PROF. PARROTT: Didn't the disease develop at a later date in your case?

A MEMBER: Yes.

PROF. PARROTT: That was our experience in New York and fruit growers that made their usual summer application early in July or during early August did not entirely protect their crop, but those who repeated their spraying later got considerable protection. Your experience is just like that of a good many growers in New York.

MR. FROST: I would like to ask Prof. Parrott one question that might help in concluding his talk to us—he has given us so many excellent points—that is, if he has ever seen any poor results from over-spraying?

PROF. PARROTT: I never have and the whole tendency in New York today is either to make more applications in our commercial apple orchards and other fruit plantings or to spray more efficiently, taking more time to thoroughly wet all surfaces of the trees and using more

spraying material. The need for more efficient spraying practices has been driven home to our fruit growers because of the great losses they have had, especially from apple scab. Then again our packing law has strongly impressed on the minds of our growers, that it is one thing to produce a great bulk of fruit but it is another thing to raise large crops that are free from blemishes by insects and diseases. Choice fruit only comes from orchards that are well sprayed.

THE CHAIRMAN: Now, Mr. Frost has suggested that we let that be Prof. Parrott's peroration, and perhaps we had better take his suggestion and stand adjourned until this evening at 7.30.

EVENING SESSION 7.30 O'CLOCK.

President Sears in the Chair

THE CHAIRMAN: Ladies and Gentlemen: We had a splendid session this afternoon, on a live topic, and I think we have a particularly interesting and valuable one for tonight.

Most everyone that talks to you off-hand about these things will tell you that we are further behind in the matter of marketing our fruit than anywhere else. That has been brought out several times at our meetings here. It is one thing all of us need to learn about, this question of marketing. Most of you are aware that New York has been doing things in the matter of marketing, things that we might very well take an active interest in at least, if not copy after.

We are very fortunate indeed this evening, to have a man talk to us who knows what they have been doing and who is going to tell us what they have been doing. I know in a general way, but as he can tell us so much better, I am not going to make any speech on that end of the subject but merely to indorse heartily the idea that this is a phase of the subject we need to study and study as carefully as possible, so I am going to introduce the speaker of the evening, Mr. H. A. Emerson, Deputy Commissioner of the Department of Foods and Markets of New York City, who is here to take the place of Commissioner Dillen, who was unable to come. Frequently it is disappointing and unfortunate when the speaker cannot get here; we are all sorry Commissioner Dillon cannot be here, but we are all mighty glad that Mr. Emerson is here and I have heard those who heard his speech at Rochester say that we have certainly a treat in store for us.

I have great pleasure in introducing Commissioner Emerson, who is going to talk to us on the subject of Marketing. (Applause).

MARKETING

Deputy Commissioner H. A. Emerson, State Department
Foods and Markets, New York City

MR. EMERSON: Mr. President, Ladies and Gentlemen:

It is always a great pleasure to visit neighbors, especially the near neighbors, and those that speak the same tongue that you speak and have the same interests that you have.

Over in our state we are peculiarly neighborly people. We even at some times think that we ourselves go to extremes. Sometimes our girls seem to think more of the neighbors' boys than of their own brothers and occasionally the boys seem to think more of the neighbors' girls than of their own sisters; so it is not at all strange that we are deeply interested in the people in Massachusetts. I can assure you that I am glad to be here. For your part I am sorry that the Commissioner is not here in person, but there are many duties to perform in his office which he is holding and he is a very busy man and so long as he has sent me here, you will have to make the best of it. (Laughter).

Last night it was my pleasure to speak in Toronto, Canada, and I visited that great camp of the soldier boys there and I thought how much better off we were here in the States not to be embroiled in the war. It is not a very pleasant thing to see these young men training and to think that in a few short weeks they will be over the sea fighting, many of them never to return and many to return maimed and wounded, and I think that this country is especially blessed to be at peace with all the world and I for one hope and trust and pray that it may continue so for years and years to come, with honor and with credit to itself. Under no other condition would any good American wish it.

This subject that we are to discuss this evening is one that everybody is deeply interested in. If there is a question that is of as much interest to consumer as to producer, it is

that of a better marketing system. That is what we all want.

Franklin told us that everything that could be worked out correctly theoretically could be worked out correctly practically if it was gone about right, so we are endeavoring to go about this subject of marketing correctly. We are trying our utmost to do that which is for the best interests of the consumer and the producer.

This is a very progressive organization; some want to go faster than others; that is why we had a progressive party for a time, they were not satisfied with the old machine and they tried the new one.

Now, in marketing, we are working along lines today in most of the states and most of the cities that we have been working along for a great many years. If we have a market and market people and a market system that we are absolutely satisfied with, then there is not much use of changing, but there is always a dissatisfied element apparently among the American people, no matter who is in office or what the case may be. There are usually two sides to the question and somebody to take up and discuss both sides of it earnestly and honestly.

You want to know what we have been doing over in New York, and then like all good Yankees, you want to know why we have been doing it and how we have been coming along with the doing and what lesson it may teach and what you may learn from it, and I will tell you in a few moments' talk why we are doing what we are doing and what we expect to do in the future.

About 25 years ago the Granger movement in this country was at its height; everybody was deeply interested in eliminating the middle man, they did not have any particular set system or method worked out, and without a system or a good plan, or the proper direction, the success was not great, but they should not be discouraged at that.

It was in 1821 that the first convention was held in Baltimore to do away with slavery. Practically every man

who sat in that convention, if not every one, was dead before slavery was done away with, yet those people who met there in 1821 were right in their conclusions, but the time was not ripe and they were obliged to wait for years and years for the change; but now-a-days we change more rapidly, quite more rapidly than we did in those earliest days, and if this marketing system is to be changed, it will be changed promptly. The American people, while they are not all from Missouri, yet they have the habit of the Missourian of wanting to be shown and when they are shown they do not hesitate and do not wait.

In that early day when those people met in Baltimore, most of our forefathers were riding about here in Massachusetts in ox-carts, and now our sons are not very well satisfied unless they have a twin six Packard or a machine of equal power. (Laughter).

Is there an ox-cart system at work in the marketing of food-stuffs? Is that the reason some people claim that the producer is getting about 35 cents of a dollar, that the consumer pays for what he produces? We all know the story of the 17 year old market-garden boy down in Staten Island that quarrelled with his father who was bringing the vegetables over from Staten Island to New York City; we know his record; he dreamed his dream and then he went about in his systematic, methodical way, as he pleased, to work out those dreams that he had dreamed, and that is how we came to get the New York Central Railroad and that is where the foundation of the Vanderbilt family was laid, but had he been absolutely satisfied with his market garden business he would never have developed the New York Central Railroad nor the millions upon millions of dollars that he earned for himself and his heirs.

Out in Cleveland we had a man engaged in this food business. He was energetic, deeply interested in handling apples and cabbages and turnips just as many of you are and just as I have been and as I am, in New York City, but he dreamed his dreams and went to work them out in a scien-

tific manner, and as a result we have the Standard Oil Company and 21 years ago Mr. Rockefeller was worth a hundred million dollars and since that time he has made enough, riding on the ear between Cleveland and New York City and playing golf, to be worth over a billion dollars. Very few of us think he has earned that amount in the last 21 years, but we would have taken it too if we had had the opportunity, but we lacked the opportunity and foresight.

But we do not want to keep on making Vanderbilts and Rockefellers at the expense of the common people. If they have set us a splendid example how to make money, how to work together, how to co-operate, how to organize, how to have our corporation, how to do things on an absolutely economical basis, then it is better for us to imitate them before it is too late, it is better for us to get in line with modern methods.

It is only a few short years ago since Massachusetts sent to that western city in which I was born, a wonderful man, a magnificent character, a man who entered at once into the food distributing business. I refer to Mr. Swift. He did a great work for the people of that country out there, established and opened markets, bought their goods, did a great deal for the consumers throughout this country, gave them the very best products that could be produced from the hogs and cattle and sheep that he bought in the west. He accumulated a great fortune and left a splendid family of sons and a splendid daughter, who are still carrying on that magnificent business. It is highly co-operative, a splendid example of what can be done; but in this food business that we are in we have no great master minds that were working for the common people. The examples you have seen are of men who were out for personal gain, for the gain of the corporation of which they happened to be the head.

Though this agitation has been going on for the last 25 years, about four years ago in New York State we reached a point where the Grangers, the New York State agricultural

societies and other kindred organizations said to the Governor: "We want a commission appointed, we want an investigation made, we want to know if it is not possible to bring about a condition where our consumers will not have to pay such high prices for foodstuffs and on the other hand we want to know if the producers in our state and without our state who patronize our markets are receiving a fair return for their products."

Governor Dick appointed the commission. He appointed William Church Osborne, a splendid man at the head of it, and on that Commission were two or three other good men, splendid men, earnest men. One of them was my friend Tuttle, a man for whom I have great regard and of whom I am extremely fond, and that Commission, after sitting several months reported that there was a waste between the dock in New York and the consumer of \$150,000,000. annually in the foodstuffs that were handled there. Was it any wonder that the consumer was complaining and was it any wonder that the producer was complaining?

Now I was deeply interested in this investigation; I was in very close touch with it; I had the honor of furnishing all the questions that were to be asked of those who were investigated on the subject and some of them did not like those question very well. They were quite pertinent, they were questions that might have been asked by an insider or one who knew more about the business than they cared to have the wide, wide world know, but the questions were asked and the answers were given and the report made. It slept. Then a gentleman came on from Chicago, he was a big shipper of foodstuffs to this eastern country, sending millions upon millions of dollars worth every year and meeting with more or less difficulty, especially in New York City, regarding the condition in which his goods arrived, regarding the condition in which they seemed to be on account of sales, and regarding the prices returned and regarding their method of quoting prices, and this gentle-

man came down there and made an investigation. It was short and swift.

They had in New York City a live poultry market. He notified them one day that he would be there the next morning to meet them at 10 o'clock. The meeting lasted from 10 o'clock in the morning until 3 in the afternoon. Plain questions were asked and just as plain answers given. The gentleman was informed that they had plenty of money to back them up in the position they had taken, that they were making a market once a week, that the poultry was delivered and very often, consumed before that market was made, that they did not sell openly to anybody who would come but only to a few jobbers, the jobber then sold to a combination of Kosher killers, that there were 100 people in the business in New York, that no new man could break in, that the deceiving commission merchant, as he was termed and as he styled himself, and he acted the part when it came to making out the account of sales, his commission was there although he never earned it, he divided the jobber's profit of two or three cents per pound with himself; he sold to his own partner, and the jobbers on the other hand divided with the Kosher killer and then all of them pooled their issues and divided on a pro rata basis.

It worked very nicely for them but was a great hardship on the consumer and producer. They had limited the arrivals of poultry to 55 cars a week; if more arrived, they carried it over from week to week. They made the prices to the consumer very high, and one week, within two or three weeks of the time his investigation started, they charged the consumer 27 cents per pound and returned the shipper 14 cents.

There was considerable money to divide between the dealers in New York City but very little left for the producer after the freight was paid and the shipper had taken his profit out had there been any. In that particular case the shipper did not have any profit and that was why he was in New York investigating, and as a result of these investiga-

tions, a grand jury was called, a complaint was laid, and an indictment drawn, and without examining a single witness outside of the combination, three of whom only were examined, 93 indictments were returned. Not one guilty man escaped, and then the 15 richest men were picked out to be prosecuted, not the poorest but the richest, and they retained Mr. Jerome and other good capable lawyers to defend them. The trial lasted 51 days, perhaps it would have lasted longer had their money lasted longer; I never asked Mr. Jerome, but I may the next time I see him

However that may be, in each and every instance a conviction was obtained and an appeal was taken and after waiting for nearly two years, the Appellate Division of our Court, five judges, reviewed the case and unanimously decided that the lower court, Judge Rosolski and the jury of twelve men were right, that these men were guilty and should serve a term in the penitentiary, but they were not satisfied, they appealed to the Court of Appeals, our highest state court, and after another wait of 18 months, that court passed upon it and they unanimously decided that both of the lower courts were right and that these men should serve a term in the penitentiary.

They had money and they had political power, but Mr. Whitman now the Governor of New York State was at that time the District Attorney. Those men served time in the penitentiary this past summer.

Now during this time an auction sale of live poultry had been opened, a public auction where men and women gathered in a room as you folks are gathered here, and where after examining the poultry on the track in the cars, a public price was made on this poultry. Now let us see what the result of this open-auction sale was.

The price to the consumer was lowered 25% to what it had been the previous year when there were fifty-five cars on an average per week received, and what were the results? With an open market that year in New York City we sold 7500 cars of poultry, or an average of 150 carloads per

week, and how was the price to the producer? The price returned was an average of 25% more than was returned the year previous or any other year in the history of the business.

They tell you that the law of supply and demand regulates prices and so it does if it has an opportunity to operate, but if somebody has the producer by the throat with one hand and the consumer by the throat with the other, that man operates in his own selfish interests and the law of supply and demand has not a single word to say about it. That was the condition we were in in the live poultry business in New York City.

Now the United States Government was informed by a gentleman who thought that he knew those frauds were taking place upon the docks in the handling of eggs, that many men employed by the railroad companies were also on the pay-roll of the so-called commission men or wholesale merchants engaged in the butter and egg and dressed poultry business. They employed the Burns Detective Agency and at the end of six weeks they had considerable evidence. A conference was held with those who had the matter in charge and they said "Take only the rich, let the poor out of this deal, they were obliged to come in on it or go out of business." What was the result?

That some of our most prominent butter and egg dealers in the city, some men rated at a million dollars, decided it was time to celebrate the Fourth of July and burned their books before the United States Government could get hold of them. What was the further result? The men were called into Court, and were asked to place their left hand on the Bible and hold up their right hand to God and tell the truth, and they promised they would and then they were asked, "Do you know for what you are indicted here? Do you know the charges against you?" They were intelligent men, bright, brilliant business men and they answered "Yes." "Are you guilty or not guilty?" Without a single

exception they said, "Guilty", and Oh! what the Judge said to them!

No man in Massachusetts would have faced an audience again so long as he might live if he was spoken to as that judge spoke to those commission men and wholesale butter and egg dealers of New York City, and then he fined them from \$2500 apiece to \$12,500 per firm or corporation. The highest fine in case of an individual was \$6,000 or \$7,000 each. These are the results which the exposure of those conditions in New York City has brought about.

People interested in the common people, producers and consumers alike said we must have a change, those exposures are so gross and flagrant that we must not continue as we are. So they went to Governor Glynn and the legislature and asked that a commission might be appointed, that a law might be passed regulating commission men. The law was passed and the commission was appointed and it is that commission that I have the honor to represent here tonight. You want to know how did our law operate? Well, it operated as most laws do against people who are very bright and very brilliant and very determined to be crooked and dishonest; in other words it did not operate very well at all.

They immediately sent out word to all their shippers, "We are not commission men any longer." They did not say, "We have a law down here that is very stringent, very impertinent and permits the State to come in and examine our books and see what we are doing." No they did not write them that. but they said, "We are not going to handle your goods on commission any more, but you may ship them to us and we will return you a net price for them; we will allow you all we think they are worth."

The shipper had no other outlet in New York City except the regular channels and they shipped to these men under those conditions and signed contracts that they would accept those prices. Now that was a business deal that was an open bargain, and no one has any complaint to offer un-

less it be the producer and consumer. The State does not object to that bargain and if the consumer and producer will stand for it, it will probably be legal for some time to come; but what was the result?

What was the working of the other law, the Commissioner law. Governor Glynn selected a newspaperman, the publisher of a farm journal as the Commissioner. He had known him for years; he had a general reputation of being honest and if you will remember that, you older men, that was the principal asset Abraham Lincoln had, yet he made a reasonably satisfactory President to everybody.

Now Mr. Dillon was appointed and he began in his quiet unassuming manner to look the situation over. He appointed as his chief deputy Mr. Tuttle, a man who had been attorney for the street railway in New York, and a man who owned a farm on Long Island, a man who was earnest, who had his dreams and hoped to see them worked out, and possibly he will, but Mr. Dillon, being a Democrat and appointed under a Democratic Administration, was up against a Republican Governor and a Republican Legislature, and this was a brand new business and people hesitate to pioneer; that is why many of you are here instead of being out west; you wanted to stay with your old friends and remain in the eastern country, while your sons and daughters, your brothers and sisters went west as my father did.

They gave Mr. Dillon in the supply bill \$15,000 to carry on a great state department for a year. It did not seem very much. Mr. Dillon was very much disposed to quit, but his friends urged him to sit still in the boat and wait and see just what might happen.

After a few months Mr. Dillon discovered that the Bread Trust in New York had raised the price of bread, claiming that on account of the elevation of flour prices it was necessary, and they also curtailed or de-horned the loaf of bread, as you farmers would say, that is cut something off it. Well, with a smaller loaf of bread at a higher price the poor people were not overly well satisfied and we have many

poor people in New York City as well as a few rich ones and a lot that would be rich.

Mr. Dillon made complaint to the Attorney-General's office, and that Attorney-General's office had heard of your humble servant and engaged me to assist them in that investigation. Well, we started the investigation where a business man would start it, right where he thought the trouble was.

We asked them to bring in their contracts for the previous year, all the contracts they had to buy and sell, and the contract showed that they had bought flour before the war broke out in July and August, sufficient flour to run them one year, so it was not necessary, on account of the price of flour, to raise the price of bread. They did not like to have that published, because they stood pretty well with the public in New York City, but the newspapers were there and they tell the public what is going on sometimes and crooked people never like to have the public know that they are crooked. However, we kept the newspapers full of it.

We got Joe Leiter on from Washington to tell us how there was about 1,000 times as much wheat sold per month in Chicago for future delivery and any other old delivery as there was produced in a year in this country and Canada and all the rest of the world combined, and he said sometimes it was a very fascinating game but he had had all he cared to pay for of that pleasure and had retired from the business.

We investigated further and found out that they had been getting over some very scientific men from Germany and elsewhere who had developed the ability to put 51% of water in a loaf of bread. Your mother and my mother could get only 30% or 35% of water in their bread when they did their level best.

At the end of a few weeks they came to us and said, "You people are creating a terrible furor in the newspapers; we have had a meeting, and if you will shut up, we will put the price of bread back to five cents a loaf and

lengthen the loaf to the original size." That was all we wanted. We did not expect to get a reduction with wheat up around \$1.58, so we told them that was all we were after. We shook hands and parted friends and we saved the people of New York City alone on the 2,000,000 loaves of bread they use daily, at least \$20,000—not such a bad nest egg for a department that had only \$15,000 to run it a year. It made the consumer smile and many poor children ate bread that might have gone to bed hungry.

The department ran along to the middle of the summer, and one day in looking over the trade papers which are supported by the financial interests in the form of advertising, we discovered that the buyers of New York were out in Oregon buying apples and paying for them \$1.35 to \$1.50 a box, a bushel box and the freight rate and icing charges were 50 cents a box additional. Then the commissioner read down further in this particular paper where it said that buyers, operators and commission men and merchants should be careful in buying New York State apples this year for \$1.50 a barrel.

Just contrast that, a three bushel barrel for \$1.50 with a bushel box for \$1.50 with a 50 cent freight rate. "Surely," the Commissioner said, "That must be a mistake," so he called up the editor and he said, "You don't know anything about this business." "Well," he said, "I am sixty, but I am not too old to learn."

He engaged a gentleman to help him, and he said "Publicity is something these fellows abhor; suppose we write a piece for the papers and tell them that according to the price now being paid for apples in Oregon and Washington, New York State apples ought to bring \$2.25 for the B grade and \$2.75 for the A grade." The editorial was written. The paper published it and 200,000 were circulated among 200,000 farmers' families in this eastern country, and then there was some slight—well, a few remarks made, to say the least, and I do not think that the men who made the remarks—I don't think those remarks were Calvinistic,

I don't think they ever heard of Jonathan Edwards or a multitude of good New England people that you know all about and I know very little about.

They began to swear and pull their hair and tell what an old ass this man was that published the paper and put those ridiculous prices in there to fool the farmers. It went along and they said, "We will fool him, we will go up the state and buy all these apples and he won't have any apples to sell at auction." So another council was held and it was decided to go up in the Hudson River Valley and take a look around, and the next morning at seven, Mr. Dillon, the chauffeur and myself left in an automobile to look the orchards over. We went directly to Will Teator's orchard, well known to be a large orchard, carefully cared for, properly sprayed and producing fruit of excellent quality.

If you are going to sell something, be sure you have something good to sell, because your customer always prefers to buy good stuff rather than wormy rubbish, even in the apple line. So we talked the matter over and he said the best offer he had had was \$2.00 a barrel for his fruit but that he would not consider it. We told him that if he would let us head the list with his orchard, we could get together on a combination orchard sale. He said he would and we said "Get into the automobile with us and we will take the thing up with your neighbors."

That night we returned with a list of 30,000 barrels of apples. We went to Mr. Deyo's orchard and to Mr. Palmer's orchard and investigated the apples. From that section we got another combination sale together and we advertised the sale by telephone from Mr. Palmer's house and let the wide, wide world know that we were going to sell most excellent fruit in the Hudson River Valley at public auction in the orchards, and bidders would have ten days to go and investigate and see what they were to bid on; that buyers from the west were solicited to come. So that when the fruit was packed, it would not be shipped

into New York City and then re-shipped but would go direct to its destination.

We knew that there were men from Esconoba, Hancock, Houghton, Sioux City, etc., who wanted these eastern apples and they were here looking around, but they had been looking around on the basis of \$2.00 as the very best for grade A. They had very moderate ideas.

We held the sale; we had had a conference with Mr. Teator; we had sized the situation up as best experienced or inexperienced men could. We studied the deal and said "Your apples, Mr. Teator, ought to bring \$3.25." He said "If they bring \$3.00 I think we will be pretty well paid." We urged him to stand pat for \$3.25 and he held for \$3.25, and then the bidding began. We reserved one bid for the owner as we do in all auction sales, and we stated it before the sale. The bids ran up on Mr. Teator's orchard to \$3.12½; he did not sell. Mr. Eiler's small orchard was sold at \$3.25 for grade A apples. In the case of other orchards we sold only a few.

The people said it was a frost and perhaps it was, but the next day we went over to Gardner and had better results. We sold Mr. Deyo's orchard, which was a large one, all Baldwins, at \$3.15 for grade B. We sold his sister's orchard at \$3.05; they never want to give a woman quite so much for her labor or time, regardless of her intelligence, as a man.

We advertised 10 days later that we would sell again at Syracuse. Quite a few people gathered there. We selected some very nice fruit up there, Onondaga County had never sold their apples at wholesale before, they had shipped to the local market, and they said, "We would not care to sell unless we got a good price." We had examined the apples and we said, "What price do you want to put your one bid at?" They said, "Three dollars a barrel." They never had to bid \$3.00 and we sold Mr. Hitchin's orchard, a very large one, at \$3.40 a barrel, and it set the pace for all the United States as the price on barrel-packed apples.

The buyer said, "These apple sales are a curse, but we want apples, and"—and they began buying and the result was that \$3.00 a barrel was paid for all the apples that were worthy for a big buyer to buy. I said worthy, because a big buyer cannot go to anything but a big orchard, it is too much expense. You must raise some quantity in your neighborhood and raise good quality if you want good sales.

What was the result of these sales? Well, I have told you. We packed four million barrels of apples up in New York State this year and it is a conservative estimate that the growers of apples in New York State this year received \$4,000,000 more for their apples than they would have received had there been no department of food and markets in our State. That was what we did with a publisher for a Commissioner. Had we had a corporation lawyer, from some things that I know now, I fear that we would have got \$6.00 a barrel (Laughter).

But we had the old publisher and he smiled and kept on smiling and they said bitter things about him, but I am going to tell you, ladies and gentlemen, if you will listen, what we heard up the state.

I went to a home out there in Onondaga County, and there were four college graduates, bright young men and lovely girls that had been up in Massachusetts to school and there was no talk about leaving the farm, no desire to go to town to see the moving pictures in particular. They were very fond of the blooded cow show they had at home. The gentleman told me that his peach crop alone paid the running expenses of his farm. He has a farm of 486 acres all set out to apples and he will never have any trouble about his boys and girls going away from home, they will be there long after he is dead and gone unless some great misfortune overtakes them and they have to go away for their health.

That is one of the objects of our department, to help the producer get a fair return for his labor, a return that will keep his children about him and his children's children and, through real prosperity, have them extremely happy

and well satisfied. Surely that is a laudable undertaking.

We want to trace this sale a little further, for we have consumers down in New York City who are poor, so very very poor, and we want to know what was the result to the consumer in the larger trade centers, for we cannot have something that is all in favor of one side and all against the other side and have it satisfactory.

We began receiving apples in New York City; we began to receive all kinds and all qualities. Now we did not receive enormous quantities ourselves; the New York State Department of Food and Markets. We are one of the most peculiar concerns you ever heard of, we have the backing of the State, we are a State Department, and we receive goods direct from a little shipper or a big shipper, a little farmer or a big farmer, from any state or any county, it does not matter who or where, and all receive the same treatment.

Now we had no money to speak of, as I told you before, so we went to the Fruit Auction Company and said, "We want you to handle these goods here as you handle the citrus fruit and the Florida fruit and the Porto Rico fruit and the lemons from Sicily and the grapes from Palmyra. Can we make an arrangement?" They said, "This is pioneering, we could not give you the same terms as we give these other people. We will take on this business at 3%." We said, "Will you permit us to charge 5% and send out the account of sale and the check that way?" They said, "We won't do that unless you let us stamp on the face of the account sales what we are doing, that 3% goes to the Fruit Auction Company and 2% to the Department." We said, "That is exactly what we want to do." What was the result? A great apple crop was raised and then the apples began to roll into New York City, thousands of barrels to other people and some to our department. We sold every day at public auction

Who does your public auction work? This is a period of efficiency and economy in the household and on the farm. It is a period of efficiency and economy in the pub-

lishing of newspapers and of trade papers and in the manufacture and sale of war munitions and automobiles and every other conceivable business must be run on lines of efficiency and economy or it cannot run. Now you want to know what economy did our people have that the old line trade did not have?

The first thing we did, we went to the New York Central Railroad and asked them to turn over to us the Desbroses Street Pier, 1000 feet long and 100 feet wide, a pier that the same amount of floor space on the main floor in a store on Washington Street one block from the pier would rent for \$300,000 a year. That pier was turned over to us with a nicely fitted auction room on the second floor without a dollar's expense.

Surely that was some rent, but was it nothing new. It was to you eastern produceers, but not to the western men. For twenty long years the western people have had a pier, number three on the Erie, absolutely free of charge.

The floats with the cars loaded with fruit came right alongside of their pier and the railroad company at their own expense discharged the cargo from the car and then the auction company opened up the samples. No samples are allowed to be fixed up in the least; as goods open, so they must remain; there is no fixing of samples, for if you fixed the samples you might fix the buyer and the fixing of buyers doesn't pay.

I was up in Cortland County the other day and I heard a little story about fixing a buyer, that made me smile. Now if it was good enough to make an old-timer like me smile, perhaps it would not harm you any to listen to it and if it doesn't make you smile, you try it on a hired man. There was a gentleman up there who had a three-quarter cow and was anxious to get rid of her so he sold her to a neighbor and boasted at the corner grocery down there about having slipped it over his neighbor with this three-quarter cow, and he said, "He never noticed it," and the son of the man who had bought the cow heard the story—this was right in David

Harum's county, and I thought there must be something wrong about it, that a farmer in David Harum's county would buy a three-quarter cow not knowing it, but the story went around, so one day I called on this farmer to find out if it were true, and he said. "Yes, it was true. I did buy a three-quarter cow from that old rascal and he was so tickled to cheat me that he sold her at 20% less than she was worth, but I bought her for beef and really people that eat beef don't eat the udder anyhow." (Laughter). Now that is the way this cheating pans out.

This is a wonderful country you know, all your famous men lived here and you love them and respect their memory, as I do, but we have a great example of one of your eastern people that went out to Chicago. He was a very modest man, he came out there and started clerking in a dry goods store for an old gentleman who afterwards wanted to sell out and run a hotel, and so he sold out to this young man and another clerk, and this young man and his partner for many years ran a store and then he bought his partner out about the time his partner operated in wheat so disastrously—it was easier to buy him out after the deal than before, and then he ran the store and several years later he died and left an estate of \$225,000,000. He never cheated a customer. If anyone bought something there that was not right, he gave him his money back, and strange to say he treated women as well as men, they got their money back too, and as a result the men and women and children in Chicago were not very anxious to buy their dry goods anywhere else except at Marshall Field's.

I have told you the economy of having this free dock and free labor from the railroad company for discharging the goods. Let us see where else there is an economy. We have engaged the auction company auctioneers; they are very capable men and have a great business to conduct, and where you have lots of work for a capable man, you can afford to pay him.

These auctioneers are selling to what we call profes-

sional buyers, they are selling to buyers who do nothing else from one year's end to the other but buy goods at auction, and as a result it goes much more rapidly than back on the farm where you are closing out at auction and where the farmers are not so accustomed to buying. They do not work so quickly. This one man getting up there talking to the audience as I am talking to you, only about three and a half times more rapidly—this gentleman sells 80 to 100 cars in a few hours, dividing it up into small lots.

You ask me to whom does he sell? You hear people sometimes say, who do not love Mr. Dillon or his assistant, or anybody on earth—and I sometimes question if they love the Almighty, they are so almighty mad at everything I have ever discussed with them—they say, "They sell to the commission men." Four-fifths of all the stuff that the auction company sells in New York are sold for the commission men. Do you think those commission men turn that stuff over to the auction company to sell for them because they can get less than they can for it at private sale? If they do, they are not treating their shipper very well. The reason they turn it over there is that it is highly perishable, they get quick action and large competitive buying. They get centralized selling at private sale, they get centralized buying and diversified selling. There is not much chance to jew down an auctioneer who talks so fast himself that he can't hear what you say.

Who is in that audience? Well, the best, the highest priced merchants in the city are represented there, the people that want the fine goods, and that next class that want the medium goods and the padones buying for the poor Italian section, and the Hebrews; there are as many different languages in that audience as you can imagine, and there are men that we only know by their number, but they have arranged for their credit so that the losses through the auction company sales are almost nothing. I think there were only \$2800 last year and the sales ran between \$25,000,000 and \$30,000,000 that were given out and I understand there

were sales of bananas and other fruit that were not published, that ran the sales up to \$40,000,000 at the public auction.

It is a large business conducted in a business-like manner, just the same as a bank. You cannot get credit there unless you are worthy of it, but any man or woman can buy there if she or he has money, or if they are worthy of credit they can obtain it there, so we were able to pay these shippers the day following the sale their cash with the Fruit Auction Company's check and were able to give them 10, 20 or 30 days' credit, through the Fruit Auction Company.

Now that was not very bad for the growers of our State, and any other State in the Union, to be able to ship to a State department that could not if they would, and would not if they could, take a single cent, except what was actually coming to them. They could not do it because the auction company would not let them, if they wanted to, and they could not stand up there and openly sell the goods and then steal for us people, when they could not even steal for themselves. Well, these sales went on and these people, who are buying there, are 80 brokers, who buy on a very small commission. There are buyers there for stores like the Providence Public Market, which is a private enterprise and a very excellent one, I understand, which is a large user of those products and is always represented by a broker in these auction sales. Why do these buyers come here? I am going to tell you:

In the beginning, about 1890, all the California fruit was sold on commission at private sale. The auction system was started up; little by little, this fruit came to the auction and a large part of it to the commission men at private sale. Gradually the auction grew, and gradually the commission men shrunk. Finally the commission men turned their wares over to be sold by the auction company, and today 98 per cent. of all the California fruit sold in the New York City market is sold at auction, either for direct account of the co-operative exchanges of California, or the

commission men, who receive the goods from the individual, the firm or corporation in California which ships them, but the auction people sell the goods and the cost to the people in California ranges from one and five-eighths per cent. commission to two and a half per cent. commission. Now, where they pay the commission man several cents above that, it is just as you are paying to our department five per cent. for what we only pay three per cent. to have done, but we have a general supervision, we look after the receipts, we see that the cars are handled, we exercise the one bid for the owner if we are requested to do so, and I would say right here that only about one car in a thousand is taken out of the auction at the owner's request. As a rule, the goods are sold. That is the way this auction is moving down there in New York.

You say, is there any other economy? Yes, there is one other. When goods arrive on the dock and are sold, for instance, they are sold, we will say, to James Butler, the great chain-store man of our city; he would correspond with your Kennedy Brothers of Boston, who are old time friends and customers of mine, and most excellent men, even though they do live in Boston. These people are not alone in business, there are other chain store people, and they are all represented and they are direct retailers and buy in the auction. Then there are the Greeks, and Italians and Jews, distributing on street corners and often push carts, for we have 12,000 push carts represented by padrones at the auction, and then the brokers, so we have a great mass of people, who are not a bit friendly; they are a good deal more apt to get into a fight and kill one another than they are to fix prices. They co-operate about as the French and Germans are co-operating at the present time, or the Turks and Russians; in fact, co-operation has not done very well, except where all the people, who co-operated, spoke the same tongue and had the same interests, and were willing to be led by their own people and not by somebody from a foreign clime.

Now we save cartage right then and there, for the old system was to charge cartage to the shipper from the dock to Washington Street or elsewhere, where the wholesale store was operated. The wholesale merchants charge, as a rule, ten per cent. for the selling of the fruit, but there were deals where he charged seven per cent. or eight or five per cent., but the receivers in New York City do not sell fruit to retailers, as a rule, there are exceptions to almost every rule, but I think it is safe to tell you that ninety per cent. of the fruit shipped to the receiving commission merchants is sold to a jobber and another commission must be earned or a profit taken. It cost the jobber to operate, 10 to 15 per cent. Our great city rents are high and expenses of all kind are high and you have a multiplicity of buyers. That was reaching the consumer very slowly, for still from the jobber it must go to the retailer.

We are eliminating in this discussion any reference to the speculator. Very often in your market, apples have changed hands three or four times and profits have sometimes been made by every one of those men who purchased them, and sometime a loss was accepted; but they are shrewd men, they are in business, they buy on time and if the market goes down they scream about the quality, they try to get back and sometimes a rebate is allowed by the commission man. His is anything but a bed of roses. He gets great quantities of stuff when there is no good market, when no speculator or buyer wants anything and when the market is thronged, the commission man stands there empty-handed, often with nothing to sell, but the rent must be paid and the hired help must be paid, so the commission man is not in heaven yet, anyhow, and I am not sure he ever will be. Mr. Tuttle told me that he estimated that \$200,000,000 were being wasted.

You ask "Can all of this business be conducted on Desbrosses Street Pier?" No, it cannot, but the Pennsylvania Railroad have an auction room alongside and have tendered us that, and the Lehigh Valley have offered us a pier. The

Baltimore & Ohio have equipped a pier and turned it over to the department; in fact we have more piers than we have goods to sell; these people are not going to let their business get away from them without a struggle; they are very earnest about this matter, very anxious to hold this business. They know what the auction company has done with the foreign fruits. They know that co-operative concerns in Porto Rico ship every dollar's worth of their stuff to their own representative in New York City, and he acts as the receiver and sells it through the Auction Company. They know that Mr. Black for years has represented the Southern California Fruit Exchange and receives and looks after their goods through the Fruit Auction Company. They know that Mr. Holland represents a California concern shipping citrous fruits to New York; they know that the Banana Trust, one of the wealthiest in the world, tested out the auction system one year ago last April. They had their own receiving business; there was no opportunity for them to fear any fraud or deception or cheating, they received their own goods and sold them with 40 most excellent and experienced salesmen, but after they had tried the auction system for 30 days, they notified their men that they might look for other positions and today the Fruit Auction Company, that same company that sells our goods and whose check we send out, sells all the bananas received in New York Harbor and sells them for a corporation that does not need the money, they could carry the account themselves, but they found it more economical, more efficient, to have the Fruit Auction Company do it for them than to do it themselves under the old system of private sale. Surely if the people in New York City themselves cannot afford to sell their stuff at private sale, it is a most remarkable commendation for the auction system.

Now Mr. Dillon the publisher of this paper, sometimes illy spoken of by competing papers that do not like their neighbors as they do themselves, is working at a very reasonable wage, in fact he works for nothing and boards him-

self, and that is about as cheap as you can expect a hired man to work for you, is it not—almost as cheap—and he is a man that has a large income, he is a man that does not need the job particularly even at that salary or any other, but he has the work at heart, he is working in the interest of the producer and the consumer.

When we had sold these goods in New York City, we did not stop there, we sent for the big retail distributors and said "Gentlemen, what price over and above the wholesale auction price are you going to charge the consumer for these goods?" Not one man told us over 25%. Acker, Merrill & Conditt, with 35 or 40 stores, said 20%, and then the James Butler people said "17% and we will pay the cartage out of that, we will use it as a leader." Now that is what they have been doing with these apples.

Then we had 10,000 lithograph cards, handsome ones, put out and put them in every retail store urging the people to buy New York State apples. We are a New York State institution and naturally boost our own state just as you should boost your state and as every other state should be boosted by its own people when opportunity presents, and we boosted these apples and told the consumers what they were worth at retail and the newspapers have been splendid with us.

There is no greater advertiser living than this man John J. Dillon, in the judgement of many people. The people that like him write columns about him, and the people that don't like him, write columns about him too, but it pays to advertise and if they won't say something nice about him he wants them to talk anyhow.

When a trade paper takes the name of one of those men whom we had fined \$6,000 in court and urges shippers to send in to that man who was fined \$6,000 for fraud on the docks within 18 months, takes his money and urges growers to ship to him and refuses the state's money and refuses to advertise the state, when they know that under no consideration can a single dollar be filched from the shipper, it sure-

ly is not influenced by the best motives but rather by money. They know that when this business is in full blast that the growers, the producer and the consumer will not pay over 2% or 2½% to have their goods sold where formerly, under the old system, the whispering system, for people in our city seldom gave out a price above a whisper, but after the sales were over and the little price currents were out, they talked right out loud, they did not hesitate a minute; "an awful sick market, the stuff was pretty bad too, most of it was rotten."

And then they wrote something to the shipper and told him they were very sorry but they could not get any more for it on account of the condition of the stuff. Occasionally there was a shipper who had the temerity to pay his fare to New York and had seen his own goods and doubted their veracity or else doubted his own eyes and then after calling on an oculist decided his eyes were all right.

I don't know that this thing happens in Boston but we do know there is a system whereby we can save the consumer and producer about 20% in the handling of foodstuffs in New York City. We know it is not an experiment. It has been tried out for years and years by people in those far-away countries. We know there is a check system in almost every business. Railroad conductors a few years ago were very careless and the company put on a check system and some of the conductors went to farming or some other labor. The saloon-keepers thought they were being defrauded and they bought cash registers. The old system was that the bar-keeper would flip a silver dollar and if it stuck to the ceiling it was the proprietor's but if it hit the floor it was the bar-tender's; now they put it in the cash register, and let us see what some of the other big successful concerns have done, what your big concerns do, don't they bond the employees? Don't they have some sort of insurance system so that if an employee defrauds them they are reimbursed? Don't they feel that the insurance company can prosecute them where they might, through charity or love or sym-

pathy not want to do it? I think that is quite a common practice in most of the states.

Of course I know there is so little dishonesty in Massachusetts that that is scarcely needed here, but I think you probably follow out the custom too. In your national and state banks, you have state examiners and federal examiners. What for? Is it because all the bankers have always been so honest or is it because you think you would like to know for sure and would like to keep them honest? It doesn't make any difference what excuse you have, you apply the remedy. Are we doing something we should not do? That is a question for the consumer and producer to answer. That is not for us to answer.

We have people in this great city who are very anxious that the public should have water at the lowest possible rate and of the very finest quality. It is only a few years ago that the corporations owned practically all the water works in practically all the cities of the United States, but one by one and sometimes two by two these companies were taken over by the different cities, the different municipalities, and they handled the water business for themselves and water in nearly every city of the United States is extremely cheap and good. Perhaps that is paternalism, I am not going to discuss it now.

You have this parcel post system. The express companies did not want you granger folks and farmers and horticulturists to have it, but after many, many years of struggle the corporations at last went down to defeat and the people received their parcel post. It may be a blessing, I hope and think it is, but at least you got what you wanted and that is all that children want, is what they want, and we are all grown up children.

Our people are extremely anxious about the railroad rate. If the corporations go to the Interstate Commerce Commission and show that they cannot operate at the rate they are allowed to charge the Interstate Commerce Commission says, "You may raise the rate." Where is the In-

terstate-Commerce Commission for the producer of food-stuffs? Where is the tribunal you go to and say, "My farm is worth so much, I ought to have 5% on that, and my labor is worth so much per hour and I work about 16 hours a day, and my wife's labor is worth so much, and she is working 16 hours a day, and there are the boys and girls and that is the cost of producing these foodstuffs."

Where is your tribunal? It has not been established yet, but I hope that through some good commercial system such as the Banana Trust have adopted, it will come to your relief and help you some. If it is a step forward, it is worth taking. If it is not a step forward, it should be defeated and its defeat is already published. Well it is a quite lively corpse yet and they know when they publish those stories that they are not publishing the truth. You don't like to have your neighbor lie to you, you don't like to subscribe for a paper and have it mislead you. Let us see what they publish.

A week or so ago I was up in Rochester and had many threats of what would happen to me that night when I spoke, and some 600 or 700 farmer folk and their friends appeared in the banquet room and of course I was timid as I always am and I felt very much frightened and told my story in a very sympathetic tone of voice about like I told it to you people, and what was the result? After some little discussion, they passed a resolution approving the act of our commission and commending our commissioner and asked the Governor and the Legislature to appropriate plenty of money this year to carry on the work, and then what did the papers say about it? The papers, one of them, said that Mr. Frank Bradley had rammed this resolution down the throats of those growers.

You women folks know how badly he rammed it down their throats when I tell you the next day they elected him President for another year. You women folks know how your husbands would vote for a man under the conditions described in one of the trade papers.

Gentlemen, they are trying to mislead you, but they do not know the American public. "You can fool part of them all of the time and can fool all of them part of the time, but you cannot fool all of them all of the time."

Now we went over to Albany and had the Sixty-eighth meeting of that Agricultural Society for the State of New York and after two or three days spent in listening to splendid papers, I never heard any better, I presume you have the same or equally as good here, these young men are doing wonders in the matter of teaching you how to handle your farm, how to put lime on your soil and how to make it sweet, how to make two blades of grass grow where one grew before, how to grow better fruit, how to get rid of all the worms and bugs that give you so much trouble, teaching you to grow it; and my job, if you please, is teaching you how to get a better price for it.

I do not wish to be personal in that, but that is what I am employed for, I am the hired man of the people of the State of New York and the Commission wants to get good fruit wherever they may be able to get it, and we welcome you shippers when you feel that it may be to your advantage to use us.

When this agricultural society got ready for resolutions, they passed a resolution commending the New York State Food Department for its good work, commending the Commissioner in a separate resolution by a unanimous vote, all standing up, and their faces were radiant with hope and joy. That is the way the people of New York State act after these papers say mean things about us. If that is the way the public is going to act, I hope they will keep on berating and abusing us. We are getting accustomed to abuse and really enjoy it.

Now the consumers here want to know a little more about what we did for them, well, about the middle of October, the boys that handle the shell-game, that is the egg business, in New York City, got the price up pretty high at wholesale for a quality of egg that did not exist, but last

spring they had laid away a very nice nest egg, some few million cases, and between the wholesalers and the jobbers, I will say right here that the cold storage man never fooled anybody on eggs. the fellow that buys from him knows what he is buying. But suddenly eggs change from cold storage to fresh eggs and a friend of mine talking here today says you can't work miracles. Why, the Saviour only changed water to wine; but these eggs all changed from cold storage to fresh eggs in the twinkling of an eye, and the consumer bought them at the fresh egg price.

Prices were very high and the poor were anxious about the winter and anxious about the cost of living; so we started out and advertised that they must obey the law and sell these eggs to the consumer for just what they were and if they did not sell cold storage eggs as cold storage eggs, we would have them arrested and fined. Now our city courts are very severe on these people when they are brought in on these complaints.

We went to the health department and in ten days the price of eggs was down ten cents a dozen to the consumer. The State of New York used through October, November and December, 125,000 cases of cold storage eggs a week; that meant \$3. a case; somebody bought those eggs for \$375,000. a week less than they would have bought for but for us.

The swindler helps nobody except the swindler and the gambler and hurts the producer and the consumer. This does not make the people in the egg business always happy. They condemn the State for doing it and they tell the papers that are abusing us, if you want our advertising very much longer, you will have to get rid of those fellows. It is up to the consumer and producer whether they want this kind of work carried on or whether they want our commission and similar commissions in other states eliminated.

I have given you the situation in New York. Possibly we are worse there than anywhere else, we have the biggest city, I believe we have the most dishonest people of any

city in the country and I am confident we have the most honest. I believe we have the best doctors in the world and I am very sure we have the poorest. We have lawyers that compare favorably with the doctors and we have egg and butter and cheese dealers and dealers in fruit and vegetables that compare with the professions, they are good, bad and indifferent.

We are not here to try those people; we are not here to condemn them, we have courts to attend to that and they have done well. There was an investigation of one of the lines known as the commission business. The Attorney-General's office has the reports on file now; I will not undertake to quote them exactly, but the language was somewhat to this effect. "If we do eliminate all these people in the business, you have no relief at hand and ready." But after investigating the books and going through them carefully it was found that many, many accounts of sales were being sent out different from the actual sales. We accepted the explanation that they were errors, but it did seem strange that they were all made against the shipper, against the producer and in the interests of the commission man; but possibly he had a left-handed bookkeeper who could not make any other kind of mistake.

There are people who condemn Mr. Dillon, yet he has collected tens of thousands of dollars for the farmer folk who subscribe for his paper, from the commission men who admitted they were cheating, when he asked to examine their books and they gave him a check to send to that subscriber. Don't you think it is good business, you hard-headed New England people, to try out a system that is not subject to error? Don't you think it is good business in this day and age of progress to see if a better system cannot be adopted?

Look about you and see what your friends and neighbors are doing. Are the woolen mills here busy? If they are, does the man who runs the mill grab a bolt of cloth and run out and sell it to somebody, or does he have a high-class

selling agency, as efficient and honest a one as he can possibly procure, and is his business complete without a first class selling system? If it is, it is the only one in the world; every other manufacturing business must have its selling force, must have it organized, efficient, economical and honest, and so must you farmers if you are going to succeed.

Do you want to know what else we are doing in New York? Remember we are doing all this with no other man on the pay-roll outside of stenographers, except myself, and we are doing it with very little money. We are doing it with \$15,000 and we are quite afraid to tell you that week before last, on Saturday evening, when we balanced up, we still had \$11,000 of the \$15,000 on hand; not such a bad showing for a State Department, for they are always supposed to be liberal and almost reckless with this State's money. (Applause.)

Now these people will tell you you cannot do anything without money. We will see whether we can or not. We hear some men who dream their dreams and they are good men, I am not here to abuse them, who tell you that we should have terminals costing \$10,000,000 here and there. Why buy a baby carriage three months before you are married? We have not any use for terminals, not by any means. We have not any business to speak of; it is a little business now, we are creeping, we hope to walk, we hope to run, and when we run we will get the things we need, but why buy a terminal when the railroad companies will give us one?

Now the other day a company in New York City came into our office with great plans for a \$2,500,000. building they were going to build up on the New York Central track. They said that they heard we were about to open a creamery for making unsalted butter to sell to the Hebrew people which they prefer over and above all other kinds of butter and that we were going to make salt butter, sell buttermilk and sweet milk and cream and going to manufacture ice cream and wanted the most sanitary establishment of that kind possible in the world; one that the ladies could come

and visit and go home with an appetite for the good things that we manufactured, so that when the State mark was on it anybody and everybody knew that the cattle had been examined on the farm, knew that the barn was clean and a fit place to keep live stock in, knew that the milk pail was clean and sanitary, knew that the cow was properly cared for and properly nourished and that there was no filth in there; and not only that, but that the cans that the milk was shipped in, or the cream—knew that we had a system all over the State so that people who wanted to raise chickens or swine or calves could skim their milk and send their cream to New York City and sell the butter fat for about what you are getting for your whole milk now.

They said they knew we wanted that and they wanted to build it for us and we told them to put it in black and white and we would entertain it. We have asked the State to permit us to rent this magnificent creamery and have it in operation in a year and open a free public market there for selling these goods. We do not expect to put the milk companies out of business either; we expect to do business like Mr. Canford or the Beatrice Milk Company or the Middleton Creamery at Denver, or a multitude of others.

Some of you know these people and many of you have bought their products, for they market here in this eastern country. They produce it on land worth \$150. to \$200. an acre and when your land is sweetened with lime and properly cared for it is just as good dairy land as any that the sun shines on in the United States, and we hope to raise the price to you people a cent a quart, and on the other hand we hope it is possible to lower the price to the consumer. We hope to have one milk wagon delivering in a block where six or eight now go, and we are not going to put anybody out of business, but we may investigate and see how much dividends they are paying on watered stock or Blue-sky; we may look into their business as we did into the bread business, and if we do you will see it in the papers. They have already been to see us and they tell us that we are dis-

turbing business. They say the yeast in the bread raises the dough and Dillon in office raises the devil with business; but from the consumer and producers' standpoint it is about time somebody raised something, it is about time the consumer and producer had a tribunal to go to and improve this business from the standpoint of economy, efficiency and honesty.

Now they ask what will become of these middle men, these commission men? "Are you going to put them out of business?" Why, no; we did not put them in business, we do not expect to put them out of business. Their's is not such a great business that one need worry much about it anyhow.

The truth of the matter is that the dealers in Chicago who have bought constantly at auction for 25 years have always had goods just the kind they wanted for their customers, have worked on a small margin, have never been short at one time or over-stocked at another, have made more money than the commission men who have served the farmers and producers, a great deal more money. It has been to their advantage, but there were only a few comparatively speaking in the business. It was a business that was not so easily gone into.

Now these are some of the things that a Commission has done in New York City and I have told you in the milk industry what we hope to do. We hope to eliminate this constant howl of tuberculosis in the milk and in the live-stock; we hate to hear that advertised; if it is true, we don't want it here; we want to eliminate it if it is true.

How are you going to ask a farmer to constantly produce more milk, and you know there are new babies coming down to New York every day, every hour, they must be fed milk, it is the great food for them and our grown up people like it now, and in a short time beer will be eliminated from our diet and then more of our people will want more and better milk; (applause), and I hope to see a sanitary milk station, a food store if you please, as clean and white as

Child's stores where anybody can stop in and get pure clean sweet milk or cream, and then some good advertiser will tell them, "You stick a good, clean sanitary egg in it." It is wonderful how the Almighty was so careful about that egg, to make it sanitary with the shell outside and the skin inside. You know they try to cure consumption with eggs and milk; why not give an ounce of prevention. Why not get as much money for milk as we do for beer? I don't see why we should not.

There is the dawn of a better day for the agricultural interests of the eastern country; the pendulum is swinging back; I remember when the live-stock industry was in bad shape in the west as you are here. The beef packers are not perfect, but they were wonderful advertisers, wonderful distributors; we paid them a tremendous price for doing it, but our products were on sale in every town in the United States, yours included, and our old friend, N. E. Hollis here, made millions distributing these foodstuffs for Swift & Co., in this city. Now they do all their own distributing.

Our State went up and took the sweep-stakes prize in San Francisco; they had a beautiful show; and I asked them, "How would you like to duplicate that show at the Grand Central Station in New York, and duplicate it in the Pennsylvania Station, and duplicate it in Wanamakers, both in Philadelphia and New York, and when you have duplicated it in his big stores, every other big department store in the United States will want a fruit show. They will say "We want a show of that kind too"; let the State furnish the show, let the producers furnish the apples and pears that they raised in such excellent quality. We only showed goods. Do you suppose that if the International Harvester Company took a sweep-stakes prize, they would sit down and smile about it, or would they advertise it, tell everybody that they had taken this prize and make many hundreds of thousands of dollars out of their success?

That is what they did, and the other night at Albany, I had the pleasure of speaking from the same platform with

one of their bright shining lights, George W. Perkins, the organizer of the Harvester Trust. He has made all the money he wants and now he wants to help the producer and the consumer, wants to make a record for having done something for the people.

You know the story of Thomas Osborne; they have not treated Mr. Dillon as bad as they treated Osborne, because they have indicted him, and he is so busy trying to clean up affairs that he even had to get out of office while he is doing it, but I hope he will soon be restored, and if there is a man to help the poor criminal in the penitentiary, is it not time we had somebody to help the agricultural interests of the country and the consumers? I thank you. (Applause).

THE CHAIRMAN: I am very glad to see one thing, and that is that Mr. Emerson realizes the fact that Boston is probably not anywhere like New York; that shows he must have studied into the matter somewhat.

Before we continue the subject, I want to ask our Vice President and the other officers to distribute the prize apples here. (This was done and everyone received an apple).

THE CHAIRMAN: Have you any questions to ask Mr. Emerson?

MR FROST: I would like to ask Mr. Emerson how the surplus is handled in a case like the auction sales?

MR. EMERSON: In the commodities which auction companies handle exclusively, such as citrons fruits which are not highly perishable, very often many cars are held out across the river and not thrown upon the market, but in the case of highly perishable products, they are sold, as it is well known that, whether sold at auction or private sale, they must either be disposed of or they would rot during the day or within a day or two.

Now then, goods that are not perishable, goods that are subject to cold storage, come in and they are stored if the shipper or owner so desires, but the auction company never exercises that function without communicating by tele-

graph or telephone with the owner. The owner controls the goods until they are sold. It is well known that through the auction system in time of glut, that it is not unlike the private sale system, he who sells first nearly always sells best, and the auction company sells first. Buyers will not buy at private sale in New York City until the auction has closed and settled the price. That is true of all business that is conducted at auction—private sales wait the action of the auction; buyers fear to buy ahead of the auction, for fear that their competitors might obtain the goods for a lesser price at the auction. They go to the private salesman because of a glut and demand a still lower price and urge the argument that, "If you don't let me have them for less today, then tomorrow I will be obliged to patronize the auction."

A MEMBER: Who really owns the Desbrosses Street Pier?

MR. EMERSON: The City of New York owns the pier and leases it to the New York Central Railroad; the City owns all the piers there.

A MEMBER: I was wondering where the New York Central Railroad got off by paying a very large rent for a pier and giving it to the City for nothing; so I would like to inquire can a Lackawanna car ferry come up to that pier?

MR. EMERSON: There would be no obstruction, but unless there was a special arrangement with the New York Central, it could not be done. The object of giving this pier for the use of the department is to have the department influence shipments to that pier, which naturally will be over their rails, but the New York Central did permit us to sell goods there from other lines in its inception, but should the business develop, it would be necessary to sell on the piers where the goods naturally arrived, belonging to the railroad company over which they arrived.

A MEMBER: Can you ship less than a earload to that pier?

MR. EMERSON: Yes sir.

A MEMBER: What is the difference between shipping a carload of apples and less than a carload?

MR. EMERSON: Your station agent would give that to you. I am only suggesting; it cost about 23 cents a barrel out in Central New York State to ship that carload of apples to New York City and in less than car-load lots, the cost is about 50% more.

A MEMBER: What is the minimum carload?

MR. EMERSON: About 160 barrels, about 150 pounds to the barrel.

A MEMBER: The reason I asked those questions is this: I had the pleasure of luncheoning with Mr. Dillon; I am in sympathy with his work, but one of the fundamental questions is this everlasting increase in the size of the minimum carload and the too wide spread between the less than carload and car-load rate; that is what has driven the farmers out of Iowa. It is what has been smashing all the dealers in the villages of New England, and that is absolutely fundamental, that as long as the Interstate Commerce Commission and, with the exception of two states, the state railroad commission, lets the minimum carload go up and the difference between the carload and less than carload rate grow wider, the producers and consumers are decidedly discriminated against and are getting the worst of it all the time.

MR. EMERSON: Of course you fully realize that we have no control over railroad rates.

A MEMBER: I approve of what you have done, and yet you are almost helpless as long as the railroad commissions let that sort of thing go on.

MR. EMERSON: We urge co-operation from the standpoint of the big concerns and from the standpoint of the little concerns, and whenever they co-operate, they find that they are better off than before. The Florida citrus fruit people and the Southern California people feel that they have gained greatly by co-operation. There is hardly a man here but what has all he can do to support his wife and children and educate them, and yet the man who led co-

operation in Utah supported 58 wives and 257 children. (Laughter).

MR. WEEKS: I want to ask what class of people buy your goods through the auction?

MR. EMERSON: We have first the large distributors who are known as shippers, who supply a multitude of little towns outside of New York City. They are large buyers. Then we have 80 brokers who buy for outside concerns on orders, small concerns or large ones, as the case may be. Then we have padrones who handle the push-cart trade and the corner-stand trade. Then we have representatives of such high-class stores as Hicks and Charles, the fanciest fruit stores in the city, and then we have the big concerns who buy for speculative purposes at times, the goods which stand speculative purchase. By that I mean apples may be bought and placed in cold storage. It is very seldom that those large buyers, however, buy any great quantity of stuff for immediate use. The small buyers in New York City are supplied at the auction; as a rule the jobber is as small a man as we reach. There is not an opportunity for a wholesaler to buy there and sell to a jobber, because the jobber can obtain credit just as well, practically, at the auction as he could from the wholesaler, and the margin is close, the competition is strong. New York is a big city and it is a natural auction city; I say a natural auction city, because abroad, as you know, all the apples are sold at auction. We think we have a better system than they do; we have a public auction, they have a restricted auction for members only. In our auctions anybody can buy.

MR. WEEKS: At your auction sales, how small a quantity is sold as a rule.

MR. EMERSON: If it were a straight car of Baldwin apples, five barrels would be as small an amount as we would sell, but if there were one barrel of Northern Spy and two of Greening, that one barrel of Northern Spy and the two barrels of Greening would be sold as separate and distinct lots. But as a practice, five barrels is our minimum.

MR. WEEKS: And your rate for selling is what percentage?

MR. EMERSON: We charge five per cent.

MR. WEEKS: What does the regular auction company outside of your Association charge?

MR. EMERSON: We pay 3% to the auction company. Until we went into the business, they had never sold apples, apples had not been what they classed as an auctionable proposition and they had refrained from selling them.

MR. WEEKS: What class of goods did they sell before?

MR. EMERSON: All kinds of citrous and aciduous fruits and all the foreign fruits. They got from 1.5% to 2½% for that.

MR. WEEKS: Since they have taken on apples, it costs the shipper 5%?

MR. EMERSON: Yes, our department takes 2% to pay me for travelling around telling you people what I know about the business. (Laughter). As soon as this business is developed, the shippers to this auction will obtain as low rates as people do from the far west or south or abroad, but then we tell you frankly that the Legislature did not support us and we like everybody else, we have got to live; we are obliged to make this charge to pay our bills. I am sorry it is that way. Has anybody else a question? Don't hesitate and don't wait. If I cannot answer it, I will tell you so. I am here to help you and that is what I want to do. Thank you. (Applause).

THE CHAIRMAN: We still have a little time available if anyone wants to offer any discussion or if you care to call for any of the questions on our program in the question box. If you do not care to do either of those, I would like to remind you again of our tomorrow morning's session.

After the chairman had called attention to the program for next day, the meeting adjourned.

SATURDAY MORNING SESSION, 10 O'CLOCK

President Sears in the Chair

THE CHAIRMAN: I think I have lived up to my promise, if any of you were here when we began, to suggest that each topic which came up for discussion was the most important one on the program, and I certainly do not want to let this morning's session go by without that.

If we can interest people in eating more apples, interest them in marketing them more satisfactorily both from the standpoint of the producer and the consumer, we shall certainly have accomplished a great end. I have often said that I think no one neglected what they produced quite as thoroughly as the farmer did. If a patent medicine man had anything that looked and tasted as good and was as wholesome as the apple and had a distinct food value, such a combination of characteristics put into a patent medicine would make a man rich in two weeks, but we fruit producers go along year after year, don't advertise at all and don't get anything like the returns we ought.

We are going to have a well balanced program this morning, starting first with the question of the food value of fruit, then taking up the marketing of apples from the two standpoints I have suggested.

I am sorry there is not a larger audience here for such an important subject as this, but I imagine we are like the church that was trying to pay off the debt, and which advertised that on a certain Sunday morning they would take up a special collection for that purpose. When the morning came, it was stormy, there were not many there, and one of the deacons came to the pastor and said, "Don't you think we'd better defer this until we have a larger audience?" "No," he said. "We have the cream, we'd better

churn." I think we are in that boat this morning, so we are glad for those who are here.

I have great pleasure in introducing as our first speaker, Miss Beulah Hatch, of Simmons' College, who is going to talk to us on "The Value of Fruit as Food," a thing most of us fruit growers know very little about and the general public less than we do. (Applause).

FRUIT AS FOOD

**Miss Beulah Hatch, Professor of Domestic Science,
Simmons College, Boston**

The world loves beauty and fragrance and Nature has been most lavish in putting them into our food, particularly in that variety which we are discussing today, namely, fruit.

Ours is the joy of watching fruit grow, of enjoying the lovely perfume of its blossoms, of gathering it, of storing it, and of preserving it as a food. Its rich coloring, sweet aroma, and delicious flavor make our menus more attractive, stimulate our appetites, and fruit rounds out our diet supplying some of those food principles which are not as adequately supplied by other foods.

Fruit contains carbohydrates. All carbohydrates contain carbon, hydrogen, and oxygen, and in fruit we find four carbohydrates: cellulose, or fibre; starch; sugar; and pectin.

The cellulose in fruit, as in vegetables, gives bulk which stimulates the muscular action of the intestinal walls, thus aiding digestion and having a laxative effect.

Starch is found in unripe fruits, but in the process of ripening it is converted into sugar by the action of acids and enzymes.

Green fruit often causes digestive disturbances because of the starch contained in it. If the fruit is underripe, it should be cooked to render the starch more easily digested.

There are several kinds of sugar found in our foods and of these three are found in fruits, namely, cane sugar, grape

sugar, and fruit sugar. Cane sugar is sweeter than either of the other two. We call sugar a fuel food, because in the body it is oxidized or burned supplying energy, part of which will be used for muscular work and part for heat in our bodies.

Aside from this value, sugar contributes sweetness to our otherwise unsweetened diet, except as we add cane sugar or molasses, and the riper the fruit the more sugar present, hence another advantage of having fruit thoroughly ripened. ,

There are two classes of fruit, those averaging from fourteen to twenty-two per cent in carbohydrates and those, sometimes called **food fruits**, are: apples, pears, huckleberries, cherries, grapes, fresh figs, fresh prunes, plums and bananas. The second class, sometimes called **flavor fruits** because of the more juicy yet highly flavored composition, are: strawberries, watermelon, muskmelon, lemons, cranberries, pineapple, blackberries, oranges, peaches, currants, raspberries, and apricots. They average from seven to thirteen per cent carbohydrates.

Pectin is the substance in fruit which brings about the formation of a "jell" in cooked fruit juice.

Fruit is one of the best sources of mineral matter. By mineral matter is meant such substances as iron which is essential in the formation of the red corpuscles in the blood of the body, and calcium which is essential in bone formation, and phosphorus which is found in every living cell of the body. Aside from mineral matter being used in all the cells of the body, it is involved in such body processes as digestion and the beating of the heart. Mineral matter is also contributed by other foods, but to complete the total mineral food of our diet, that of fruit and vegetables is advisable.

In fruit there are present acids which add to the flavor of the fruit and have a decided laxative action.

One of the first additions to a baby's milk diet is fruit juice from oranges or stewed prunes and later from baked

apple, because of the laxative action of the acids contained in the fruit.

Last but not least, fruit contains in large quantities, water. Water is the liquid of all the fluids of the body carrying food from the intestinal tract to the tissues of the body and carrying waste from the tissues to the organs of excretion. The very presence of water in fruit is refreshing and because of it fruit is one of the best foods to carry or buy when travelling, for then it is often difficult or even impossible to obtain pure water, and in the skin-sealed fruit is the delicious beverage supplied by Nature, flavored and sweetened and laden with real nourishment.

Not only for the traveller does fruit hold nutriment but also for the invalid who, not ready for the more concentrated foods, welcomes the glass of chilled grape juice or the delicate yet nourishing baked apple, or the home canned Bartlett pear.

Children instinctively love fruit of all kinds. It is so simple yet full of goodness. It is satisfying and nourishing at meals, or between meals if a forenoon or afternoon lunch is necessary.

I have talked about the traveller, the invalid, babies, and children enjoying fruit. We the men and women of Massachusetts doing our ordinary work, may daily partake of that delicious food called fruit and most of us appreciate it. Apples, pears, peaches, plums, quinces, grapes, cherries, currants, strawberries, blackberries, blueberries, raspberries, gooseberries, cranberries, and muskmelons are all Massachusetts fruits. We need not look to the North, South, East, nor West, for here, in our own state, we find variety, and completeness in color, flavor, and texture. Let us co-operate with our neighbors and buy their harvest and for all that we spend we shall receive full measure and running over.

Fruit may be served in a variety of forms for breakfast, luncheon, dinner, supper, afternoon teas, and parties.

Good fruit is just ripe, sound, and clean, and in buying fruit, it is economy to select the best, for the flavor and

keeping qualities will be much superior to those of inferior grades.

In the preparation of fruit for the table, whether to be served raw or cooked, it should be thoroughly washed and when possible wiped with a clean, dry cloth.

In stewing or baking fruit, there are a few general directions to be kept in mind. First, a silver knife rather than a steel knife should be used when possible to remove the skin, because the acid in the fruit with the steel knife forms a new compound which detracts from the color and flavor of the fruit. Second, such fruit as apples or pears should be used immediately after the skin has been removed, otherwise they will discolor. If, for any reason, they cannot be used immediately, they should be dropped into cold water. Third, fruit should never be cooked in tin or iron, because of the action of the acid, as when a steel knife is used. An enameled sauce pan or earthen baking dish is appropriate. Fourth, in stewing fruit to retain the natural color, cook gently yet as quickly as possible. Add the sugar toward the end of the cooking. The sugar will not only help to darken the fruit if cooked for long, but will also lose its sweetness due to the action of the acids in the fruit. In cooking hard fruits, such as quinces or hard pears, cook in clear water until tender, then add the sugar at the end, thus preserving the natural color. If the deep red color of preserved quinces is desired, cook the sugar with the quinces for a longer time and to obtain a dark pear sauce, bake the pears slowly with sugar and a little water in a covered dish. Fifth, to obtain variety in the flavor of cooked fruits, combine one fruit with another, as strawberries and rhubarb in rhubarb sauce, quince and apple in apple sauce, sections of peaches and pears in cored apples ready for baking.

At luncheon or dinners fruits make attractive and delicious entrees, such as compotes, fritters, and salads.

Compotes of rice or cream of wheat or farina are made in the following way. Cook the cereal, mould it into individual servings while hot, and in the center of each portion

place a canned peach or some raspberry preserve or any stewed fruit.

Fritters are made by dipping sections of fruit such as peaches or apples in fritter batter and frying them in deep fat. The sauce made of sugar, cornstarch, and water boiled together twenty minutes may be flavored with lemon juice, or the juice from the fruit, if it was canned fruit.

Fruit salads may be easily prepared by attractively arranging chilled fruit on crisp lettuce leaves. There are three varieties of salad dressing that may be served. French dressing, made of oil, vinegar, and seasonings and yolks of eggs; or boiled dressing, a cooked mixture of eggs, milk, vinegar, and seasonings. To the mayonnaise dressing or the boiled dressing whipped cream may be added.

For desserts the housekeeper has in fruit an unlimited variety. There is one kind for cold days, hot puddings with delicious sauces; one kind for warm days, gelatine desserts; one kind for hot days, ice creams, mousses, and sherbets. She can make the hot desserts when she expects to be busy in the kitchen for some time before the meal; gelatine desserts for supper on the day when she expects to make calls, or for Sunday dinner when she expects to go to church; frozen desserts in vacation time when the boys are home to crack the ice and turn the freezer for her.

Hot puddings may be grouped under a few heads; those made with a cake mixture, those with a baking powder biscuit mixture, and those with pastry. Place blackberries or blueberries or sliced peaches, or sliced apples in a buttered baking dish, sprinkle with sugar, dot with butter, and pour over the prepared fruit a one-egg cake mixture. Bake about forty minutes and serve with cream or an egg sauce. A baking powder biscuit dough may be spread over the fruit in place of the cake mixture. This same fruit may be mixed with a slightly stiffer cake mixture and steamed about two hours. To make apple dumplings, roll out baking powder biscuit dough or pastry, cut in five-inch squares, place a cored, pared apple in the center of each square, fill the center

with sugar, add a little cinnamon, a tiny bit of butter, fold the corners of the square together, invert, and place on a buttered pan. Bake forty minutes.

Another fruit dumpling can be made as follows: Stew blackberries or blueberries or sliced apples with sugar, and a little water. Drop by spoonfuls a soft baking powder biscuit dough into the boiling fruit, cover and cook twenty-five minutes. No comments need to be given for New England pies and turnovers, because they are famous and popular among all people.

In making the gelatine desserts, make a jelly of fruit juice such as peach, blackberry or strawberry, and lemon juice, boiling water, sugar, and gelatine. Cool and if desired add sections of peaches or whole strawberries. Chill until firm and serve with cream. A few nuts may be added.

A water ice made of grape juices and garnished with whipped cream, or a mousse made of peaches and whipped cream, or an ice cream made of a custard and thin cream and any canned fruit are all possible with home canned fruit.

It is with a sense of confidence for the winter's fruit supply that the thrifty housekeeper puts away her jars of preserves. The canned fruit with cake will furnish good desserts and the simple home meal can be "pieced out" with some preserves if unexpected company arrives.

We appreciate the oranges, lemons, grape fruit, pineapple, bananas, and other fruits sent us by other states. They bring variety to our already bountiful supply and help heap our tables with beauty and flavor and last, nourishment, in the form of water, of cellulose and of acids, both of which have a laxative action, sugar which yields heat and energy and helps flavor our diet, mineral matter which is essential in all the tissues of the body, and the body processes.

Form the habit of eating fresh fruit every day. Let it be the first course at breakfast. At night have a basket of clean fruit on the table in the living room. It will furnish

delicious refreshment for your guests when they drop in to spend a winter's evening and will create a spirit of hospitality and good cheer. (Applause).

THE CHAIRMAN: I wonder if the people in the audience realize how much hungrier you look than you did before Miss Hatch began her talk. My friend Patch here, who just moved, looks almost famished, to me. We have always been glad of any questions or discussions at any of our sessions, and we plan to carry out the same scheme this morning. We would be glad to have any questions.

A MEMBER: Mr. President, I generally eat an apple every evening about 8 o'clock. I am now about 80 years of age and I thought I would buy some 800 trees and carry me through to a century. (Laughter). I think that certainly nothing is better than an apple. Would you say eat a baked apple rather than a raw apple?

MISS HATCH: No, raw fruit seems to me more valuable in the diet than cooked fruit, but if a person, for any very special reason, cannot seem to take care of fruit raw, then cook it, but the raw fruit seems to be more healthful, accomplishes more.

THE CHAIRMAN: Well, that is a good advertisement, our friend here has been eating apples and has lived to be 80. I should certainly advise him to set out that orchard, and in the meantime some of the rest of us can supply him a few years until it comes into bearing. Are there other questions? I would like to ask Miss Hatch this question; it used to be an old saying that fruit was golden in the morning silver at noon and lead at night, if I remember rightly: what about that?

MISS HATCH: There isn't anything to support it.

THE CHAIRMAN: I have been eating lots of lead, if there is.

MISS HATCH: Really I think it is a very good thing to eat fruit at night just before you go to bed. The acids and cellulose are very good for laxatives, but of course we want to be sure it is ripe, morning or night.

A MEMBER: I want to ask you if it makes any difference in relation to your meals whether you have eaten a starchy meal and the various kinds of fruits, their effect on acid and digestion at the same time?

MISS HATCH: I said in my lecture that there are two kinds of fruits dependent on the composition, one kind we call food fruits and the other flavor fruits, but even if you eat the more concentrated fruits, such as the apple or banana, there is not enough carbohydrate there to interfere with the starchy meal. Of course if you eat nothing but potatoes and beans, then I should eat a watery fruit, but if you ate the average mixed meal with a certain amount of meat and vegetables, then any kind of fruit.

A MEMBER: Did I understand the Professor to say that she always pared apples?

MISS HATCH: Oh no, I said if you did, to use a silver knife. But in the skin there is a certain amount of mineral matter, flavor, and acid, which is very good for us.

A MEMBER: I would like to ask if the acids of fruits have any effect on aluminum?

MISS HATCH: If there is any action, it is so slight that we can neglect it. I always use aluminum at home.

A MEMBER: Is not the skin of the apple rather indigestible?

MISS HATCH: It might be for people who did not have a very strong digestion, but if you masticate it thoroughly, it will be all right. The peeling is less digestible, but if a person has an ordinarily strong digestive apparatus, the peeling won't do any harm, but it should be thoroughly masticated.

A MEMBER: Is not fruit more beneficial if eaten exclusively at meals and not eaten at all times of the day?

MISS HATCH: Well, it is better to form the habit of eating regularly, either three times a day or four times a day, and it is not a good plan to break over that rule for fruits or anything else, but if you need a forenoon or after-

noon lunch or are very hungry, fruits are very good things to take, because fruit is not as concentrated as some food, such as eggs and meat, and it will satisfy you and do you some good.

A MEMBER: I should like to ask the Professor the comparative nutritive value between vegetables such as carrots and turnips, and apples and pears?

MISS HATCH: If you were to take the total percentage of carbohydrates of the fruits you mentioned, and vegetables, it would be just about the same and the mineral matter as contributed by both groups of food. There is more acid in the fruit than in the vegetables, but very often in making out a well rounded diet, we should see that there are plenty of carrots, turnips, etc., and also plenty of fruit, because the difference in the flavor will stimulate the appetite, but the contribution is very much the same.

A MEMBER: There are some doctors who believe that fruit should be eaten between meals and that if you take it that way, you will not crowd your stomach so much.

MISS HATCH: I don't know but what eating between meals is a good thing; I find it agrees with me. There is another thing I have not heard spoken of in reference to fruit; as we grow old, the tissues harden, that is one cause of death; the acids of fruits tend to prevent the hardening of the tissues.

MRS. STORROW: It seems to me the question asked brings out a point which has impressed me always, and that is how little we know of what constitutes a balanced diet; what would be the qualities necessary to keep us all in good health? Not necessarily the amount or number of times we eat a day, but from what diet could we get the right proportion? I wonder if Prof. Hatch could enlighten us on that question?

MISS HATCH: Experiments have been tried over and over again on different kinds of diet and you find people vary in their opinions, but the general concensus of opinion among physiologists is that a mixed diet, one consisting of a

certain amount of meat or fish, and one with a good amount of vegetables, starchy vegetables such as potatoes and a less concentrated vegetable such as spinach, lettuce, etc., with fruit, makes the best diet. Does that answer your question?

MRS. STORROW: No, because that is so vague. I have tried for a great many years to get a definite answer to that question from doctors, but until last winter I never could get anyone to say that the human machine needs such a proportion of carbohydrates, protein, minerals, etc. Is not there some definite conformation of which the proportion should be the same?

THE CHAIRMAN: Mrs. Storrow wants a balanced ration such as we have for stock.

MRS. STORROW: I never could understand why our stock receives such intelligent and scientific attention and the human receives no attention at all.

THE CHAIRMAN: You ought to hear Dr. Wiley talk about that. He tells about a man who had a valuable hog in Illinois and the Government sent two doctors from Washington to look after the hog, and a neighbor had a sick child and couldn't get even one doctor to look after that.

MISS HATCH: Sometimes a doctor, in making out a diet for a person, will say, "See that the patient receives so many calories." A calorie is a measure of heat, and by experiment we have found that fat gives twice as much heat as carbohydrates and proteins, and the proteins are necessary for building the tissues. Suppose I need 2500 calories in my food—a tenth of those calories should be supplied by protein, in order to get the right amount of protein for the building of tissue. Now the only way to show that is to show you a meal. Supposing I had, for breakfast, fruit and cereal, an egg and toast and some sort of a beverage for heat, and at noon I had meat or fish and two or three vegetables and a light dessert, possibly with fruit and bread and butter, and at night I had for supper, scallops, macaroni and cheese and some nut bread,—you know I spoke about raisin bread—and some sauce and a piece of apple pie. Now my calo-

ries would be all right for the day. That is, if you have meat once or twice a day and vegetables at least once a day and bread twice a day and fruit once a day and possibly a glass of milk, you will get the proper number of calories in the right proportion. Does that answer your question?

MRS. STORROW: That is still too vague for my entire satisfaction. You have got there a tremendous variety of food. If we were taking care of that hog, we should have probably everything weighed out and we should not say that you had meat twice a day, but we should say exactly how much meat and what kind of meat and would know exactly how much meat and what kind of meat and would state exactly the proportions. Now my complaint against all the doctors I have ever consulted, but one, is that I never could get that definite proportion and then leave it to me to say how much of that food in all I should take, but what are the proportions necessary for keeping a person in health?

MISS HATCH: You see in our foods there is a great deal more variety than in food for animals. You can say give an animal so many pounds of oats, etc. I don't know exactly how it would be, but you have oats and corn, etc., to give to the animals. We have as food, meat, eggs, butter, beans, etc. The only thing to do is to get a table; there you have the composition of each typical food given, and you can buy tables which will give the exact number of calories, and of those calories the percentage of protein for every food we serve, and take that table and you can sit down and estimate exactly how much food you ought to eat for the day. If I were making out a diet for a family who were restricted for certain reasons, I should take this little book and sit down and work it out, because I could not remember possibly that I received two grams more for the beets than for something else; roughly, meat, eggs and beans are protein food; you want a good amount of them; also starchy things, such as potatoes and bread, and you also want watery vegetables, and to make the thing perfectly complete you must work with a table.

THE CHAIRMAN: Do you know what percentage of proteins, for instance, how many calories we ought to get from proteins, the average person?

MISS HATCH: Supposing you have 3,000 calories, a tenth of those calories should come from proteins.

THE CHAIRMAN: What are you going to do with with the other nine-tenths?

MISS HATCH: The other nine-tenths would come from fat or carbohydrates, any proportion of those; as a rule, your appetite will determine that, you cannot eat more than a certain amount of fat and naturally you take care of that by your own appetite.

THE CHAIRMAN: It seems that we could sit down with one of these outlines, and if we know that 10% comes from proteins, we could work out just what we ought to have.

MRS. STORROW: Then it seems that every house-keeper needs a table.

MISS HATCH: That is one reason why home economics has grown as it has. As soon as you open up home economics, you have chemistry and physiology and a certain amount of physics, which opens up a tremendous study, and then you can work intelligently.

THE CHAIRMAN: I should think if you know the percentages of these different foods, you could sit down with the analysis of the different types before you and work it out.

MISS HATCH: There are some doctors who give their patients tables and let them make it out.

THE CHAIRMAN: Mrs. Storrow, would you mind telling us the name of this exceptional doctor here mentioned?

MRS. STORROW: I would be very glad to; on account of not being able to depend on my appetite, I came here a year ago and was put on a vegetable diet. I liked it so much and waxed so well that I have kept it up ever since, but the doctor who put me on that vegetable diet gave me certain definite rules to go by, that if I did not eat meat,

I must have beans or peas or something to take its place, so he gave me a little table of the quantities contained in various foods and the proportion I would probably need to keep in health, and by keeping to that, I have done very well.

A MEMBER: I would like to ask the speaker if the amount of protein food one should have does not depend on his age and the work he is doing.

MISS HATCH: For children the protein does not vary as much as the total calories, and by calories I am talking about the measure of energy produced by the food you eat. As we grow older, the total number of calories decreases. In youth, you need more protein, and as age progresses, you need a little less protein. That is a rough average, a working average.

A MEMBER: I might say that I have been told that, with advancing life, we should cut out meat to a great extent, eat less and less meat and eggs and use more vegetables, fruit, bread and milk; that that is very conducive to health.

THE CHAIRMAN: That would agree with what Miss Hatch has said.

A MEMBER: Mr. President, I would like to ask the speaker what she thinks best for a farmer—I suppose we are all farmers, ought to be, if we are not, what is best for us to eat for energy, calories, etc., to make us do a good day's work?

THE CHAIRMAN: He is thinking about planting this orchard, I presume.

A MEMBER: If I am going to be a hundred, I want to know what to eat.

MISS HATCH: For years people thought that in order to be well and strong, they ought to have a lot of meat, but theories have changed radically since then and the meat has been reduced, you hear lower and lower estimates for protein; that is, we speak of protein as the food principle contributed by meat, particularly, but for a man or woman that wants to live a long while, he or she ought to eat a small

amount of meat or fish and then make up the rest of the protein with milk and eggs and peas and beans; in other words, don't make meat your sole source of protein, but also eggs, milk, cheese, beans, peas and nuts—nuts are very valuable as a source of protein and fat. They are very concentrated, and yet, mixed with less concentrated food, they are very good. Then you ought to eat carrots and turnips and onions and beets, etc., because they contain mineral matter which we find in fruit. Potatoes not as much in proportion to the total composition, because we always think of potatoes as contributing starch to such a great degree; and apples. Then it is not well to eat potatoes and rice at the same meal or potatoes and macaroni, because the cereals contain a large amount of starch, and if you are eating potatoes and a piece of bread, you are getting plenty of starch. If you are doing a good day's work, many people think it is better to eat the hearty meal at noon, and I think that is so, but for people who are in the city and have to pay a large amount of money for their meals and are doing a lot of head work, then it seems better to have a light meal at noon and a heavy one at night.

A MEMBER: Can they sleep as well?

MISS HATCH: Yes, I think just as well, because they have not been doing a lot of physical labor and the muscles of the body are not tired.

THE CHAIRMAN: I wonder if it would not be interesting to the audience to have you say just a word about these things here?

PROF. CHENOWETH: I would like for Miss Hatch to point me a way out of a difficulty; the doctor tells me to eat when I feel like it and when I am not hungry don't go to the table; my wife has a ration laid out just the same as the dairymen have for their cattle or hogs. Which am I going to follow, the doctor or my wife?

MISS HATCH: You will have to decide which will do you the greatest amount of good. I know that my brother, a few years ago, was told to eat only when he was hungry

and he got in the habit of going out and having an ice-cream soda or something of that kind, but sooner or later he got over that and came back to a regular day's ration at certain times. If the doctor has told you to do that, he probably has good reasons for doing so, and if I were you I would ask my wife to have the food arranged so that I could have the total food value during the day that the doctor had recommended. Under ordinary conditions it is better to eat at regular intervals.

I thought it would be interesting to people who do not use a great deal of fruit if they could see some samples of the various ways of cooking it. We did not cook any pies, because I think one always thinks of apples in connection with pies and we left that to your imagination, but these things represent a few unusual ways of preparing fruit and I have a recipe card in front of each one which you can copy if you wish.

THE CHAIRMAN: Prof. Chenoweth raised a question whether, if your wife has arranged a menu for you and the doctor has given you other directions, had you better obey the doctor or your wife. I don't think many of us would hesitate about that decision.

PROF. CHENOWETH: No, I should obey the wife. (Laughter).

THE CHAIRMAN: Perhaps we ought to stop our discussion now unless someone has a question he would like to ask.

A MEMBER: Prof. Hatch said that the peel of fruit was valuable. I want to ask about the peel of oranges and grape fruit.

MISS HATCH: It is very tough and I do not believe it could be digested unless you cooked it. We often do cook it for a confection and there is a good deal in it. There is an oil in the skins of oranges and grape fruit which is good for us and there is also a certain amount of acid and mineral matter which is good for us, but it would have to be cooked to be worth anything.

THE CHAIRMAN: It seems to me we ought to have worked up a fairly good market for fruit by this time. Now the next question is marketing it and I want to call your attention to a thing I meant to mention before, to the cover of our program—you will see that this young man has a market already developed and is proceeding to fill it. It may be interesting to you, I am quite sure it will be, to know that this is Prof. Chenoweth's little boy, and as my children are all girls, I might say he is the finest boy I have ever seen.

Perhaps we'd better pass now to our other two subjects, which are really very closely connected, the Marketing problem from the standpoint of the producer and consumer. We are going to start with the producer end of it first and then have the subject discussed from the standpoint of the consumer, and I feel that ought to round the thing out and give us a better idea of the whole subject. Ordinarily we don't give the consumer much chance here, it is all brought up from the standpoint of those of us who are producers.

We have asked Mr. Fred Smith, Director of the Essex County Agricultural School, who for many years was in active practical work, and with whom most of you are already familiar, as he has spoken here a great many times—we have asked him to talk on the subject of the Marketing of Fruit from the Standpoint of the Producer. I have great pleasure in introducing Mr. Smith. (Applause).

MARKETING FRUIT FROM THE STANDPOINT OF THE PRODUCER

**Director Fred A. Smith, Middleton, Essex County
Agricultural School**

Mr. President and fellow fruit growers :

When your President caught me at an off moment and telephoned me to take part in this program, I have such great regard for him and always feel like co-operating with him in any sort of work, that I carelessly said yes, and since that time I have been regretting my rashness in promising to do that work for him, but you will have to stand for the result.

In the discussion of the question of Marketing Fruit from the Standpoint of the Grower, I want to first tell you that I realize that the line between the growing and the marketing of fruit is not very clearly defined; they are very closely dependent upon each other, for letting down or carelessness on either side may result in the failure of the proposition.

Here in Massachusetts we have exceptional advantages on the marketing side, with such a large and dense population, as it were almost a continuous city from New York to Portland, and it is hard to imagine any fruit farm so situated that it cannot take advantage of these good markets. As fruit growers it is incumbent upon us to use all sorts of originality in taking advantage of these good markets.

In this discussion of marketing, I am going to take the greatest latitude in discussing it, and I am going to tell you that I consider that the marketing begins with the picking. I know that some of my hearers will say that I have gone back into the growing quite a way, but yet I feel sure that proper marketing begins with the picking of fruit and the first consideration there is that the grower and the market man ought to know the exact time for harvesting.

If you have ever conducted a large or small fruit enterprise and allowed the work of harvesting, that is the ripening, to get ahead of you, you will quickly realize the importance of knowing the proper time of harvesting, and the proper time of harvesting has a great effect on your results and receipts when you face your market returns.

For instance, in apples one needs to know the advantages of successive pickings on the early varieties and the importance of knowing the exact distance and time it will take to get that apple onto the market in order to get the proper results. You all know what the effect will be with Red Astrachan or Yellow Transparent if this little detail is overlooked; so I think we will all agree that there is a great deal of importance in knowing the matter of dates and times for picking. Think for a moment how important this is in the pear industry, to know the proper ripening time to get those pears properly harvested and properly cooled in order to get the highest marketable product.

Care in picking is of prime importance. A friend of mine this year found himself at harvest time with a crop of considerably over a thousand barrels of apples and his crew gradually slipping away, and he was forced to come here into the city and pick almost any sort of help that was offered, and I assure you he had a hard time in getting that crop under cover. I think it had a material effect in his returns, his sales.

I saw that crew working and I saw those men fairly tearing the fruit from the trees, many times leaving the

stems on the trees and many other times the fruit bud for the succeeding years going off with the twig and with the apple. So I think, in consideration of our orchard and particularly our marketing, we ought to consider the picking proposition very carefully.

Next to the picking problem is the problem of the package. For winter fruit, this is comparatively simple, because we seem to have settled down to the barrel and box as the package and this allows of comparatively less originality and latitude in handling the fruit than perhaps the summer or fall varieties. In this section we have been accustomed to use the Boston market bushel box very freely, and the more I have occasion to study it, the more I am satisfied it is a unique package, and while I presume it came in use largely to supply the needs of the market gardeners, yet today I consider this package one that lends itself to many of the conditions and situations very nicely indeed. I have repeatedly used this bushel as a package for mid-season fruit, to very good advantage. One of the best ways to use it is to have your supply of boxes come to the farm with the four sides nailed together and perhaps what is to be ultimately the top, slatted, but the bottoms not nailed. Then with your better grades of fruit it is possible to face them, or cheek them as it were, showing the cheek of the fruit and you get a very attractive package indeed. For hand-picked fruit, for small lots, I consider the bushel box one of the best packages we could possibly employ. Your mill men will do that work for you; it is possible to get them to put on this little light cover at a very little cost, usually, about one cent per box.

If you are catering to an especially good market and willing to give liberal measure, you can add to the efficiency of that box by putting a little riser on it before you tack on this temporary cover, and that gives your bushel the appearance of a full, complete package, so that the bushel box is a very satisfactory package indeed. There are many other packages which lend themselves to the use of one who is

trying to take advantage of a near retail store, a very good retail market.

I picked up some of the packages which I have employed in the past, this morning when I came through the hall. I have one package here which I have used for apples, and for plums and peaches and even for other fruits.

(Shows a small round basket with a wire bail.)

Later, in discussing the matter of marketing, I will try and divide the question of wholesale and retail and touch on this again, but I would like to call your attention to the usefulness of some of these smaller packages like this one before you now, to help you to get into that fancy trade.

About the first of August, if you are harvesting some of the attractive early varieties, I am going to say Early Strawberry, for instance, and put a stock of these little baskets on the market, when the child goes down with its mother to help in the morning marketing, I assure you that a great many of these baskets will be taken back home and it is surprising the amount of attractive fruit that can be marketed in this way. This is approximately a two-quart package and here is a four-quart package of the same type.

I had a personal experience which I want to tell you about. Before we had such a good market for McIntosh by the dozen, I succeeded in putting McIntosh on the Essex County City market in this package and even went so far as to have a hand in the retail price of that package. For instance, we were able to place these packages on the fruit stands and in the better grocery stores, where the package would retail for thirty-five or forty cents and we would receive for that package in that form twenty-eight or thirty cents; and that made a very satisfactory way of marketing McIntosh.

It was also a very desirable package for marketing strictly fancy Wealthy and I could easily imagine the extension of that package to some of the later varieties, varieties as good as Wagner, for instance, for dessert use. This is a package that I have employed to good advantage in

handling varieties like Red Astrachan and Duchess and sometimes Gravenstein, and I have been able to bring back to the farm as high as seven or seven and a half dollars a barrel for strictly fancy Red Astrachan packed in this form.

When you are marketing a mixed load, perhaps of vegetables and fruits, and covering a grocery trade, you will find that many times they will welcome a pack of this sort. This is bound to give some color to their display of fruit and vegetables and they are glad to get it.

Here is another package that we have found satisfactory. (Shows a flat, four-quart basket of the type used in the Georgia carrier). When you approach a grocer and ask him to come out and look at your stock and you display box after box of that type packed in this form, you will very often get a most willing and attentive customer. Then a package of that sort has great advantages at this time of the year, for the house-wife is glad to get a small package and this answers well. That package level full is marked here three quarts and a half, but filled it would come near to a four-quart package. With varieties as perishable as Red Astrachan, that might be as many as one would care to use.

There is another feature worth mentioning if you are covering that sort of trade; the grocery clerk welcomes a unit package of that sort which takes only a moment to pick up and hand to the customer. You are selling simply a unit and there is no weighing or measuring to do, it is a perfectly open package and is a very valuable package for that work. It makes a useful package on which you can come somewhere near realizing a dozen price for strictly fine fruit.

I would like to explain a little scrape I got into using this package; we packed some very fancy Duchess in this form, put them on the market and found the fruit-stand and grocery trade telling what fine dessert apples they were and had to withdraw that package because that is strictly a cooking apple and should not be put on the market under false colors. It had the bright stripes and so

closely resembled the Gravensteins to follow that it was very misleading.

Now there is another point I would like to bring out at this time, that is the desirability of buying new packages for the better fruit and using the old packages or the second-hand packages, (your bushel boxes, second-hand barrels, etc.) for the lower grades. I think this is particularly true when you are doing a fine berry business.

There is a little difference between grades of berry packages. This, (showing a strawberry box), is the grade known as the D. G. or dark ground grade, and this as the W. W. or White Wood. The difference in price is twenty-five to fifty cents a thousand, so that is a very small consideration, but there is difference enough in the looks of the package to warrant the better package, the W. W. or White Wood grade, and I think this is also true of your packages where you are employing the bushel or barrel. I think it will pay you to put the extra two or three cents into the better package.

The package question is a serious one at best, and of course it costs the fruit grower quite a percentage of his receipts, and yet I believe that it is a poor place at which to economize.

There is one other feature about using a Boston market bushel box, the Boston market bushel is a good legal tender, you can almost always get an allowance for the package or get your money back. I don't know just where that stands in the Boston market today.

MR. PATCH: The box is a legal tender for about eight cents.

MR. SMITH: And it would cost us about twelve cents to get a package we would like to put on the market with first class fruit, so it is better to put on the bushel box. Some growers are using great originality in the labels and packing and marking. Ever since the days of the Hale package and label "U. C. Top, U. C. All," others have been trying to modify and imitate it and I believe that every

farm should make an effort to introduce originality into their work at this point.

Many of you are familiar with the work of Mr. Mann, Charles Mann, over in Essex County, who, for this section perhaps, started the idea of packing apples in little split baskets, making it possible for us to get from our grocer a peck or half bushel of properly graded and packed fruit in that form, and that, I think, is very desirable; indeed many people cannot take at that time of the year, a barrel package, and many do not care to take the Western box. But getting fruit in that form is very desirable and this year Mr. Mann has been packing very fine peaches in these paper cartons, a dozen peaches in a box, and up in our part of the State we have been getting very favorable comment from that work. I understand that others are doing the same thing and I believe that bringing proper originality into our work is a thing we ought to aim to do.

We have been legislating on the size of the package; we have legislation controlling the size of the package even down to the quart inside the package, and you all know what that means on the fruit stands, sometimes a package is very slack packed at least.

Now I have found from personal experience that the last handful or the last ten per cent put on the top of that package was often times, by all odds, the most profitable. To give you specific cases, I found it possible to sell raspberries packed in this oval pint, so called, and good attention given to filling them carefully and facing them out well, and then carry them to the market in one of these single tiered trays, to give returns something like this; when carelessly packed berries on the market bring about eight or nine cents per box; berries packed giving attention to a full box and all the other details would bring about fifteen cents on the market. I have seen the same thing borne out in strawberry growing, growers who gave attention to filling the baskets, facing them out well, getting them to market with the berries uncrushed, in good condi-

tion, to realize fully as great returns, and I believe here is another point where the market grower can be resourceful.

This brings us up to a consideration of the packing. The packing is a very important thing. I feel sure, from my study of the program, that the one who is to speak after me will go over the situation perhaps overhaul us as farmers, as we should be, on account of our laxness in proper packing and grading.

It pays well to pack a uniform grade of fruit under the new law, under our Massachusetts law. I believe it is a mistake, even though all the conditions required by the law are met, to pack fruits of various sizes in the same package. We ought to aim to have the fruit graded well as to size and color.

I have spoken of the desirability of filling the package well. If you fail to fill the package properly in the barrel pack, of course you get into trouble at once, because shortly all the apples in the package are injured, but even in the open package this is of more importance than is usually realized.

The next consideration should be transportation. Possibly some of you have been close to Professor Sears and he has told you how he arranged it to have a trunk trolley line pass through his orchard, but for many of us it is impossible to get a trunk trolley line through the orchard and so we have the problem of transportation facing us very abruptly.

It is a big advantage to have a transportation line giving both passenger and freight service, and I am glad our laws have been modified so we can have that service. I have in mind a party thirty miles from Boston who said it took ten days to get a refrigerator car to the siding to pack fruit for the market. The express service is sometimes equally annoying, although I think I detect, since the advent of the parcel post, a little more attention toward handling express shipments in better shape; possibly they have more time, and I think the rates are more favorable,

but we still need a great improvement in the handling of express packages.

If one chooses to solve the problem for himself, of course he has to resort to the use of the market wagon, with its advantages and disadvantages, or the truck, and I believe we are at a time now when we should pay much more attention to the advantages of marketing by truck. My attention has been called to that very closely this Fall, not so much on the fruit side as on the market garden side, when I have seen, during the rush of the season, the truck run right out onto the field and the heavy crops have been handled directly from there. I believe the fruit man is going to get some ideas and help from this very thing. I believe also that the truck is going to be a greater adjunct to our business each succeeding year. Some of the light trucks have done wonderful work this year in marketing the peaches. I know where they have made runs of twenty, twenty-five and thirty miles from the orchard and handled an enormous amount of fruit, and I believe they are going to be each year more valuable.

I had occasion to use a truck in marketing small fruit as far back as 1908, and at that time it was quite a question as to whether it would lend itself to such work.; would it be possible to take perishable fruit like raspberries, strawberries, etc., to the market and handle the fruit in good shape? And we proved to our satisfaction that it would. It was over very hard roads, with heavy grades, and yet if we kept a reasonable speed, we were able to do it, able to get valuable fruits into the market in those open, single-layer crates, in perfect condition without the injury of hardly a berry, and I believe that each succeeding year the trucks will be of more and more use to us.

The next consideration is the market. There is very little I can tell you directly about the ultimate retail market, because I have had little experience. I have always looked on the retailing of fruit as more of a proposition for the peddler than for the farmer, and yet I know it is possi-

ble, by properly working a small town, for one to do a splendid retail business.

I do not know whether your Secretary is the originator of the idea of bringing the customer to the farm or not, but I find that being employed to good advantage and more and more each year. I have noticed this year, particularly in the marketing of the peach crop, that more of the peaches have been sold at the farm, it seems to me, than I have ever known before.

Where one is fortunate enough to have a farm located beside one of the main trunk lines of highway, I think they ought to aim to cater to that trade; ought to grade the fruit, pack it and present it in a form that will market as large a proportion of the crop as they can right at home. I know we had a peach crop in Essex County that was largely marketed right at the door, and where those men packed their crop so that the autoists going by purchased the package and used it up while on the trip, they almost always got a customer on the return trip. I believe that is a line of marketing that ought to be pushed to the utmost, I think one comes as near getting a hundred cents out of a dollar that way as by any form of marketing that I know anything about.

Then of course we have the wholesale market through the commission man or by direct sales, and the storing of fruit, either under the instruction and advice of the commission man, (which is often very valuable indeed and should be used many times to its fullest extent), or storing under one's own name and responsibility and afterward issuing his order to the commission man or otherwise as he chooses.

I would like to speak just a moment about some of the emergency marketing; I choose to call it emergency marketing because it appeals to me that way. I suppose when one loads a car with a coal scoop, using our valuable Ben Davis or possibly the Kieffer, down on the Eastern shore, that may be emergency packing and emergency marketing.

I have noticed that that method is on the increase. I hope to be able to analyze it a little more later and see what its advantages and disadvantages are, but I know this year a great deal of fruit came into Boston and other cities in that way, all the way from perhaps the better or larger sized apples clear down to the cider apples. In many cities apples came into the city markets this year and were handled through small presses and plants—more than I have ever seen before.

We are unfortunate in Massachusetts in not having good facilities for evaporating and canning, yet when these facilities are furnished, I feel sure that will be one of our good emergency market methods. The same thing will be true of supplying jelly stocks and stock for fruit filling, pie filling, etc.

Just before harvesting the new crop this year, we had a severe wind storm and orchardists in parts of the State found themselves with twenty-five or thirty per cent of the crop on the ground.

I want to tell you how one resourceful fruit farmer marketed that crop on the ground. He went to one of the large grocery stores doing a baking business and found that he could get a ready sale there for the fruit. The proprietor said, "Yes, we want to make a little early mince meat stock and we could use two or three cars now to pretty good advantage;" and he was able to market eighty or ninety per cent of that windfall crop in that way at a good price, about seventy-five or eighty cents a hundred pounds.

And then of course there is the question of feeding out fruit at home, which should not be overlooked. I think many times we can keep a percentage of that fruit at home and feed it out to the stock and find that it helps out the other grades so that the marketing of the other grades will more than make up for the fruit at home.

I think the New England fruit grower has been too keen to market too closely. I believe that the time is now ripe for the man marketing fruit to do some good co-opera-

tive work. I believe that through some sort of an organization we ought to now start a campaign of advertising and publicity that will help us to market the product from these young orchards which are coming in from year to year, and I think we need to go at that with a better and more definite plan than we have done in the past.

Personally I have had considerable experience in the handling of window displays of fruit and displays in other places, and while that is helpful to a certain extent, it is too big a campaign for the individual to carry on, ordinarily; he does not carry it on on a large enough scale, and yet I believe that, properly handled, it will be very valuable indeed in helping us to increase the sales of our own local fruit and carry valuable information to the consumer. Perhaps this is a project of the right size for an association like this to take up, but I feel sure that something like that ought to be done.

I know I have exceeded my time and I want to summarize this into two suggestions: first, as fruit farmers, we should aim for two objectives, at least; to put enough skill into our growing, packing and marketing to assure a good, profitable return, and second, and perhaps more important than the other, we should aim to give the buyer and consumer good value for our fruits sold. (Applause).

THE CHAIRMAN: We have a few minutes for the discussion of Mr Smith's talk. If you have any questions to ask, I hope you will let us have them.

A MEMBER: I would ask the speaker if he thinks that is a bushel box? (Indicating the Western type of apple box).

MR. SMITH: That holds a standard bushel, yes, but I was speaking about the Boston market bushel box, eighteen by eighteen by eight, which is nearer five pecks than a bushel.

A MEMBER: Would you advocate sending the McIntosh in the bushel box?

MR. SMITH: Why, no, but I consider the box far and away in advance of the barrel for marketing McIntosh. I consider McIntosh too good a fruit to put into a Boston market bushel box.

A MEMBER: I want to ask Mr. Smith if he used the small basket and wanted to get them into the Boston market, how he would pack the baskets to ship into that market? If there is any carrier for holding the small baskets?

MR. SMITH: We have had to make a carrier adapted to the truck and the market wagon, and that is one objection to packing that small package out on the farm; it is a hard package to handle; it is a rolling package, and yet you can fit your wagon or truck to handle them in very good shape, usually by building up some carriers.

A MEMBER: I would like to ask Mr. Smith right along that line—he said something about the truck—if he doesn't think there might be some special springs put in the truck that would be a benefit to the fruit grower?

MR. SMITH: There are some very desirable forms made now that can be put right on the body of the truck or wagon. They are built more on the principle of the old-fashioned bed spring and are very desirable indeed. In fact I have seen adaptations to be used where the fruit is being taken from the orchard to the packing house. I believe that giving attention to those conveniences is a good thing, and they are on the market.

MR. RICHARDS: In Marshfield, where I come from, where the Marshall berry is raised, we have now formed the Marshfield Strawberry Association, which is trying to control the Marshall strawberry. The Marshall strawberry is raised better in Marshfield than almost anywhere else, and there has been a movement to establish a Strawberry Association to enable them to control the market more, but the trouble is with us that all the growers there do not unite. Not more perhaps than a half or a third of those who send berries to the Boston market, and consequently the thing

cannot be controlled. I do not belong to it yet myself. I am studying the thing and so, accordingly this year we sent our berries in the trays you speak of, where the trays hold twenty-one baskets, and we pile the berry boxes up properly. Our berries this year in Marshfield brought, the first berries seventy cents a quart, sixty and seventy cents a basket, and went down to thirty-five and twenty-five. But when I used to be actively in the business, I was a pioneer in the strawberry business in Marshfield thirty-five years ago and had to send them by train. Now all are going by truck, and when we send about three or four hundred thousand baskets in that way by those trucks and they get here early in the morning, we get good prices.

THE CHAIRMAN: I should think it would be a fine thing to live in a neighborhood where the price of strawberries went **down** to twenty-five cents a box. In our section the price goes **up** to twenty-five cents. (Laughter.)

Are there any other questions on this paper?

MR. GILMORE: I should like to ask Mr. Smith if he can tell us anything about the cost of taking a small basket from the orchard to the retail store or wherever he ships them, either per mile or by the distance he has to go; if he has figured that out, per basket, so that he could tell us something about the cost?

MR. SMITH: No, I cannot give it to you off hand.

MR. WILLIAMS: I would like to know whether Mr. Smith considers the proposition of small package retail work profitable in fruit when you have not a large enough quantity to keep up the supply?

THE CHAIRMAN: Mr. Williams raises the question whether it is a proper line of marketing to attempt to develop the small package when you have not a large enough quantity of fruit to keep up the supply?

MR. SMITH: I think that is a wonderfully good suggestion. Probably not; that campaign would be more adapted to a farm doing a long season or a mixed fruit business. That is my feeling about it.

MR. SANDERS: The question I am often asked by apple growers up in Maine, New Hampshire and sometimes Vermont, is whether or not it is practicable and advisable to try to ship lower grades of apples in bulk and dispose of them that way, especially in big years, that is, ship them loose in box cars, for example, in order to cut down the expenses of marketing so there will be a little margin left for the grower?

MR. SMITH: I refer that back to the President.

THE CHAIRMAN: We do not ship ours that way. The question is raised whether it is profitable under any conditions to ship apples in bulk by car load lots or by boat, in order to cut down the expense. I should hope that most of us were not growing fruit that would be handled in that way. Some of our neighbors do, of course.

A MEMBER: In New York State, where apples are produced on a much larger scale than in Massachusetts, where men have two hundred and fifty or three hundred acres of fruit, they often have low grade fruit that should not be put in barrels and that should be distributed to the consumer at the lowest possible cost, which increases consumption and establishes the habit of eating fruit. In order to get that on the market at the lowest price, so it can be sold to the wagon peddler or push-cart man, and often to the small grocer at the lowest possible cost and return a profit to the grower, a great quantity of fruit is handled that way.

A vast quantity of fruit is put in cars in bulk and usually sells for seventy-five cents to one dollar and fifty cents or one dollar and seventy-five cents per barrel and sometimes higher, and in that way we place a great quantity of fruit in the hands of the consumer, or at least the peddler, at very low cost. This year we have an illustration of an economic condition that often occurs. The buyers in the orchard often use fruit that has not cost much money to bear the market down. When they pay a high price for the fruit, they cannot do this, they put the expensive fruit

in cold storage; then the farmer will flood the market for several months with a poor grade of apples, which cuts down the selling season for the high quality apples and creates market conditions such as we have at present. There is an unusual amount of good fruit in storage now and two or three months of the selling season has been occupied by this poor fruit which has cut down the price that will be realized on the better fruit; that condition is largely obviated, both for the grower, the consumer and the middleman, by putting more fruit on the market early in the season in bulk cars.

A MEMBER: I want to offer a suggestion that J. H. Hale, of Seymour, Ct., has adopted; he makes a point of leaving his apples until they are ripe, and the year I was there we had a heavy thunder shower and there were a good many perfect apples on the ground and he simply went to Ansonia, and New Haven and Waterbury and had signs printed in different languages that the people could speak and read, and he had no trouble at all in having anywhere from ten to fifteen peddlers come up there and take all the apples their wagons could hold comfortably, and sometimes more, at fifty cents a bushel, good fruit for immediate consumption. He realized fifty cents a bushel for that fruit and they took it right out of the orchard so that it didn't cost him much to handle it.

THE CHAIRMAN: We will now take up the question of Marketing the Fruit from the Standpoint of the Consumer, and we are fortunate in having Mrs. J. J. Storrow with us this morning, who is not only a consumer but a producer, and who will address us on this subject.

MARKETING FRUIT FROM THE STANDPOINT OF THE CONSUMER

Mrs. James J. Storrow

You are all such experts that I feel shy in speaking on such a subject as this, but my excuse might be that the consumer is not the expert but the ignorant person and I represent that ignorant person. Mr. Smith has covered so much of the few ideas that had occurred to me that I am afraid I have very little to offer. There is an old fable about the hands and feet and brain and all the other parts of the body striking and refusing to work any longer for the lazy stomach because the stomach did nothing. Of course the result was that they all grew faint and helpless and then they began to realize that they were all one part of one whole body and inter-dependent. Now that is the way it seems to me it is with the grower, the middle-man and the consumer. It may seem as if every one worked but the consumer, but after all, if the consumer did not consume, there would not be any particular work for the others to do.

As I say, I represent the consumer, who is inert and helpless at the mercy of the grower and the middle-man, unable to demand anything and yet governing production by refusing to consume what he doesn't like. Right here I want to pay a tribute to the dealer, who works so hard to give us the very best at a moment's notice. I am one of the kind that is liable to telephone my dealer twenty minutes or half an hour before dinner time, that I want some broilers and fresh asparagus and hot house grapes and pears and a few other delicacies of the season and want them at once, and they will get them around to us in twenty minutes. We

cannot keep house in that sort of way without the dealer to do it for us and they are mighty obliging people and while they will always be with us, it seems as if there should be more points of contact between the grower and the consumer; some system must be worked out by which the perishable fruits and vegetables can go by the shortest routes so that we won't get our berries, cherries and fresh vegetables either stale or spoiled.

The parcel post provides a possible transportation, and perhaps the telephone or perhaps this Association could be the middle-man between them, and perhaps in time we will send out an S. O. S. call for some strawberries for dinner which will be picked up by the grower and rushed to the nearest aero station, but at the present time we have got to depend on land transportation. As long as fruit must travel, the packing of it is of the utmost importance, but we wonder why the local growers have been so slow, so much behind, in letting the Western men get ahead of them as they have to a certain extent. It seems to me, now, from Mr. Smith's talk, as if they were catching up rapidly.

Take the cherries—why do California cherries come so beautifully packed, that although we know they are stale and tasteless compared with those of our next door neighbor which are tumbled helter skelter with the stems all sticking up, yet we can hardly resist buying the California fruit. The Western apples have been for years arranged so that you knew exactly how many would be in each box you bought, and it seems as if it was a little careless, as if the local growers had to wait for a law before they graded the size of their apples. Now it seems to me that any grower who markets his fruit according to size and quality, marking it A, B, and C, or one, two, and three, so that we could depend absolutely upon his mark, would make a hit with the consumer. Not only is the local grown fruit less well packed, but it is frequently more expensive. I heard of peaches which came from the best Connecticut orchards sent by express to New Hampshire and costing less than

those that were grown nearby, after the express was paid. In going about the country, I found that people picking berries have refused to sell them for less than I should have had to pay in Boston. It seems as if it would be fair to all to have one price on the farm and another price in the stores, and that the consumer and the grower might split the difference on those that the consumer bought on the farm.

I am told there has been a very interesting experiment tried on Long Island; the first incentive was to make fertile some land said to be unproductive, and the Long Island Railroad entered into the scheme, in packing what they call "home hampers." Those are hampers of mixed fruit and vegetables going directly from the grower to the consumer, and the Railroad rushes them through and they arrive very fresh and beautifully packed. When Mr. Smith spoke of co-operation, I wondered whether he meant merely co-operation among the growers or if he meant co-operation among the consumers and dealers as well. Our Government has done an immense work for agriculture of all kinds, and if the farmers ask for help in reaching the consumers more directly, it seems as if the Government would respond. As for the consumers, it is almost pitiful how quickly they respond to anything that is done up attractively. We are almost foolish in our gratitude, and the price we will pay as Mr. Smith has already borne testimony, but I wish that instead of simply tempting us, you would also try to educate us.

Now most of us don't know that there are any apples in existence except the Baldwins and Russets and a few of the early apples or a few Greenings. Now that is as far as we all know. How very attractive the grab bag is for old and young. If we could have home hampers and have a little surprise, have a sample of apples, of what could be sent to us if we liked that particular sample, it seems to me that it would be very attractive. Something in the way of a pear that is a little different from Beurre Bosc or Seekle or

Seldon, would add a charm we can never feel for the half a dozen brown paper bags in which we usually get our old stand-bys. The little road-side stands that have sprung up along automobile routes I am glad to hear have proven very successful; that seems such a reasonable way of developing retail marketing, but in developing that, I hope the automobile will not be made an easy mark; the consumer resents being taken in.

When I was a bride I started out with the idea of going to market several times a week and I did it persistently although I did not know any better what I was getting than if I had telephoned for it, but I was scared away and that avenue was closed to me for many years because I caught one market man winking at another with whom I was trying to trade; and you return with gratitude to your retailer when you think you are being taken in like that. When the growers over-reach and try to take advantage of our lack of organization, we shall turn back to the dealer every time. There ought to be good team work among us all; it seems to me that small growers could combine to advertise in the papers or through an organization like this so that the consumers would know where to telephone for fresh fruits and vegetables which could be sent directly by parcel post; then there should be an arrangement made to can all surplus fruit and vegetables, either directly on the farm or at some local industry. The new methods of canning are not difficult, and think how much more pleasant it would be to have our fruit and vegetables either fresh or canned than stale and have so much of it spoiled. It seems to me that a canning department would be an essential department of a fruit and vegetable grower. Of course a dealer will always exist for the less perishable product which has to be stored and distributed gradually, but he ought to be made to play fair and not try to corner the market, and hold back what we want.

One thing I would like to ask you growers, why you don't make more of such a crop as nectarines? Your Presi-

dent has made a mistake in saying that I have become a grower; I have not; my husband is a grower, and I am still a consumer, but my husband has been very successful in growing nectarines against a wall right at our place. They are not as delicate as those grown under glass, but they are very nutritious.

Now we have been an extravagant and shiftless people in this country, uneconomical in everything we do, but especially uneconomical in our treatment of our soil. When I was out West a few years ago, I was struck with the brave efforts people were making to get a living out of the land, dry farming the desert where there was only a muddy water hole for man and beast and no water whatever for the land. If people can live on such farms as we saw there, every farmer in New England ought to be a millionaire. No one knows what the future holds for us; we are wonderfully prosperous now that the rest of the world is fighting and we are supplying the tools to fight with, but once the war is over and Europe settles down to her industry again, we have got to look out and the best preparation we can make is to start intensive farming and to stop all the waste and get into closer touch with the consumer. (Applause).

THE CHAIRMAN: Mrs. Storrow has certainly given us a very interesting paper and a number of decidedly practical suggestions, it seems to me. I am not sure about the nectarine business. We certainly have walls in some parts of the State, which she suggested as being desirable. Now can we have a few questions on this very interesting paper?

A MEMBER: I would like to ask if it would not be possible for the consumers who live in the city to buy this fruit that the gentleman in the back of the room was talking about and can it themselves?

THE CHAIRMAN: Is that for Mrs. Storrow or the gentleman back there or some other consumer? You heard the question whether it would not be possible for the con-

sumers in the city to buy the carload fruit and can it for themselves.

MRS. STORROW: Many of them do, but my suggestion for canning was with reference to the perishable fruit which could not come in carloads to advantage and might be wasted if sent in carloads to the city.

A MEMBER: I would like to ask Mrs. Storrow if she means by the nectarine growing against the wall, the ordinary stone wall of the farm or a wall especially built?

MRS. STORROW: It is the ordinary brick wall of the stable.

A MEMBER: It is a high wall?

MRS. STORROW: Yes, it was a high wall.

A MEMBER: And the vine runs high?

MRS. STORROW: Yes, but I suppose the same thing could be grown against the house or any wooden wall. It was merely an experiment. We wanted some nectarines to grow under glass and some were left over and we planted them around and wherever we planted them they have grown and flourished with very little protection in winter.

THE CHAIRMAN: I think the gentleman was misled by my joke; my wife says they frequently need explaining. He evidently thought that the walls we have were adapted to that purpose.

A MEMBER: I would like to ask the speaker why she expects to get first class fruit from the farmer and split the price that the market man would charge, instead of paying the full price as she would have to pay in Boston?

MRS. STORROW: The reason under those circumstances would be that the consumer carries it home; the market is brought to the farm and it gives you a little bit of a grouch if you think that the grower is getting the highest price out of you when he is getting a great deal more than he possibly could through the ordinary dealer.

MR. CLARKSON: I think that Mrs. Storrow has brought a good point to our attention. I did considerable business along this line selling directly to the customer

coming out to my farm in an automobile and I always liked to have them come back again. I have tried not to be exorbitant in selling them the fruit, giving them a little lower price than the price at the market. You must remember that we are paying nothing for transportation and I think we might do well to make them a present of a few small baskets of fruit, give them a small basket when we sell them four or five dollars' worth.

MRS. STORROW: Excuse me, but I think we want justice and not favors.

A MEMBER: Perhaps I might speak just a word on that line of this retail marketing. We found that the people who came in the automobiles would not pay as much as we could get wholesale in Boston for it.

THE CHAIRMAN: You must have a bad class of automobilists; we get along much better than that out our way.

A MEMBER: I would like to ask Mrs. Storrow if the average consumer in the city knows when the flood season of perishable products is on? That is, there is a time that the producer knows when Elberta Peaches are flooding the market, there is a time when strawberries are flooding the market, but does the average house-wife in her home know when that season is at its height and attempt to take advantage of that?

MRS. STORROW: I think the average house-wife is a terribly ignorant person. (Laughter). I don't think she knows much of anything if you take into account the house-wives of the city who have never seen the country and know nothing whatever about crops. They know that there may be a supply that sends the prices down, but that is the most they can be expected to know.

THE CHAIRMAN: It seems to me that she is frequently lacking even that knowledge; there may be a flood on, but she does not get any inkling of it in the price she has to pay.

MR. PALMER: There are two or three experiments of this kind that have been made, trying to educate the con-

sumer. The great difficulty with the house-wife is that she does not know and has no way of finding out. It needs publicity and there are very few individual growers who produce enough stuff to pay them to advertise to inform the consumer what is in the market. There are two Associations that have tried it; Mr. Atwood, of New York, who is a man of very large means, has a very large grape fruit grove outside of Tampa, and his production this year is very large, and he decided that he would carry on a campaign of National publicity for his grape fruit, and he told a friend of mine that he had found it paid him, there was a demand for his grape fruit and he would sell it at much more money than enough to pay the cost of advertising, but to do that is only possible because he had a very large amount of fruit.

It is the same way with these Sun Kist oranges and this fruit campaign from Florida. It costs a vast amount of money for the consumer to be informed what is being offered and directed what to buy, and the average producer, no matter how large, is unable to do that. Another point, the average consumer to-day does this, they will take an interest in any new scheme of selling for a very short time, but what they want to do is to save labor. The average house-keeper to-day telephones the grocer what she wants. The idea is that she doesn't want to bother, and if you get her interest aroused by some campaign, she will start for a few days and keep it up and be all interested, but by the end of three or four weeks it dies down. We tried that in New York two or three years ago, and it became quite the thing to do, to come up there and buy. There were automobiles around this market in the morning and everyone was talking it over. We had an arrangement whereby when they arrived a boy followed them and carried everything back to their barrel, which was shipped home for a quarter. For a while it was the thing to do, go up in the morning, and everybody was there, and then people got tired of it and gradually it petered out.

MR. JENKS: There is another phase of the idea of the

price which we charge to the city customer coming out to our farm which has not been touched upon, and that is the necessity of the average producer protecting his retailer, protecting his regular channels of trade, wholesalers and retailers. If he is going to undersell them at his farm, they naturally are going to feel somewhat opposed to it and less inclined to work his products in the city. Also the average city consumer coming out to the small farm is more a nuisance and consumes more time than the added price they are willing to pay. (Laughter and applause). Mr. Rice has just told me of an example that his people had last season that is typical, he said, of many; an elderly man came out in his limousine and wanted a basket of peaches, went through the packing shed, pinched the peaches on top of a good many baskets, spent considerable time and finally took one basket away. Unless the grower is doing a large enough business to warrant keeping one person on hand to attend to these orders, I think they are not getting much for their time and labor fussing with the consumer at the farm.

THE CHAIRMAN: I think Mr. Jenks brought up an important phase of the question right there; certainly the idea of keeping on friendly relations with our retailer is very important.

A MEMBER: I know of a case in point; a Boston woman, forced to go into the country for her health, bought a farm. She found that she had surplus fruit and berries and poultry on her farm, and she built beside her farm two bulletin boards regular black-boards like those used in school, and every morning she went out and marked for the automobile trade the things she had to sell and the prices, Jersey milk, eggs, fruit, whatever she had, and she always had ready a certain quantity packed to deliver. She built up a trade that she told me reached, in one year, \$2,000. That seems to be high, but she certainly built up a trade. People came to her stand as they came to a market. There was the price for the day; "I've got this to sell, it is ready to deliver"; and she found that they treated her just as they

treat the market man. She showed the goods in an attractive form, always a little beneath the city market price because she was not meeting the cost of transportation and delivery.

MRS. BELT: If we are going to sell to the consumer, why don't we ask a good price? Why do we have to ask a small price, lower than the retailer. I am in business and I sell direct to the consumer. I ask a very fair price, a high price, some people tell me, but I have a fine class of trade and my customers come back to me every year and I get a good price for everything I sell, and I don't know why the farmers—why should we ask a low price for our goods when we can get a high price? (Laughter and applause).

THE CHAIRMAN: I don't think we should, but still I think that Mr. Jenk's point is very well taken; you will find difficulty, unless you are marketing all of your products on your farm, in maintaining a lower price there and making concessions to your customers who come out there, as against the customer who buys your fruit from the retailer in town.

SECRETARY BROWN: I think one point that has not been thought of is the freshness of the goods delivered right in the orchard, on the farm. The consumer who pays the same price at the orchard is getting very much fresher goods than the one who goes to the retail store, so that when people come to my place, I tell them I charge the same price as they would pay at the store, but they have the choice of what they see there, which of course is very much larger than they would have at the store; and also I usually have a few ripe peaches that we give out as samples, so that they go away eating, which of course they couldn't do at the store—make up a little extra that way, but freshness is the main point.

A MEMBER: I think there is a reasonable way that the consumer and grower can get together on some of these matters. Now I have frequently, for small fruits, gone out on the farm where they were raised, and in every instance

the grower has handed me an empty berry basket and asked if we cared to pick them ourselves. Of course we were more than delighted, it was a novel experience to go and pick the ripest berries you could find, just the very ones that the grower wanted to get rid of, you got the freshest and best he had and you paid a fair price for them, you saved him a little labor when he handed you the basket and you paid for them and went away.

MRS. STORROW: I would like to say, about the price, it all depends on whether the growers want to build up a retail trade. If they want to bring their fruit directly to the consumer, they must make some concession to make up for the convenience of being able to telephone to your dealer around the corner and having it sent around in quick time; there has got to be a division of advantage on both sides.

A MEMBER: There are various sides to all these questions. I happen to own a small farm in Worcester County. I am a pretty poor farmer, but there are some very good ones about me and one man raises a good deal of small fruit. People come there to get it, and if they want a crate or half a crate, he will tell them it will be ready Tuesday, and so they go there Tuesday, and if for some reason he has sold it or it is not ready until Wednesday, they have to drive out twice, and when they get there he says, "I don't know just what the price is in the city, I will find out what the price is today and send you a bill." He doesn't know; on the other hand, there is another farmer on the other side of me who raises peaches and this last year was his first crop of any size. He had 15,000 or 20,000 baskets and catered particularly to the automobile trade. He put up signs for a mile or two on each side of his place and asked me the privilege of putting up some signs on my trees, which I granted him, and he specially catered for that trade, charged them a round price and sold them right on the farm for more than he could have gotten if he carried them 15 or 20 miles to Boston or Fitchburg or Worcester.

MR. PUTNAM: There is a question that has not been brought up, that is whether the farmer's and his wife's time is worth anything or not. The consumer expects a farmer to deliver at the door, and doesn't seem to think it costs the farmer anything to deliver. It is a question whether the time of the farmer is worth as much as the time of an errand boy in a grocery store. Then, when it comes to the trade this gentleman spoke of that was advertised on the bulletin board on the highway, someone has got to wait on those customers. They come there in an automobile and usually want to talk and ask about things. Is the time of the farmer's wife or the boy hired to attend to it worth as much as the time of the boy hired to wait on customers at the country or city grocery store?

I might say that I am engaged myself in the parcel post delivery of farm products from a farm way up in Maine, to New York City, and it took me a year and a half to get the trade I have. We have more or less correspondence and someone has got to attend to it. If the farmer hasn't a stenographer, he must put his time or some one's time against that of the stenographer of the merchant, and it is a question whether his time is worth anything or not.

MR. WILLIAMS: I was particularly interested in what Mr. Jenks said. It seems at least charmingly inconsistent to me for Mr. Jenks to state that we have got to keep up our prices on the farm to protect our dealers and middlemen, when pretty nearly every convention I ever attended, the cry seems to be to get rid of the middlemen. We talk about getting rid of the middlemen so that we can get more than thirty-five cents of that dollar that the city man pays, and yet we are going to protect our dealers by high prices at the farm. I don't know how to explain that, it seems unreasonable, anyway. This year I happened to do quite a large business with automobile parties on peaches, and I found that it paid to take a little bit and give a little bit. I charged more than I could get on the Boston market, but at the same time I did not charge as much as the consumer

would have to pay for peaches in a local market, and it worked out to the advantage of both myself and my customers and I expect a good trade next year.

A MEMBER: It seems to me that one of the worst features of the consumer and producer question is this, that in times of glut, when the price is down, the consumer does not get the benefit, the retailer does not reduce his profit, in fact he is going to take more and keep the retail price up which does not help to move that fruit. I saw an instance a year ago this fall, when good apples were selling at thirty-five cents a bushel, and I took occasion to visit a few of the stores around some of the smaller towns and the average price at that time was about 10 cents for three pounds or about \$1.60 a bushel; that was what the consumer had to pay for those 35 cent apples.

A MEMBER: It seems to me that the fruit growers are laboring under a rather difficult situation by trying to serve two masters at once, the middle man and the consumer. They cannot seem to make things work well. I know of a gentleman who sold his apples last year direct to the consumer, and through the kindness of some friend that wrote a little piece in the paper about it, he got orders for 1500 barrels of apples; that was a great deal more than he had; he supplied what he could himself and turned the rest over to his neighbor. I suppose that he advertised that he was willing to send them anywhere, I think, in New York; I don't know whether the price was given or not, but the man that had the apple, told me himself, that he had orders from every New England state, for 1500 barrels. That's Dr. Pritchard, a man well known to many of you here.

THE CHAIRMAN: If I may take just a moment, I would like to give you one experience. I think we helped both parties. Of course if you are going to throw the middleman out altogether, that's all right, but usually you cannot do that. We were marketing peaches there at the farm and put a certain price on them, then we sold at wholesale to our retailer up in town enough cheaper so that he could

sell at the same price, and we had the experience of keeping the price down to the consumer in town. Repeatedly they asked if we would not raise the farm price, saying, "It's no use for us to charge more than you are charging at the farm," but we kept the price down. It was a large price compared to what peaches were selling at most places, but we kept the price down to the consumer in Amherst and Northampton by not raising the price at the farm and by selling a little under to the middleman.

MR. GILMORE: I would like to say a word about the way we worked it on our place. We delivered to the retail stores in town but we do not deliver to the consumer, and that protects the retailer. At the farm we sell at a lower rate than the retailer does in town, but the retailer delivers so that the consumer is getting extra service, which of course they must expect to pay for if they buy from the retailer. If they come out to the farm, we expect to sell to them a little cheaper than they can buy from the retailer, to pay them for coming out there. In that way we have had no trouble with the retailers in town at all; they understood our price system and agreed to it.

THE CHAIRMAN: I suppose we ought to close this discussion. There are a few matters to which I want to call your attention before we adjourn. In the first place, if there is any special question in the list you want discussed, we want to give you an opportunity to have that brought up at the present time. "How can we secure a more accurate crop estimate?" Mr. Sanders wants to say a word on that. I might say, for Mr. Howard's benefit, that we met in conference here yesterday and are planning for another at 1 o'clock today, to discuss that among those who may be specifically interested. Perhaps that may be one of the best ways to get around it, to invite you to come here at 1 o'clock, when that question may be brought up. I think there is no question but what the present crop estimate is unsatisfactory and we are trying to have it improved.

Committee on Crop Reports appointed, A. R. Jenks, I. l. Margeson, Richard Hittinger.

THE CHAIRMAN: Number 24 has been called for, whether it is advisable to plant more pears. Mr. Margeson, would you mind saying a word on that?

MR. MARGESON: Mr. Chairman, I think we'd better learn how to grow pears successfully before we plant any more. I think a good many of the pear growers are having a good deal of trouble. I myself am the grower of a young orchard, and what I would like to do is to cut the pears all out, get rid of them. I don't know that they are so very profitable unless we grow certain varieties, and it seems to me that you get a nice crop of pears pretty well through and you are very apt to lose the foliage of your trees and won't get a matured pear. I think we have got to take into consideration the pear psylla and thrip and be able to take better care of them before we plant more pears. There may be a field for pears that we have not got at the present time, on account of so many of the old orchards going out of business.

THE CHAIRMAN: You remember yesterday Dr. Parrott said that a great many growers were planting them in New York on account of so many of the old trees going out?

A MEMBER: I raise the Beurre Bosc and the Seckle; I get \$3.50 a bushel for the Beurre Bosc; isn't that enough?

MR. SANDERS: There is one means for improving the crop estimate in regard to apples; I am making a sort of survey of the apples over the state and I have this week sent out the inquiry, asking for the names and addresses of growers by town, from one to four persons in each town. Now there are a number of the men in this audience to whom I sent them and a number of you have told me that you sent them back. First of all, I want to thank you for your co-operation, and in the second place I want to ask any of the others of you who have received the lists asking for the names and addresses of all growers in your town, to fill them out. It is information that will be extremely help-

ful to us or to anyone who is attempting to do anything for improving the growing or estimating the crop, and in turn will be useful to you and I would like to urge upon you the making out of a list and mailing it back to me promptly.

MR. MARGESON: There are one or two things I think we should not forget; we have enjoyed the hospitality of the Massachusetts Horticultural Society in having the use of their hall here and many other courtesies, and I would like to move a vote of thanks to the Massachusetts Horticultural Society.

The motion was seconded and adopted.

MR. MARGESON: There is another matter I think it would be well to take up at this time; we had a good representative of the Department of Foods and Markets last evening in Mr. Emerson and I am sure we appreciate what New York has been doing for the grower, and I would move that it be resolved that the Massachusetts Fruit Growers' Association congratulate the people of New York State on having their Commission and Department of Foods and Markets and on the valuable and progressive work that has been done in marketing farm products, and that we send a copy to the Governor and other officials of New York.

The motion was seconded and adopted.

MR. JENKS: I would like to move you that the Association extend a vote of thanks and appreciation to the Superintendent of the Trade Exhibit, Mr. Sawyer. Mr. Sawyer has worked hard in this matter for two or three months, even going as far west as Rochester, New York, to get those two fine graders for us, and has done more than any other officer of the Association to make this convention the fine success it has been.

The motion seconded.

THE CHAIRMAN: I should like to suggest in this connection that we have at least one or two other members of the Association who are constantly working hard and we do not always pass a vote of thanks for them, and that is our good Secretary and his wife. If there are no remarks on

this motion, all in favor will say "aye."

Motion adopted.

MR. MARGESON: I think it would be well for us to move a vote of thanks to those who have efficiently served us in the capacity of speakers. I move that we extend a vote of thanks to them.

Motion seconded and adopted.

THE CHAIRMAN: One question which is usually brought up at this last session of our Association is the question of where we shall hold our next annual convention. Are there any suggestions on that point?

SECRETARY BROWN: I move that that be referred to the Executive Committee with power to act.

The motion was seconded and adopted, after which the meeting took recess until 2 P. M.

SATURDAY AFTERNOON SESSION, 2 O'CLOCK

With the Massachusetts Horticultural Society

Hon. Wilfrid Wheeler in the Chair

THE CHAIRMAN: This session of the program is held by the Massachusetts Horticultural Society in its regular lecture course. We have already had two of our Saturday afternoon meetings, and next Saturday afternoon we are to have with us Dr. George T. Moore, of the Missouri Botanical Gardens, who will give us an illustrated lecture on those gardens, and we would like very much to have everyone now here, come and extend the invitation to any friend who may be interested.

To-day we have with us a man who knows the subject of the fertilization of Apple Trees and various other agricultural crops thoroughly, and as the fertilizer problem this year is one of the most important ones which the farmers are facing, we are very sure you will listen with great attention to Dr. Lipman this afternoon, who will speak to you on Fertilizers for the Orchard, and it gives me great pleasure to introduce to you at this time Dr. J. G. Lipman, of New Brunswick, N. J. (Applause).

FERTILIZERS FOR THE ORCHARD

**Dr. J. G. Lipman, Director Experiment Station,
New Brunswick, N. J.**

There may be persons in this audience whose mental attitude toward the subject that I am to discuss may be that of the man from a remote rural district who visited the Zoological Garden and saw a giraffe for the first time. He looked at the ungainly body of the animal, his feet and his

small head and long neck and shook his head dubiously and said, "There ain't no such animal."

Now there are people who may be inclined to think that the matter of fertilizers for orchards is a matter of very subordinate importance, and there is something to be said, perhaps a great deal to be said, on that side of the question. Those of you who have read the publications of some of our stations, notably the New York Geneva Experiment Station, the Pennsylvania Experiment Station, the New Hampshire Experiment Station, may have come to the conclusion that many soils contain apparently enough plant food to make fertilizers unnecessary in the growing of apples. At least in the fertilizer experiments which have been carried out in the past and in other states, fertilizers now and then have failed to show any increase as to crop yields or any serious modifications in the quality of the fruit. Making that allowance for the failure of fertilizers to show results now and then, it remains true nevertheless that the fertilization of orchards is a question which is deserving of consideration and is in every way a practical question. This morning I looked through, with a great deal of pleasure, the collection of books upstairs, and to refresh my memory I turned over the pages of some of the older publications on fruit growing.

Now I should like to quote to you very briefly one or two authors who had thought of the fertilization of orchards 100 years ago or 60 or 70 years ago. You will find upstairs a copy of a book called "The American Orchardist," by Dr. Thatcher published in 1822. In it you will find this: "It has been ascertained by experience and observation that apples, pears, peaches, etc., attain to their highest perfection only when the soil about the roots is kept open and frequently manured." He says further, "The process of Nature is greatly assisted by such substances as cause the greatest degree of fermentation when buried in the earth," and recommends materials that were available in those days, the use of bodies of dead animals, hair, wool waste, horns, hoofs, woolen rags and things of that sort that are waste products

but contain plant food. You will find something very similar stated by Thomas, who published a book on fruit growing in 1867. These older observations are quite pertinent when taken together with the fairly recent publications of some of our stations showing that apple trees growing on clay loams or silt loams often fail to respond to applications of fertilizer, and more than that, there are men as you know, who have been eminently successful in growing apples under the so-called sod mulch method.

In growing apples by means of the sod mulch method, a double crop, in a way, is being produced on the land; a certain amount of plant food must be placed at the disposal of the trees themselves; a certain amount of plant food must be placed at the disposal of the grass growing between the trees. The experience of Mr. Hitchings is cited as one of the striking proofs that not only may plant food be unnecessary to some extent, but that there is enough plant food for the trees themselves as well as for grass which may be growing in the orchard. I wanted to make this statement to be sure that there is no misunderstanding on the subject, and to show you later that the observations of apple growers of 100 years ago are sound and that in spite of the exceptions, the day comes sooner or later in every apple orchard when the addition of plant food from one source or another is worth while.

Possibly if apples or pears or peaches are an annual crop, we should realize the plant food relations a great deal more definitely than we realize them today because of the long period through which the trees are enabled to accumulate plant food, the long growing season of the tree, but it is true nevertheless that taking the analyses of fruit and the leaves and the twigs and trunks of the trees, that there is being removed in an apple orchard, through an average of ten years, 50 or 60 pounds of nitrogen, about 15 pounds of phosphoric acid and 50 to 70 pounds of potash, and when you compare the plant food draught caused by fruit trees with that caused by annual crops like corn, you will admit

that fruit trees are a more exhaustive crop, surely as exhaustive a crop as annual crops which we may grow on the land of the same character, and that will explain to us why failure to respond to fertilization within the first two or three years in the life of the orchard does not at all indicate that there will be failure to respond to fertilization later on.

Perhaps one of the most impressive experiences I had in this connection was what I had in South Jersey where we have a peach orchard, for experiment. Prof. Blake, our horticulturist, pointed out to me a year after the trees were set out, the amount of wood growth of those trees was more than sufficient to indicate that plant food was being placed at the disposal of those trees in adequate, perhaps excessive, amounts. It happened that these trees had been planted on very poor, sandy, gravelly loam. The soil had been under corn a year or two before that and the corn finally ceased to be profitable.

Prof. Blake claims that the land finally refused to grow snap beans when the trees were set out, and he said to me, "It is very well to talk about fertilizers, but I am inclined to think that if I am to take the trees themselves as a guide, that there is ample plant food in the soil and that the use of fertilizers would not be justified". I said to him, "I am not a fruit grower, I do not profess to know anything about the production of it, I do not profess to know very much about peaches and peach trees, but I am willing to make this statement, that within a year or two or three years, we will realize that profitable production of peaches on this particular soil is not possible without the use of plant food from outside sources.

Since then, we have found that the quantity of fruit and the size of the fruit is almost in direct proportion to the amount of nitrogen which we have applied in the spring in the peach orchard. We have used quantities of 50 pounds per acre, 100 pounds per acre and 150 pounds per acre of nitrate of soda and we had almost a proportional increase where the larger quantities of nitrate of soda were

used. I have talked to other peach growers in South Jersey and they admit that where the trees are set so close together as to make the supply of nitrogen through cover crops impracticable, the use in the spring of readily available nitrogenous fertilizers is necessary if the size and quantity of fruit is to be secured.

One of the old writers that I quoted a few moments ago points out very clearly—I am sure I could not improve on his statement when he says that the fruit grower himself should be the judge whether his trees need fertilizer or not. He says if the annual twig growth is two or three feet or more, the chances are that the land is supplying enough plant food for the needs of the trees, but every fruit grower, as he puts it, can decide with certainty that if the twig growth is less than one foot per annum, his trees need plant food. I take it that every progressive fruit grower is quite familiar with these facts and relations and that for me it would hardly be worth while to dwell on them to any great extent.

I do think however that it might be of interest to you to consider, in the first place, that because of the heavy draught on the plant food resources of the soil, the trees must be supplied either from the soil resources or from outside sources. If the soil, as may be shown by analysis, is rich enough in plant food, particularly manurial plant food, the use of commercial fertilizers may not be a matter of importance.

If the soils are not naturally well supplied with plant food, the use of commercial fertilizers or of other material containing plant food, sooner or later will become a matter of great importance; hence let us take a little time in answering the question whether, under average conditions, the plant food in the soil becomes available fast enough to supply the needs of the tree? There is a great deal of misconception on this point. We are led to think that because the trees have a long growing season, it is the amount which may become available throughout the growing season that

will determine the growth and the production but that is not so. You must remember that the growing process is a gradual process, that there are certain checks to this gradual process, that there may be relatively rapid growth through a period of ten days or two weeks, depending on the moisture and temperature relations. You will also remember that the soil machinery on which you depend for making plant food available is influenced directly by moisture and temperature conditions. If you could sterilize your soil by means of heat or chemicals, the production of available nitrogen compounds would cease, and no matter how great an amount of nitrogen the soil might contain, it would be of no use to crops unless there were bacteria and other invisible plants active in decomposing the vegetable and other compounds in the soil, so that out of these compounds simple nitrogenous materials may be formed that could be used by the trees or other crops, and in so far as the activities of the bacteria in the soil are checked, the growth of the trees themselves is checked. In order to have, then, growth that would be adequate for profitable production, plant food must be produced, not in amounts merely sufficient for a certain amount of growth but a greater amount of plant food must be furnished if there is to be profitable growth.

We often wonder, those of us who study plant food relations, why it is that the fertilizer formulas of the most popular fertilizers do not correspond at all with the proportions of plant food that the crop takes out of the land. I said a few moments ago that your apple orchard of bearing age may be taking out 60 pounds of nitrogen and 15 pounds of phosphoric acid and, we will say, 60 pounds of potash per acre, per annum. That means 4 times as much nitrogen as phosphoric acid; four times as much potash as phosphoric acid. But do we, when we buy fertilizer, a fruit fertilizer, do we ask for, let us say, a four-one-four formula. You know that we use more phosphoric acid in proportion in our fertilizer mixture than we use nitrogen or potash. Did you

stop to ask this question and to attempt to answer it—why is it?

As bearing on the same point, I want to call your attention to the fact that farmers in Connecticut, on Long Island, in Southern New Jersey, in Maryland or in Virginia are producing very much larger crops of all sorts on their sandy soils with a plant food capital which is half as large as that contained in the heavier soils of Central New Jersey or New York or Pennsylvania or Maryland. A brother of mine who is farming in South Jersey raises 80 bushels of shelled corn per acre on land that contains just under one tenth of one per cent. of nitrogen, about .08% of phosphoric acid and a little under 1% of total potash. At New Brunswick the soil contains a little over .02% of nitrogen, more than twice as much; it contains .16% of phosphoric acid, twice as much, it contains over 2% of potash, more than twice as much, and we think we are doing well when we grow 50 or 60 bushels of shelled corn per acre.

It is not only the amount of plant food capital in the soil, but the rate of circulation of that plant food capital in the soil, and that applies as well to the growing of fruit trees as it does to the growing of any other crop, but we are apt to overlook it and we are apt to overlook, moreover, that some kinds of plant food circulate in the soil a great deal more readily than other kinds. We forget that phosphoric acid does not circulate in the soil as readily as does nitrogen or potash; perhaps that is the reason why we do not follow in making up fertilizer formulas, the analyses of crops indicating a certain relation of nitrogen to phosphoric acid and potash.

The late Mr. Bowker, who was one of the pioneers, as you know, in the fertilizer industry, used to tell how, in the early Stockbridge Fertilizers, the formulas were made up on the basis of the composition of the crop substance, and phosphoric acid was not used in as large amounts in proportion as it is now, just because the analyses indicated that the plant does not need as much phosphoric acid as of other

ingredients but actual experience taught the farmer and those who experimented with fertilizers, that it is not only a question of the amount contained in the plant substance, but the circulation of the plant food in the soil, and in orchard fertilizers we have to face this very question and we have to consider not only how much plant food there is in the soil, but how fast that plant food may be made available; and therefore if you can make the plant food in the soil available fast enough, and if the natural supplies in the soil are great, the introduction of plant food from outside sources may not seem to be necessary. I want to make that particular point quite emphatic. It depends on the natural supplies, in the first place, and on the rate at which the soil supply may be changed into such forms as may be accessible to the crops. For this reason, the fruit grower will concern himself, in the first place, with such methods as will enable him to utilize in a more thorough way, the plant food in the soil.

Prof. Gourley is here from the New Hampshire Station, and he was telling me this morning that fertilizers on the granitic soils in their orchards did not seem to show much increase in the production of apples. Prof. Hedrick, of the Geneva Station, had experienced something of the same sort, but Prof. Gourley will admit to you, as will Prof. Hedrick or Prof. Stewart, of the Pennsylvania Experiment Station, that after all is said and done, orchards that are tilled will produce more fruit and better fruit than orchards that are not tilled, and there may be a few striking exceptions of tillage, and Dr. Thatcher pointed out 100 years ago that tillage simply stimulates those chemical and bacteriological changes in the soil which make for the production of larger amounts of available plant food, and unless you can have fertilization beyond the actual needs of crops, you are not going to get the best results nor the largest crops. We have more than enough. Tillage then is one of the factors which, I believe, progressive fruit growers will recognize as essential in successful production.

But we must go beyond mere tillage. I was in California this summer and took the time to make myself acquainted with the methods used in the growing of citrus fruit. I talked to many of the orange growers, and they confessed to me that one of the big problems in California is the maintenance of humus, the maintenance of organic matter. Several of them admitted to me that in spite of the use of green manures, they were not able to maintain a sufficient amount of vegetable matter in their soils. We can understand why that should be so, because these irrigated soils are rich in soluble salts, they are rich in lime. The temperatures are uniform, and when the irrigation water is put on a certain type of soil, the bacteria which would destroy the fibre cellulose becomes so prominent that the vegetable matter passes out as if burned in a furnace. Mr. McBeth has isolated a large number of these cellulose destroying bacteria, and it is remarkable how fast they will destroy the most resistant type of woody fibre. They are active and prominent in these California soils under their conditions.

A brother of mine who is connected with the University of California said, "I have been advising the citrus growers in California for some time now not to depend on cover crops alone, because cover crops are not going to maintain the humus in their soils. I have been advising them to buy cheap straw; they can buy wheat straw or second grade alfalfa for a very few dollars a ton; they can buy alfalfa as low as \$7. a ton and put that on a cover crop and plow the whole mass under." Unless they do that very thing, they will not be able to maintain the organic matter in the soils.

Changes in our humus here are not as far reaching, but they go on just the same and the organic matter disappears and the more thorough our tillage, the more rapid the disappearance of the vegetable matter, and as soon as we cease to maintain a sufficient supply of vegetable matter in our soils, then we slow down the machinery which is responsible for the making available of plant food, and the crop then

begins to show it for lack of nitrogen as well as for lack of available phosphoric acid and potash, and so the next step in the utilization of the fertility which is present in all of our fruit soils is the maintenance of a sufficient quantity of vegetable matter; whether you use manure or a cover crop of some sort is immaterial; but you will find that you cannot depend on tillage alone, nor can you depend on commercial fertilizers alone to give you soil conditions that will be acceptable and satisfactory in every way.

I remember a little experience I had with one of the leading fruit growers in our state, who was farming on a gravelly soil in South Jersey. He was then wedded to the theory that ground limestone and basic slag was all that his soil needed; he objected to the use of cover crops because he said, "Where I grow crimson clover or vetch, I have too much trouble from the different fungus diseases that are apt to attack my apples, and so I do nothing but use ground limestone and basic slag to supply phosphoric acid and let the weeds grow in the orchards and plow them under—I get enough vegetable matter out of the weeds to maintain the vegetable matter in the soil." I told him that I was willing to predict that sooner or later he would buy nitrogen unless he decided to grow crimson clover, cow-peas, alfalfa, vetch or some other leguminous crop in his orchard. He is using nitrogen now, because he realized in the course of two or three years that his fruit was shrinking in size and that yields were not as large as they should have been.

This time comes sooner or later in every orchard—it may be a long time in coming on land that is very productive, it may be a short time in coming on land that is not as productive, but utilizing the natural stores of plant food, we will always emphasize tillage and the maintenance of the organic matter in the soil, whether it is in as far reaching a way as they do in citrus groves in California or in a more modest way as we attempt in New England, New York, Pennsylvania or New Jersey.

The third means which we all recognize as essential in

the utilization of plant food resources of the soil is lime. We need not expect that our bacteria, our living soil machinery, will be effective unless we maintain a sufficient amount of lime in the soil, and that for the best results, both as to quality and to quantity of fruit, we shall have to consider the use of lime in a more or less systematic way. Those are the three essential points which we will have to consider in fruit growing, in so far as the supplying of plant food to our trees is concerned, before we reach the thought of buying plant food, in commercial forms.

Before I take up the discussion of commercial forms of plant food as applied to fruit growing, I want to say that it has always seemed a pity to me that we have given up some of the old practices that prevailed 50 or 75 or 100 years ago. Now and then we still hear the older folks tell us about composts, how they used to compost oats, sods or muck or peat with manure, and how they used to add a certain quantity of soil to the compost and how much lime they added and if wood ashes were available, they added wood ashes. In some cases they commended leached rather than unleached ashes in making up certain composts. You will find a lot in Johnson's old muck book and other books on agriculture which discuss compost making as an important part of farm operations.

It is my impression that we shall go back, in this country, to composting. We abandoned it because of the high cost of labor, but I believe that not alone from the standpoint of plant food but from the standpoint of soil inoculation, from the standpoint of maintaining the living machinery in our land at the highest state of efficiency possible under our climatic conditions, we shall go back to composting. The old fashioned gardener will tell you there is nothing like well-rotted manure to start things growing in the spring.

The Chinese, after many centuries of farming with limited funds to buy plant food from outside sources, take the mud out of their canals to go with clover and they put down

a layer of mud and a layer of clover and another of mud and another layer of clover, and turn it over and over and put it on their land. There is the nitrogen from the air and there is the potash and some phosphoric acid from the rich mud of their canals. They raise a great deal more per acre, as you know, than we do, not that I would advise any American farmer to follow exactly the system that the Chinese farmer is employing; I merely point out the principle and I want to leave the thought with you that in part we shall return to the principle in that we shall recognize that when we add composted material to the soil, we add in every thimbleful of this material many millions or billions of living organisms, and this agent was discovered by the practical farmer long before the day of bacteriology.

Some of the old books on agriculture will tell you that farmers in Finland and Sweden hundreds of years ago recognized that when they drained an old swamp and used lime marl on it, that in order to get that swamp under cultivation quickly, a relatively small quantity of rich loam from a productive field or from a garden, sprinkled on that reclaimed bog or swamp land produced wonders. They inoculated it you see when they introduced very large numbers of living organisms which constitute part of the machinery of the soil for transforming inert, unavailable plant food; and we recognize now-a-days that it is not the amount of plant food in the soil but the rate of utilization of that plant food, for the bulk of plant food is inert, is of no use to the crops.

I am reminded of the man who was making an automobile trip in North Dakota in a Ford car—you need not smile, this is not a Ford story—something went wrong with his machine, he stopped to examine it and found there was one nut loose and looking into his tool box, discovered that he had left his monkey-wrench at home. He did not feel safe to proceed and decided that he would walk along the road a way and see if he could borrow one. After a while he came across a tall husky Swede who spoke a broken English, and

he said to him, "Friend, could you tell me where I may find a monkey-wrench?" And the Swede shook his head and in his broken English he said, "My unele Ole, he keep a mule-ranch, and my brother, Gene, he keep a sheep ranch and I keep a cow ranch, but I tink North Dakota is too tam cold for a monkey ranch." (Laughter.)

The chemists will collect samples of soil and analyze them and say, "Here is one soil that is twice as rich as another soil." Quantatively it may be true, actually it may not be true, because the measure of soil fertility is crop production, and a peat bog that contains in dry peat 2% of nitrogen, is less valuable as a soil than an upland field that contains only .15% of nitrogen; so we come back again to this same question of the rate of the utilization of plant food which may be in the soil and we want to utilize this plant food as effectively as we can before we resort to the use of purchased plant food; but as we extract more and more from the land, we come to the time when we recognize that, supplementing natural plant food resources, is often profitable if not always profitable.

There are many fertilizers, as you know; the choice is from among various materials, but we can simplify the problem by recognizing that in so far as nitrogen is concerned, we may be able to draw on the air for sufficient quantities in cover crops to permit us perhaps to get along without the purchase of nitrate of soda or sulphate of ammonia or tankage or some of the other concentrated and readily available forms of nitrogen. That will depend entirely on the soil itself.

As I said a while ago, we find it profitable in peach growing to dole out nitrogen to the crop, because the soil itself has little to offer and when our trees are so close together as not to allow the utilization of cover crops because of the drying out of the soil by the roots and the shading of the ground by the trees we have to resort to the use of nitrate of soda. That applies to apples and pears on the lighter soil. I dare say that on heavier land we might be

able to draw all of the nitrogen that may be needed out of the air by means of cover crops.

In so far as phosphoric acid is concerned, I believe that because of the slow circulation of phosphoric acid in the soil, that it would be profitable to use material containing readily available phosphoric acid in the growing of fruit. Now as to the amount, that would depend entirely of course on the age of trees and the set of fruit and climatic conditions and various other things.

As to potash, there is a great deal of interest just at present in potash because it is not accessible to us in any considerable quantity nor at any reasonable price. If the land is light enough and if the crops are large enough, surely the lighter soils would justify the use of potash in the growing of peaches, apples and pears. It will depend largely in my opinion, on the soil. I believe if the soil is heavy enough, it may be found that the use of potash would not give returns that would warrant the use of potash fertilizers. It is a soil question to a great extent, and a question of those other factors which I discussed, factors of vegetable matter, of lime and of tillage, which of course are bound to vary from one orchard to another, but if the soil is thin, or if the amount of vegetable matter is low, even in the heavier land, the use of potash salts might be justifiable and profitable, but just now we are confronted by the problem of placing a larger supply of potash at the disposal of the trees as well as of other crops.

We have thought a great deal about ways and means of making more readily available the potash supplies in the soil itself, because, after all, most of our heavy soils are exceedingly well provided with potash. There is hardly any danger of exhausting them, surely not in the case of fruit trees. But the problem is how to make a sufficiently large amount of potash available within the growing season to supply the maximum needs of the crop? You will find that there is a difference of opinion among soil specialists, as to how that might be best accomplished under existing

conditions. You talk about vegetable matter and everybody agrees that, other things being equal, the better the supply of vegetable matter in the soil, the more fermentation, the more decomposition of available material, the greater the supply of available potash. There is on the other hand, a difference of opinion as to the part lime plays in making potash available. Dr. Brooks, of your Station, says that in his experiments, lime has not manifested any very great value in increasing the supply of available potash. Dr. Hartwell, of the Rhode Island Station, seems to be inclined to back Dr. Brooks up, at least to some extent. Dr. Brooks also claims that land plaster has not been found to be a very effective means of increasing the supply of available potash out of the soil resources, and that you see is a debated question.

On the other hand, I find that most of the soil specialists in New England, that is, taking Connecticut, Rhode Island, New Hampshire and Maine—Dr. Kendall of New Hampshire and Dr. Woods of Maine—seem to think that common salt is well worth a trial as a means of unloeking the stores of insoluble potash in the soil. I have already told you that some years ago farmers used to salt their manure. I know of old farmers in the vicinity of New Brunswick who still tell me about the wonderful crops of grass they used to grow when they salted their manure before they spread it. You still find a great many of the older folks who have had the experience, say that common salt gives an increase when used on grass land, and I believe there is scientific evidence of more recent date which will bear them out.

Since the potash scarcity came upon us, I have advised farmers in our State to use salt and I have had reports from a number as the result of last season's experience, indicating that they have found it worth while and that they have been able to supply a larger amount of potash to the crops because of the use of salt. And that until normal conditions are again restored, we do not know how long the war may last—we at least have in this material an effective agent, not only

because it makes the potash compounds in the soil apparently more available, but because also it is a material within the reach of the average farmer because it is so cheap. I take it that most farmers in Massachusetts could get salt in car-load lots, 99% purity, for about \$5. or \$5.50 a ton delivered; and if used at the rate of 100 to 200 pounds per acre surely it is not an expensive fertilizer, and will serve to increase to a sufficient extent the amount of potash which may be available to provide for the time being at least.

Now then, in so far as the fruit grower is concerned, if I were to sum up the question, if your land is naturally fertile, if you are using cover crops, leguminous cover crops, if you are drawing enough nitrogen out of the air to supply the maximum needs of the trees as shown by the amount of wood growth, your fertilizer question is a relatively simple one. At that you might find it profitable to use some carrier of phosphoric acid, whether it be acid phosphate or basic slag or bone meal. As to potash, it depends entirely on the make-up of your soil, the distance of trees from one another, seasonal conditions and the previous history of the soil. I might perhaps have said that in the first place and spared you all this discussion, but I thought you might be interested sufficiently to consider with me the facts which underlie the supply of plant food to orchard fruits. (Applause).

THE CHAIRMAN: Now we know this is a very interesting subject and undoubtedly you have some questions to ask Prof. Lipman. I have one which was handed in that I will first read: "What can be recommended for an animal fertilizer campaign for young trees two years old and apple trees set in blocks in a Massachusetts pasture, impossible to cultivate beneath the trees?" The question is what animal fertilizer can be used as a fertilizer on those trees?

PROF. LIPMAN: The two factors which come in in that case are the moisture factor and the plant food factor. It is not practicable to plow the land, so it would have to stay in grass; if animals are pastured and some manure is spread on the orchard, I take it that the trees, under those condi-

tions would make all the growth that may be needed, but I should prefer to reinforce the manure with some phosphoric acid. If animals are not pastured in the orchard, either manure or possibly cheap grass or hay or some other vegetable refuse used as a mulch under those conditions would be found profitable; in fact I believe that we are not giving as much consideration to the problem of mulching of orchards that cannot be cultivated, as we should. I do not know whether I have quite answered the question, but I should prefer animal manure, if it is available, or grass or compost reinforced with some phosphoric acid under those conditions.

THE CHAIRMAN: I think I read one word wrong here, instead of "animal" I think it is "annual" fertilizer campaign.

PROF. LIPMAN: I should still answer the question in the same way. Under those conditions, where land cannot be plowed, I should prefer to depend on animal manure if it is at all available, because of the protective action of the mulch and because of the need for a greater number of bacteria which you will introduce with the manure, that is, where you do not stir the soil, where you do not till it, where you do not stimulate the machinery of which I spoke a few moments ago, the introduction of animal manures or composts would be desirable.

THE CHAIRMAN: Another question; "I would like a good formula for a peach orchard just coming into bearing. The orchard is cultivated."

PROF. LIPMAN: There is nothing said about the type of soil?

THE CHAIRMAN: Nothing

PROF. LIPMAN: I may answer, assuming that the soil is medium or light in character—most of the peach orchards in our State are that type of soil, though we have orchards in North Jersey on heavy land—assuming that the soil is light, I should prefer to use either acid phosphate or basic slag as a source of phosphoric acid, and the amount supplied

should be at the rate of 250 or 300 pounds per acre, either acid phosphate or basic slag, to supply the phosphoric acid. Assuming again that the soil is light, I should prefer to use some potash. I should recommend an equivalent of 100 pounds muriate of potash, possibly 150 pounds of muriate of potash, per acre per annum, and I should also use preferably in the spring, nitrate of soda at the rate of 100 to 150 pounds per acre, and the mixture then would be one of 600 pounds. 300 pounds of acid phosphate or basic slag, 150 pounds of muriate of potash and 150 pounds of nitrate of soda, the nitrate to be applied preferably in the spring if the soil is sandy. If the orchard is on heavy land and, as often happens in our State, where the ground is inclined to be stony and steep and the tillage of any considerable amount of it is rather impracticable, I should prefer to use some cover crop or animal manure or both reinforced with phosphoric acid.

MR. PERKINS: Do you mix the 600 pounds together at once?

PROF. LIPMAN: No, for sandy soil I should prefer to apply the phosphoric acid and potash in the fall, although that is not absolutely necessary. Because of the character of the mixture used, acid phosphate, nitrate of soda and muriate of potash, if the season is rainy, it will give you trouble in passing through the fertilizer distributor. In that case it might be well to use, instead of three hundred pounds of acid phosphate, fifty pounds of bone shale and two hundred and fifty of acid phosphate and one hundred and fifty of each of the others. If you grow a cover crop, I should prefer to use phosphoric acid and potash in the fall before the cover crop; it will depend on the size of the trees and the amount of shading. We find that where the shading is bad and the soil is light, the cover crop often fails to give results, especially with the later variety of peaches, there is so much tramping that even rye does not amount to much and we have come to think that it would pay us to set our peach trees further apart so as to be able to maintain the vegetable matter in the soil by means of cover crops.

Manure is too expensive a fertilizer for us under those conditions.

MR. WINSOR OF RHODE ISLAND: How about using salt, mixing it with some other things, as a top dressing for grass?

PROFESSOR LIPMAN: We have done this very thing and others that I know have done the same. A lot of salt that we bought last year was granular, about the size of barley or wheat grains, and we mixed it with acid phosphate and sulphate of ammonia and nitrate of soda. We have no difficulty in distributing it in our fertilizer distributor. I'm afraid that if there is any trouble at all, it is apt to occur in a wet season, and if the materials are mixed for some time before they are applied. Ordinarily in average dry weather, I do not anticipate any trouble at all, the material will dry very nicely and could be all applied at once.

MR. RICHARDS: The gentleman spoke of nitrogen as being a thing that we demand. Isn't it generally considered among fruit growers that nitrogen is a grand thing to make trees grow? I want my orchard to grow two or three feet annually, on the smaller trees, which I do not expect to bear fruit, but on my grown trees I do not propose to use nitrogen to such extent; and isn't it generally considered that the nitrogen should be mostly for the growth of the trees but not so much for the perfection of the fruit? I speak of apples, now.

PROFESSOR LIPMAN: It should be for both. I think I stated that in our peach orchard we have found increased production as we increased the amount of nitrate of soda. The land itself was not able to supply the maximum need of the trees. Everybody knows that available nitrogen, in considerable amounts, tends to prolong the vegetative period of the crop and tends to be responsible for a great deal of unripe wood and winter killing, and if we use nitrogen in sufficiently large amounts, we are apt to have all wood and no fruit. I assume, of course, that we use nitrogen with discrimination, and I take it that every progressive

fruit grower recognizes the disadvantage as well as the advantage accruing from the use of readily available nitrogenous fertilizers, so that we have to watch our trees carefully. I remember one peach grower said to me, "One year we used as much as four hundred pounds of nitrate of soda per acre and got away with it, but I don't expect that we can get away with four hundred pounds of nitrate of soda in the average season, but we had a very heavy set of fruit and seasonal conditions were such as to warrant the application." That is the reason peach growers prefer to wait till spring with their nitrate of soda, and if there is no fruit it is hardly worth while to waste a great deal of money on nitrogen. If the set of fruit is heavy, you would use more nitrogen, but you would use nitrogen for both the fruit and for the trees, understanding the limitations of nitrogen.

MR. WHARTON: I have been told that old sawdust is good to mulch trees with.

PROFESSOR LIPMAN: Yes, I should answer in the affirmative, with the qualification that, like straw, excessive quantities of sawdust are apt to cause injury to vegetation. There is a certain proportion of soluble vegetable material in sawdust, as there is in straw, and if your mulch is very heavy, there is some danger, especially on a lighter soil, but everything being equal, the heavier your land the greater the amount of sawdust you could use with safety; the lighter the soil, the more careful you should be in using sawdust; but even on light land, you could use moderate amounts of it with profit.

MR. WASHBURN: For young trees in the sod and culture of the pasture, where manure is not available, what would you recommend for young trees not bearing?

PROFESSOR LIPMAN: If the orchard is young and the moisture supply in the soil is very good, I should prefer to top dress the grass or broad-cast in the orchard readily available nitrogen, either nitrate or sulphate of ammonia with some available phosphoric acid, and then cut the grass to give the mulch. That might be the most feasible way,

provided the draft on the soil water is not too great, because when you have a large crop of grass you use up a large amount of soil water and you might use up enough to stunt the growth of the trees. It depends entirely on the slope and texture of the land, the rain fall, etc., but that is a practical, economical way of increasing the supply of nitrogen in the soil that would gradually become available, or, of course, if you can buy cheap grass, sedge hay or something of that sort to mulch, that will answer the purpose.

MR. RICE: I would like to ask the speaker if he would recommend putting one hundred to two hundred pounds of salt on a peach orchard this year when he cannot get the potash?

PROFESSOR LIPMAN: I would say yes, I think you will find it worth while.

A MEMBER: Will the speaker explain the difference between salt and nitrate of soda?

PROFESSOR LIPMAN: Both are salt of soda, but one is a chloride of soda and the other is a nitrate of soda; one contains the element nitrogen and the other does not; both are readily soluble and they help to make potash available because the soluble soda salts and the soda in the salt reacts with the insoluble potash compounds in the soil and makes them available, but while nitrate of soda would furnish nitrogen and soda, it would also increase the supply of available potash in the soil. Common salt furnishes no plant food in itself, but the soda in it would serve to make available a greater amount of soil potash.

A MEMBER: Would pond muck be beneficial to bearing apple trees, common pond muck, provided carbonate of lime were added to it?

PROFESSOR LIPMAN: Yes, decidedly so. I would, under all circumstances, advise the addition of carbonate of lime and we advise farmers in our State to use carbonate of lime with common mud or muck or peat for additions to soil.

A MEMBER: You would not put any salt in that mixture?

PROFESSOR LIPMAN: Yes, I should add salt.

THE CHAIRMAN: I would like to ask how long it takes that muck or the nitrogen in that muck to become available?

PROFESSOR LIPMAN: That will depend—if you are using manure, it will depend on the proportion of manure to the muck. You will find in the old muck books the statement that there is a limit beyond which you cannot dilute muck or peat with manure. If you are not using manure, assuming that it is a mixture of muck and lime only, then the question of availability is a rather indefinite one. If you keep it in a heap, moist, in contact with lime for several weeks, I believe it would give you much better results than if you spread the two directly.

A MEMBER: Where would you get so much salt? You want to get a thousand pounds; where would you buy it?

PROFESSOR LIPMAN: There are a number of companies, at least two that I know of, the name and address of one escapes me, but the other one is the International Salt Company, of Watkins, N. Y., also Scranton, Pa. They sell a salt of ninety-nine per cent purity, at two dollars and fifty cents a ton, F. O. B. Watkins. The freight rate to most points in Massachusetts should not be over two dollars or three dollars a ton, at the most, so you ought to be able to get that at five dollars or five dollars and fifty cents a ton delivered.

A MEMBER: I would like to ask what effect a large amount of cultivation is likely to have on an orchard? The fertilizer material that might be in the orchard? I have in mind a neighbor who cultivates his orchard pretty thoroughly, generally gets quite a crop of apples, but does not use any fertilizer.

PROF. LIPMAN: The cultivation of land, provided it is thorough, is for the conservation of soil moisture and for the increase of the amount of available plant food, nitrates, phosphates, etc., and the more thoroughly the work of culti-

vation, the greater will be the amount of plant food made available, but we may go beyond the point of economy and waste too great an amount of plant food. We know that for every pound of nitrogen which we harvest in the crop, the soil, under average conditions, loses another. If a crop of wheat that you have harvested contains fifty pounds of nitrogen, the soil will have lost a hundred pounds of nitrogen. You cannot utilize every particle of plant food that becomes available, and we can go beyond the point of safety so that for a number of years, if the soil is fertile, most thorough cultivation, will increase the available plant food to a point to give us much larger crops and then the soil will be poorer than similar land that had not been as thoroughly cultivated. That applies to lime. We use lime in that sense to increase the amount of available plant food. You know that years ago they used to fallow their soil; in Europe they still do so. Many years ago they used to have the regular three-fold system; a man had thirty acres of land, he had ten acres fallowed every year, just as the farmers in the dry farming section of the United States and Canada grow one crop in two years on some of the land because they have not enough water, the rain fall is too slight for more than one crop in two years or two crops in three years, but the farmers in Europe, after they have farmed their land for many years and it has become poor, had to fallow it, let the land rest. You find that idea expressed in the Bible, the land was to receive a rest once in seven years, and there are a great many places in Europe where they still have the notion that land must rest, and they crop for several years until the production dwindles down and then they let weeds grow for several years and the land seems to regain, in a way, some of its lost fertility. Unless you maintain the vegetable matter in the soil, the time will come when that thoroughly tilled land will be poorer than similar land that has received less cultivation.

MR. FRANKLIN: I am interested in strawberries, and I would like to ask a question of great importance to me;

we are situated where we have to pay five to seven dollars a cord for manure, and that is prohibitive, almost, and I have a field that will be in bearing this year. We would like to know what to do with it previous to its fruiting, as to fertilizing. The land is in very good shape now.

PROFESSOR LIPMAN: Manure may not be as expensive a fertilizer as the gentleman assumes, it will depend partly on the original cost and partly on the expense of hauling and spreading, etc., but in so far as average manure goes, it contains ten pounds of nitrogen and about seven or eight pounds of phosphoric acid and nine or ten pounds of potash, and under present prices, I regard city stable manure as a cheap fertilizer at two dollars and fifty cents a ton, and not beyond the reach—not a very expensive fertilizer at two dollars and seventy-five cents or three dollars a ton, depending of course, on the cost of hauling and handling; that has to be remembered. It is possible there may be cornstalks, waste hay and other waste vegetable material that could be used for composting with some manure and a little lime to give the most satisfactory material for strawberries. If that is not available, then you would have to depend on a commercial fertilizer. Potash being out of the question, you would have to do whatever can be done to make the potash in the soil itself available. We have talked about the use of salt, and all that we have said would apply to strawberries as to other crops, only you would use rather more fertilizer for strawberries than you would expect to apply in the average apple or peach orchard.

MR. FRANKLIN: You would not advise lime for strawberries, would you?

PROFESSOR LIPMAN: That will depend, of course, on the previous history of the soil, but the strawberry growers in our State who have been using ground limestone in moderate amounts, as much as three quarters of a ton or one ton of ground limestone, find that it seems to give them good results, but don't seem to think that large applications are necessary.

MR. RICHARDS: You speak of manure in terms of tons; we farmers and fruit growers are used to saying cords.

PROFESSOR LIPMAN: Well, double that.

MR. RICHARDS: At Marshfield Hills it costs six dollars and fifty cents a ton delivered; you cannot buy it even in Marshfield for less than that.

MR. WALKER: I have read that turnips in growing make use of a greater amount of potash in the soil than most other crops, and that therefore when they are grown as a cover crop and turned in, they tend to increase the available potash in the soil more than other cover crops. Is there anything in that?

PROFESSOR LIPMAN: That statement has been made with reference to the ability of turnips to utilize insoluble rather than soluble potash, and turnips, as the analysis show, do not contain as much potash as some of the legumes. For instance, the clovers contain a larger proportion of potash and I should regard clover and vetch as a more satisfactory crop through which soil potash might be saved up and used to be transformed later into fertilizer for other crops—potash as well as nitrogen fertilizers. I do not see that turnips would have any advantage as a cover crop over legumes that can be grown under the same conditions, because the legumes will not only add potash matter to the soil, but will also add nitrogen to the soil.

MR. HALE: Does ground limestone produce satisfactory results in the soil, and what is the maximum price at which you would consider it an economical fertilizer?

PROFESSOR LIPMAN: Ground limestone produces good results if used in sufficient quantities. Our observations and experience indicate that for practical purposes one ton of freshly burned lime is equivalent to two tons of ground limestone, and you can decide then which is the cheapest source of lime for your purpose, using that method of comparison. For instance, if you can obtain a freshly burned lime, run of the kiln lime in bulk, in carload lots, at,

let us say, four dollars a ton, then ground limestone should not cost you delivered much over two dollars and twenty-five cents a ton. I would make a little extra allowance from the standpoint of convenience. If the haul is a long one, if the freight station is two or three miles away, I should prefer burned lime at that, unless, of course, the farmer or his hired help entirely object to the handling of burned lime, but as far as prevailing prices go, I believe that in most places fresh burned lime, run of the kiln, is still the cheapest source of lime, you get more for your dollar. There are a great many people, who, realizing that, prefer ground limestone, nevertheless because it is a more convenient material to handle.

A MEMBER: I would like to ask the speaker if he would recommend cultivating next summer a 25-year old orchard seeded to red clover last July.

PROFESSOR LIPMAN: I should prefer to plow it in; if you do not, you will have some other grasses that will come in, and from the moisture standpoint and the standpoint of phosphoric acid and potash, I should prefer to plow that and cultivate it and seed it down again next summer, if you still feel that the trees are being forced too much.

A MEMBER: How early would you plow it?

PROFESSOR LIPMAN: As early as the land is fit to plow. Allowing for convenience—if you have some other plowing that is more pressing, you might wait, but within your convenience, other things being considered, I should prefer to plow it as soon as practicable.

PROF. SEARS: I would like to ask the speaker, can we improve color in our fruit, considering an apple orchard in sod, and also the difference between an apple orchard in sod and one in cultivation, the improvement we can make in the color of our apples.

PROF. LIPMAN: Your idea is, can we improve color in fruit by fertilizers and what fertilizer to use? Yes, I think we can, only our knowledge on the subject is not as definite as it might be. We know this, that where large amounts of

available nitrogen are present, the color of the fruit is not always satisfactory. Things that make for slow growth make for better color, and for that reason people will favor the sod mulch method, because it checks, to some extent, the growth of a tree, so they obtain better color. Large amounts of nitrogen and good color do not run in the same direction; nevertheless, if we could supply large amounts of nitrogen early in the season and then check it, even though we had a large amount of nitrogen, if we had plenty of available phosphoric acid and potash, we might produce fruit that is well colored, and for that reason you will find that a great many fruit growers who are using cover crops in their orchards prefer to employ a mixture of a legume and non-legume; for instance, Professor Blake, our horticulturist, says that he found a mixture of oats and winter vetch, or a mixture of barley and winter vetch very satisfactory. The oats make a very rapid growth in mid-summer. They dry out the soil and they check nitrification; that means they check the supply of available nitrogen to the crop and they force the ripening of the wood and the color of the fruit. Now then there is something to be said about certain materials which are fertilizers in one sense only, compounds like manganese, copper or zinc, especially; as to the manganese, there has been some very interesting work done in France, a very small amount of material, a few pounds per acre, practically, seem to act as a stimulant in some way, producing growth, and that has a bearing on the color of the fruit, but that matter has not gone beyond the experimental stage. I do not feel in a position to give you anything definite on that.

MR. WINSOR: In Rhode Island, a number of our growers have been sowing barley with clover and barley alone and it has been sowed in soil that is in a high state of cultivation and fertilization, and the barley plants, after coming up, would seem to damp off, that is, they would turn yellow after getting up two or three inches high. I would like to know the reason?

PROF. LIPMAN: The injury of course is probably of a fungous character, and we know that barley, oats or wheat would be apt to act in the same way when it is dry, warm weather. The rust and the mildews are, as we know, apt to cause serious injury. We find that to be a great difficulty in our experimental work in the green-house where we use oats, wheat or barley, their rusting. When that condition is very bad, I imagine that buckwheat might be substituted and would answer the purpose, and if that is not satisfactory, I suppose Kaffir corn or sorghum might do. Sorghum of course is much ranker and we must realize that we don't want too much vegetable matter or we might dry the soil out too much for the use of the trees.

MR. WINSOR: Could we help by the use of formaldehyde?

PROF. LIPMAN: Yes, if the spores of the fungus are carried on the seed, which is apt to be the case, then the treatment of the oats or barley with formaldehyde would help matters very greatly.

A MEMBER: What are the conditions of using formaldehyde in that instance? How do you use it?

THE CHAIRMAN: If you send over to the office, Room 136, State House, I think we can give you a pamphlet on that subject.

MR. HUSTON OF NEW YORK: I really have a sort of a question in regard to the title of the subject here, the expression that on account of the high prices of fertilizers the matter is of a good deal of importance. I think it is not unfair to call attention to the fact that the different ingredients entering into the commercial fertilizers have changed prices, but from quite different reasons. Your ammoniates have always been sold on the basis of supply and demand. Now nitrate of soda has gone up quite materially and freight has gone up very much. The demand has gone up very much; the other ammoniates go along with it, so that is nothing unusual. Your phosphoric acid proposition is quite unique; phosphate rock has gone down, but sulfuric acid

has gone up. Now, why did it go up? There has been no great advance in the cost of the pyrites from which the sulfuric acid is made, there has been a little advance, about four shillings, on the freight, but that would not amount to over twenty-five cents on a ton of acid phosphate, but the price of sulfuric acid itself has gone from four to five dollars to twenty-eight or thirty dollars, I think it was quoted at the other day, merely because somebody wants it more. The nitrate of potash has advanced perhaps fifty per cent. unless they chance to have contracts for a long period of delivery, when it would not go up at all. Therefore your advance in acid phosphate, to about twenty-one dollars, is due to the fact that the sulfuric acid is sold for something else. So far as the foreign situation is concerned, I wish to particularly impress on you that none of the German potash that has been delivered since the war broke out has cost the American buyer over forty dollars a ton, but it is selling for about four hundred and fifty dollars. The reason of that is that the contracts expire at the end of 1916 and if we could get any potash, we would have to sell it to our contractors at the regulation price, which is about thirty-nine dollars and five cents less fifteen, and the only extra charge we have been submitted to at all is the maximum of four dollars extra freight to get to Rotterdam instead of Hamburg, and whatever war insurance they chose to put on themselves. Had the maximum ever fallen on the same lot of goods, the European freight, the maximum charge ought not to have been over five dollars, and that would not have been as much as the discount we get, so that nobody has paid over forty dollars a ton for muriate of potash and we have turned over thousands of tons that we had in our own warehouses when the war broke out at the regulation price, so there has been a very handsome profit but our German friends have not been getting that profit, that is all in America. Any advance over the old price is all American the Germans even have to pay the ocean freight. I think it is not unfair, in view of the remarkable advance in prices, and

your feeling that your fertilizer prices have gone up very much, to at least offer you the consolation of telling you that all those increases in prices, with the exception of the nitrate situation, are for the account of the Americans entirely, you are taking it out of one hand and putting it in the other. Whether you'd rather have the money or let the fertilizer companies have it is for you to decide.

MR. SMITH: I have in mind a Seekle pear tree and it has been liberally provided with stable manure, ground bone and wood ashes and refuse from the garden, so it ought to be in good condition, but the tree has not grown for the last seven years, it is not any larger now than it was then. Now I should like to ask what is the matter? And the currants are the same way, they don't grow.

PROF. LIPMAN: I should not think, from your description, that it is a plant food difficulty, because you stated that you had used in addition to stable manure, wood ashes and bone meal, but on the other hand I receive a good many complaints in the course of the year, from people in our State who have small gardens, and the story seems to be the same, "We used to grow good crops, we use manure, two or three loads of manure every year on a small garden, but now we have gotten to a point where, the more manure we use, the worse it gets." Now and then we get a sort of a soil indigestion where we use too much organic matter. Whether that is your case or not, I don't know, but if it is not, then I should be inclined to ascribe the difficulty to an injury either by disease germs or some mechanical injury of the roots or some material in the subsoil, a hardpan of some sort, or possibly the water table being too near the surface. There may be various reasons entirely apart from plant food why crops would not thrive.

MR. SMITH: Would you advise trying lime?

PROF. LIPMAN: With the wood ashes that you use and bone meal I should not imagine it would be a case of acidity, still, not knowing the exact conditions, I am not able to find the cause.

THE CHAIRMAN: I think at this time we will bring the discussion to a close. We have had a long and very interesting discussion and I will make the announcement again that next Saturday Dr. George T. Poore, of St. Louis, Mo., will speak in this hall on the Missouri Botanical Gardens and we invite you all to be present at that time and at all the future meetings of the Horticultural Society this winter. The meeting is now adjourned.

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January 15, 1916.

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 French, Samuel C., Westwood
 Frost, Arthur H., Boston
 18 Tremont St.
 Frost, G. Howard, W. Newton
 Frost, Sylvester C., Arlington
 Lake St.
 Fuller, Horace C., Leominster
 Fuller, Howard, Shirley

G.

Gale, W. F., Springfield
 24 Crystal Ave.
 Gannon, William J., W. Medford
 15 Madison St.
 Gardner, R. O., Boston
 Care of Jos. Breck & Sons
 Gay, E. S., 33 Ames St., Lawrence
 Geer, A. S., Three Rivers
 Geer, H. D., Three Rivers
 Geer, Mr. and Mrs. J. T.
 Three Rivers
 Geissler, J. J., Box 144, Sharon
 German, Kali Works, New York City
 42 Broadway
 Gerrish, Miss Isabel F., Ashland
 Gibson, Fred J., Hillsboro, N. H.
 Gilbert, A. M., Boston
 810 Barristers Hall
 Gilbert, Ralph D., Box 299, Boston
 Gilligan, Sidney D., Warren
 Gilmore, Abiel P. R., Acushnet
 R. No. 1
 Gilmore, Edwin M., Marlboro
 Hosmer St.
 Gilmore, Howard P., Westboro
 Gilson, Dr. F. Earland, Groton
 Gladding, Wallace L.,
 Box 184 W. Brookfield
 Gleason, Chas. A., Springfield
 Gleason, Walter D., Pratts Junction
 Gold, Chas. L., West Cornwall, Conn.
 Goldthwait, Addison B., Bardwells
 R. D.
 Goldthwait, Roy, Bardwells
 Goodell, Everett E., Westboro
 Goodrich, B. F. Co., Akron, Ohio
 Goodrich, Grainville S., W. Newbury
 R. D. 1-74
 Goodrich, James H., W. Newbury
 Goodrich, Walter H., Hudson
 Chapin Rd.
 Goss, B. J., Ayer
 Gould's Mftg. Co., of N. E., Boston
 58 Pearl St.
 Gould, Walter F., Ipswich
 Gould, Mr. and Mrs. Winthrop W.,
 Pratts Junction
 Gourley, Joseph H., Durham, N. H.
 344 Western Ave.
 Graham, Charles S., Holden
 Graham, G. S. Phillips Rd., Holden
 Granger, Miss Helen, Griswoldville
 Graves, Arthur E., Worcester
 48 Wachuset St.

Graves, Wilson A., Shelburne
Gray & Aldrich, Boston
33 Commercial Wf
Gray, Rev. Ora Samuel, Amherst
Greeley, Eugene O., Derry, N. H.
Green, Clayton R., Belchertown
Greene, William A., Saundersville
Greenough, J. J., Deerfield
Grief Bros., Cooperage Co.,
Cleveland, Ohio
Griswold, Gilbert E., Buckland

H.

Hackett, A. Edward, Belton
Haight, Harry D., Boston
110 Gainsboro St.
Hale, George H., Hudson
34 Lincoln St.
Hale, Herbert A., Colrain
Hale, James O., Byfield
Hale, M., Groton
Hale, Thaddeus, Wellesley Hills
Hall, Chas. A., Ashfield
Hall, Fred P., Danvers
Hall, Russell B., Medway
Hall, Stacy L., Boston
100 F. H. Market
Hallock, Francis R., Stow
Halloran, Edward J., Roxbury
52 Calumet St.
Hammond, Irving C., Onset
Hannaford, Frank H., Lexington
Box 116
Hansen, William, North Granby, Ct.
Hardy, John H., Jr., Littleton
Harper, Henry, Marlboro
Harrington, Arthur B., Charlestown
10 Salem St.
Harris, Roland W., No. Andover
316 Johnston St.
Harvey, Frank W., Cheswold, Del.
Harvey, John T., Pittsfield, N. H.
Hastings, Frank W., Sudbury
Haskell, E. B., Southbridge
Haskell, Tarbell P., Northboro
Hathaway, Charles E., Somerset
Hathaway, Howard W., Somerset
Hawkins, A. C., Lancaster
Haye, Marcus L., Westwood
Hayes, James, Ashby
Haynes, Daniel W., Framingham
Salem St.
Hazen, M. S., New York City
51 Chambers St.
Heald, Philip C., Greenville, N. H.
Heath, Elmer H., Neponset
72 Minot St.

Heggie, James, Somerville
102 Flint St.
Hersey, Everell A., Westboro
Hessell, Robert, Framingham
R. No. 2
Heywood, Mr. and Mrs. Ezra K.
Pratts Junction
Hiestand, T. B., Holyoke
115 Suffeld St.
Higbee, Harry G., Hyde Park
13 Austin St.
Higgins, Robert H., Arlington
7 Swan St.
Hill, Chas. E., Temple, N. H.
Hill, Edgar S., Hillcrest, Dudley
Hill, Ernest L., Millis
Hinds, James, Winchester
Hitchcock, Chas. F., Gilbertville
Hittinger, Richard, Belmont
Hodgkins, Clarence E., Northampton
Holden, Thomas M., Newton Centre
Holland, Charles P., Brockton
183 Main St.
Holmes, Albert H., Kingston
Holway, T. E. & Co., Boston
17 No. Market St.
Hooper, W. L., Cambridge
2286 Mass. Ave.
Hopkins, Mrs. James C., Dover
Hosmer, Wm. H., Leominster
104 Lindell Ave.
Houghton, Clement S., Boston
60 State St.
Howard, A. B. & Son, Belchertown
Howard, Mrs. Fred C., Wakefield
89 Gould St.
Howard, Henry M., W. Newton
Howe, Chas. B., Petersham
Howe, D. A., Worcester
218 Summer St.
Howe, Elmer D., Marlboro
Howe, James S., Jr., So. Framingham
Howe, Sumner L., Marlboro
Bolton St.
Howes, Abbott L., Ashfield
Howes, Albert, So. Ashfield
Howes, Alvah W., Ashfield
Howes, Miss Gertrude E.,
W. Mansfield
Howes, John W., Ashfield
Howes, Raymond G., Ashfield
Howes, Seth H., Southboro
Howes, Wesley E., R. No. 1, Medway
Howes, Dr. Williard B., Rutland
Hoxsie, Allen N., E. Greenwich, R. I.
Lock Box 402
Hubbard, Charles J. G., Berlin
Hubbard, Edwin A., Ashby

Hubbard, Jesse B., Boston
95 Milk St.
Hubbard, Eliot, Boston
206 Beacon St.
Hubbard, Robert, Middletown, Conn.
Box 785
Hurlburt, Dr. C. S., E. Longmeadow
Hulst, Alfred N., Amherst
Hunting, A. I., W. Boylston
Hutchinson, Walter K., Arlington
Hyde, Wheeler Co., Boston
41 No. Market St.

I.

Isley, Fred, Newbury
Ingraham, Mrs. R. F., Millis
Ives, E. M., Meriden, Conn.

J.

Jackson, Dr. Alton A., Everett
512 Broadway
Jackson, Dr. A. W., Worcester
136 Austin St.
Jacobs, Albert A., R. D. Clinton
Jacques, Otis A., Boston
17 Quincy Row
James, Frank M., Haverhill
126 Monument St.
Jameson, George W., Lexington
Jarvis, Chester D., Storrs, Conn.
Jefts, George M., Stoneham
Jencks, Fred A., Weonsocket, R. I.
Jenkins, George E., Clifton
Clifton Ave.
Jenkins, Zebina H., West Barnstable
Jenks, Albert R., Springfield
Massasoit Bldg.
Jennings, Edward,
Newton Lower Falls
Jennings, Warren E.,
Newton Lower Falls
Jewett, Warren C., Worcester
Johnson, Everett M., Colrain
Johnson, J. Henry, Leominster
408 West St.
Johnson, John F., Northboro
Johnson, Richard W., Westboro
Jones, Fred W., Boston
50 Equitable Bldg.
Jones, John, Attleboro
107 Slater St.
Jones, Nathaniel R., Billerica
Joslin, Dr. Perry E., Milford
177 Main St.

K.

Kandle, Herbert A., Natick
65 Rockland St.
Keller, William F., Holliston
Kelly, Charles P., Newburyport
Kelly Bros., Dansville, N. Y.
Kelsey, D. S., W. Hartford, Conn.
Kemp, Charles J., Ipswich
Kemp, Walter H., Colrain
Kendall, Charles E., Milford, N. H.
Kendall, E. Dana, Holden
Kendall, H. Prentice, Sterling
Keyes, Louis G., Nashua St., Woburn
Keyes, G. Harvey, W. Boylston
Keyes, John F., Lancaster, Box 85
Kilburn, Joseph H., Pratts Junction
Kimball, Alfred, Haverhill
Kimball, Leonard H., E. Haverhill
Kingman & Hearty, Inc., Boston
20 N. S. Faneuil Hall
Kinney, Herbert R., Worcester
Kirby, Ralph J., Arlington
Kittredge, George D.
Mount Vernon, N. H.
Knapp, George S., Groton
Knight, Willis E., Gardner
Knights, Arthur A., Worcester
100 Beacon St.
Knights, Harry W., Boston
87 Commercial St.
Kyes, Arthur N., Hepkinton
3 Hayden Row

L.

Labouteley, Gaston E., Three Rivers
Lamphear, Arthur S., Gardner
R. D. 2-50
Lamson, Arthur C., Marlboro
Lamson, E. M., Hudson
Lane, Gilbert E., W. Peabody
Langley, H. S., Saxonville
Lawrence, Carl A. P., Groton
Lawrence, Edward, Brookline
34 Kilsythe Rd.
Leach, C. Arthur, So. Hamilton
Learned, Frederick H., Winchester
22 Lebanon St.
Learned, W. H., Florence
Lee, W. H., Box 1243, Springfield
Leland, P. F., 31 Milk St., Boston
Leman, J. Howard, Box 2365, Boston
Leonard, F. M., Boston
52 Clinton St.
Lewis, Frank D., Groton
Ley, Harry A., Springfield
Care of F. T. Ley Co., Main St.

Libbey, Chas. E., Worcester
158 Holden St.
Lincoln, Henry T., N. Scituate
Box 113
Linton, William, Antrim, N. H.
Locke, Geo. L., Winchester
17 Ridge St.
Locke, Howard R., Amherst, N. H.
Locke, Isaac H., Belmont
561 Pleasant St.
Locke, Jas. E., Belmont
575 Pleasant St.
Lord & Spencer, Boston,
21 N. S. F. Hall Market
Loud, C. Oliver, Framingham
Loud, Chas. E., Boston
75 State St.
Lovell, Henry, Worcester
12 N. Ashland St.
Luard, Richard G., Wrentham
Ludwig, Frank P., Springfield
70 Amherst St.
Luke, T. A. E., Ashby
Lull, Robert D., Hamilton
Lumsden, James, Reading
Lunt, Daniel A., Boston
62 N. Wash. St.
Lunt, Geo. W., Newburyport
60 E. High St.
Lyford, W. C., Natick
Lyman, Chas. E., Middlefield, Ct.
Lyman, Henry H., Middlefield, Ct.
Lyons, M. E., Marlboro
12 Belmont St.

M.

MacDougall, Allister F.,
Northampton
MacRae, Donald, State Farm
Mack, Wallace P., Derry, N. H.
Mackay, W. J., Springfield
Macuen, A. T., Milford
Macurda, W. E., Boston
92 State St.
Madigan, Wm. J., R. D., Harvard
Mainland, John Y., Newton Centre
54 Gray Cliff Rd.
Makepeace, John C., Wareham
Maloney, Bros. & Wells Co.
Dansville, N. Y.
Mann, Chas. W., Methuen
Mann, Horace W., Stoughton
1057 Wash. St.
Mannion, Thos. J., Concord Jct.
R. D. 27
Marble, Ralph P., W. Berlin
Margeson, Ingram I., Westwood

Marshall, A. A., Fitchburg
Marshall, Geo. A., Fitchburg
Marshall, Jas. C., Tewksbury
Martin, Geo. J., W. Newton
Mason, Joseph, Newton Upper Falls
Mason, Otis N., Box 1, Wrentham
Mathews, Mrs. Charlotte V.,
Brookline, N. H.
Mathews, Edwin, Orange
R. D., 2-79A
Mattson, John B., Ashby
Maxam, Chas. W., Adamsville
May, Geo. H., Lancaster
Maynard, L. R., So. Berlin
Box 47
Maynard, E. W., Springfield
855 Belmont Ave.
Maynard, Samuel T., Northboro
McDonald, Chas. G., Medway
McDonald, Henry P., Boston
50 Congress St.
McGowthey, P. J., Dorchester
21 Arcadia St.
McGuire, W. H. Jr., Wilbraham
McIntyre, H. W., W. Brookfield
McKay, Wm. L., Geneva, N. Y.
McMillan, Geo., Mt. Hermon
McNeish, Dr. Alex., Leicester
Mead, A. & O. W. & Co., Boston
Mead, Herbert O., R. D. Lunenburg
Mead, L. H., Harvard
Measures, Daniel E., Rowley
Mentzer, Thornton E., Northboro
Merrifield, Fred L., Colrain.
Merrill, Amos A., Hampden
Merriman, Jas. L., Bolton
Merritt, Chas. L., So. Weymouth
Meserve, John M., Hudson
Messenger, Geo. E., Fitchburg
Pearl Hill Rd.
Midgeley, Leonard C., Westboro
Miles, H. C. C., Milford, Ct.
Millard, Alfred, Boston
Hotel Bellevue
Miller, Allan B., Worcester
32 Westland St.
Miller, Arthur, Boston
46 Clinton St.
Miller, Danforth D., Worcester
9 Pleasant St.
Miller, E. Cyrus, Haydenville
Mills, John K., Northboro
Minott, Chas. W., Hudson
Minns, Miss Susan, Princeton
Modoc Co., Inc., Phil., Pa.
Monk, Rodney E., Pratts Junction
Moore, Clarence A., Arlington
81 Walnut St.

Moore, Elliott J., Worcester
 Moore, H. Ward, Worcester
 Moore, J. L., Wayland
 Mowry, Whipple F., Box 182, Milford
 Morgan, Paul B., Worcester
 Morrell, Melville P., Gleasondale
 Morse, Prof. A. D., Pelham
 Morse, Frank E., Boston
 162 Boylston St.
 Morse, Geo. F., So. Lancaster
 Morse, Herbert L., W. Roxbury
 9 Whitmore St.
 Morse, Munroe, Medway
 Mortimer, Edmund, Grafton
 Moulton, Geo. D., Boston
 51 Oliver St.
 Moses, H. A., Woronoco,
 Woronoake Heights
 Moxley, Chas. S., No. Andover
 Mudge, Everett P., Swampscott
 Munroe, Howard M., Lexington
 R. D. 2
 Munson, E. Malcolm, S. Dartmouth
 Munson, Whittaker Co., Boston
 623 Tremont Bldg.
 Munson, Willard A., Dedham
 Murch, Harry A., Sherborn
 Murdock, Harry E., Danvers
 Murray, Robt. B., Roxbury
 28 Atherton St.
 Myers, Weil & Co., Cleveland, Ohio
 670 Broadway

N.

Nash, Franklin W., Ludlow
 Nelson, John Walter, Lexington
 R. No. 1
 N. E. Box Co., Boston
 1039 Old South Bldg.
 N. E. Nurseries, Bedford
 Nichols, Earl M., Lyonsville
 Nichols, Dr. Estes, Hebron, Me.
 Nichols, J. B., Waltham
 14 Norumbega Terrace
 Norris, J. Edward, W. Springfield
 988 Riverdale
 Norris, Ziba A., Needham
 North, Wayne H., Boston
 161 Devonshire St.
 Noyes, Miss Mabel F., Methuen
 416 Lowell St.
 Noyes, Geo. W., Byfield
 Noyes, W. W. & C. R., Boston
 13 No. Market St.
 Nugent, Jas. H., Fall River
 332 Bedford St.

Nye, Theodore H., Worcester
 19 Beverely Rd.

O.

Oliver, Geo. T., Boston
 30 Ipswich St.
 Openshaw, John, M. A. C., Amherst
 Orcutt, B. A., Buckland
 Orcutt, John C., Boston
 Chamber of Commerce
 Osborne, J. Warren, Middleton
 Osborn, L. T., Great Barrington
 Osgood, H. G., R. No. 1, Westford
 Overend, Walter E., Spencer
 Tafts Corner

P.

Packard, A. A., Springfield
 254 Union St.
 Page, John F., N. Leominster
 Page, J. Nathan, N. Leominster
 Faine, Everett L., Berlin
 Palmer, Geo. L., Kents Hill, Me.
 Parke, Everett B., Burlington
 Parker, Edmund, Westboro
 22 Ruggles St.
 Parker, Elmer B., Wilton, N. H.
 Parker, Frederick H., Billerica
 Parker, Francis R., Fitzwilliam, N.H.
 Parker, Capt. Horace B., Brookfield
 Parker, Jas. M., Medway
 Parker, Walter S., Reading
 55 Walnut St.
 Parker, Wm. E., W. Boylston
 Parks, Wm. A., Needham Heights
 Parmelee, H. A., Williamsburg
 R. D. 1
 Parmenter, C. I., Box 112, Fayville
 Parmenter, Ralph E., Hudson, N. H.
 Parsons, Wilfred A., Southampton
 Patch, A. Warren, Boston
 17 N. Market St.
 Patch, Frank A., Littleton
 Patten, Jas. W., Sterling
 Patten, Robt. G., R. No. 2, Amesbury
 Patrick, Henry L., Hopedale
 Paul, A. Russell, Belvidere, N. J.
 Paul, Miss Eleanor F., Sherborn
 Paul, Miss E. V., Belvidere, N. J.
 Peabody, Geo., Williamstown
 Pearmain, John D., Framingham
 Pearson, Benjamin, Byfield
 Pearson, John A., W. Roxbury
 205 Park St.
 Pease, Arthur D., R. No. 2, Chester
 Peckham, Amos L., Jamestown, R. I.

Penney, Arthur S., Saugus
 199 Essex St.
 Penney, Walter H., Saugus
 220 Essex St.
 Perkins, Frank, Newburyport
 42 E. High St.
 Perkins, Henry J., Springfield
 Perkins, Robt. F., Framingham
 Perry, J. A., Newburyport
 Perry, Roland, Reading
 Perry, Walter I., Newburyport
 Care of Bliss & Perry
 Peters, Austin, D. V. S., Harvard
 Peters, Frederick C., Ardmore, Pa.
 Box 546
 Peterson, Rudolph, Concord
 Phipps, G. A., Dorchester
 605 Washington St.
 Pickard, Wm. L., Littleton
 Pickens, J. M., R. No. 2, Ludlow
 Pierce, Alfred, Lexington
 301 Mass. Ave.
 Pierce, W. C., West Boylston
 Piper, Henry N., Holliston
 Piper, Ralph B., Townsend
 Platt, Norman S., New Haven, Ct.
 395 Whalley Ave.
 Poor, Jas. C., N. Andover
 Poore, Walter, Lake St., Haverhill
 R. D.
 Porter, Sylvester E., W. Berlin
 Potter, Geo. A., Great Barrington
 Potter, Robert H., South Westport
 Pottle, Chas. L., Holliston
 Powell, Edwin C., Springfield
 280 Forest Park Ave.
 Powers, Edwin U., Leominster
 Powers, John G., No. Easton
 Pratt, Benj. G., New York City
 50 Church St.
 Pratt, M. C., Middletown Springs, Vt.
 Pratt, Orestes M., Plymouth, N. H.
 R. No. 4
 Prescott, Chas. W., Concord
 Prichard, Asa B., Somerville
 City Hall
 Prichard, Reuben P.,
 State Rangers' School,
 Wanakeena, N. J.
 Priest, Edwin H., Littleton
 Priest, Frank, Littleton
 Priest, Geo. L., Littleton
 Priest, Lyman F., Gleasondale
 Priest, Harold A., Gleasondale
 Proctor, Albert E., Hopkinton
 Purington, Geo., Colrain
 Purington, Nelson, Colrain
 Putnam, J. H., Greenfield

Putnam, Oliver J., Leominster
 288 Highland Ave.
 Purrington, Wilbur M., Haydenville

Q.

Quinby, William, 58 State St., Boston

R.

Race, R. Henry, N. Egremont
 Raddin, Sam. H., Groton
 Rae, Geo. L., Needham Heights
 Box 393
 Ranney, Wm. H.
 Derry Village, N. H.
 Rawson, Geo. A., Newton
 41 Vernon St.
 Rea, F. Orris, N. Andover
 34 Rea St.
 Read, G. P. Inc., New York City
 199 Duane St.
 Read, Henry B., Barre
 Reed, Jas. O., R. D., Mason, N. H.
 Rees, Prof. Ralph W., Amherst
 M. A. C.
 Reilly, Wm. J., Nurseries
 Dansville, N. Y.
 Reynolds, Daniel W., Haverhill
 R. 2, 749 Broadway
 Reynolds, Mr. and Mrs. Edwin O.
 N. Andover
 Rice, H. L., 20 High St., Boston
 Rice, J. L., R. D. Ludlow
 Rice, J. Wilbur, R. D. Ludlow
 Rice, Lee W., R. D., Ludlow
 Richards, Lysander S., Boston
 Hotel Nottingham
 Richardson, Evan F., Millis
 Richardson, Jas. H., Thornton, R. I.
 Riley, Ernest E., Needham
 Ripley, Edw. P., Weston
 Robbins, Alfred N., Norwood
 85 Walpole St.
 Robbins, Henry W., Littleton
 Roberts, Louis E., So. Lincoln
 Robertson, Chas. H., Leyden
 Robinson, Alfred E., Lexington
 Robinson, Everett, Uxbridge
 Robinson, E. D., Vineyard Haven
 Rockwell, F. P.
 R. D., Rockfall, Ct.
 Rogers, Dexter M., Allston
 344 Cambridge St.
 Rogers, Elijah, Southington, Ct.
 Rogers, F. D., R. D. 1, Monson
 Rogers, Preston C., W. Newbury
 Rothwell, Mrs. B. J., Needham

Root, Wright A., Eastham
Broad Brook Farm
Rose, Milton S., Harwich
Ross, Henry W., Worcester
29 Shaffine St.
Ross, Walter D., Worcester
Rowell, John, 33 Beaver St., Salem
Russell, Fred A., Methuen

S.

Sage, Chas. D., N. Brookfield
Sanborn, Carl N., Cambridge
19 Cambridge Terrace
Sanborn, H. L.
R. D., Box 34, Nashua, N. H.
Sanborn, Dr. Nathan W., Holden
Sanders, Vergil A., Wakefield
Sanderson, J. Gardner, W. Medway
Sands, Furber, & Co., Boston
90 F. H. Market
Sargent, Fred W., Amesbury
Sawyer, Chas. F., Hebron, Me.
R. D.
Sawyer, John F., Reading,
8 Arlington St.
Seales, Carvin H., Leominster
Scheuerle, John A., Springfield
470 Belmont Ave.
Schworm, Chas. S., Boston
Back Bay
Scott, John H., Wrentham
Scott, Walter, Cranbury, N. J.
R. D. 1
Searle, O. C. & Son, Southampton
Sears, Arthur E., Mason, N. H.
Sears, Prof. and Mrs. Fred C.
M. A. C., Amherst
Sears, Horace G., Danvers
Sears, Vinton A., Boston
53 State St.
Sebastian, L. A., W. Acton
Severance, Chas. F., Greenfield
via Lyden Stage
Sevey, Glen C., Russell
Shaw, Dr. J. K., M. A. C., Amherst
Shaw, Walter K., Boston
18 Post Office Square
Shaw, Silas A., Auburn, Me.
Shea, Robt. O., Boston
623 Tremont Bldg.
Shearer, Jas., Colrain
Sherman, Ellsworth P., Marlboro
75 Warren Ave.
Sherman, Wm. B., Providence, R. I.
45 Elmwood Ave.
Shinkwin, Wm. A., Hudson
Shumway, E. F., Belchertown

Simons, Shuttleworth Webling Co.
46 Clinton, Boston
Sims, Dr. Thos., Melrose
119 W. Foster St.
Slocum, Wm. S., Newport, R. I.
Box 164
Small, Chas. E., Berlin
Smith, Allison P., Stow
Smith, Arthur M., Millis
Smith, Chas. A., Ashfield
Smith, Chas. S., Lincoln
Smith, C. K., Worcester
17 Main St.
Smith, Fred A., Hathorne
Essex Agric. School
Smith, Geo. N., Wellesley Hills
Smith, Geo. W., Melrose, Ct.
Smith, Hiram N., N. Andover
Smith, John L., Barre
Smith, Robt. B., No. Andover
Box 87
Smith, Walter J., Ashby
Southwick, Walter H., Nahant
Sowerby, Edmund, Marlboro
Spaulding, Percy F., Ashby
Spoor, J. A., Chicago
1305 1st National Bank Bldg.
Sprague, Geo. H., Ipswich
Sprague, Isaac, Wellesley Hills
Sprowl, Paul & Co., Boston
23 N. Market St.
Stanard, Frank W., Tyringham
Staples, Geo. W., Hartford, Ct.
Steele, Fred, Hersam St., Stoneham
Stene, A. Everett, Kingston, R. I.
Stetson, Archie B., Griswoldville
Stetson, Clarence F., Buckland
Stetson, Edgar G., Griswoldville
Stevens, Abel F., Wellesley
Stevens, Geo. T., Groton
Stewart, Andrew, Quincy
177 Whitwell St.
Stewart, James L., Amesbury
Stilson, F. S., Providence, R. I.
89 Angell St.
Stimson, Rufus W., Boston
511 Ford Bldg.
Stockwell, O., Fitchburg
Stone, Geo. E., Shrewsbury
Stone & Forsyth, Boston
67 Kingston St.
Stone, L. L., R. D. 2, 678 Ludlow
Storer, John H., Groton
Stowe, Geo. Burton, W. Millbury
Stowe, Geo. I., Box 5, W. Millbury
Stow, Harris C., Grafton
Stratton, Edward N., Marlboro
Stratton, Herbert, Hudson

Stuart, Louis A., Pratts Junction
Sussmann, Rudolph, Ashfield
Swain, Allen N., Boston
644 Tremont Bldg.
Swain, Donald N., W. Roxbury
95 Mt. Vernon St.
Swain, Mrs. Fanny S., W. Roxbury
95 Mt. Vernon St.
Swain, Dr. Mary L., W Roxbury
73 Garfield Ave.
Sweet, G. A. Nursery Co.,
Dansville, N. Y.
Sweet, L. C., Cummington
Symmes, Samuel S., Winchester

T.

Taplin, W. A., Brighton
35 Foster St.
Taylor, Arthur G., Fitchburg
R. D. 1
Taylor, Geo. E., Jr., Shelburne
Taylor, G. E., Wayland
Taylor, Wm. R., Westford
Teele, E. R., W. Acton
Thayer, Herbert A., Harvard
Thayer, John E., Lancaster
Thomas, L. P., Rockland
Thompson, Alfred N., Framingham
R. D.
Thompson, James & Co.,
112 Prince St., N. Y. City
Thompson, Jared B., Monterey
Thompson, Waldo V., Westboro
R. D. 2
Thurlow, Geo. C., W. Newbury
Moulton St.
Tilton, J. Dana, Wellesley
Tilton, Dr. J. O., Lexington
1 Elm Ave.
Titcomb, Walter H., Littleton
Toohey, Wm. J., No. Andover,
304 Stevens St.
Towle, Dr. Geo. P., Carlisle
Towne, Abner, R. D. Williamstown
Towne, W. N., Waltham
229 Moody St.
Townsend, Henry M., W. Boylston
Townesley, Fred R., Ashfield
R. No. 1
Trask, Fred R., Sterling
Tucker, A. S., Warren
Tucker, Clarence, Readville
Care of Thos. Leyland Co.
Tucker, Wm. A., Sterling Junct.
Tufts, William, Sudbury
Turner, Edward F., Brockton
Turner, N. B., Great Barrington

Tuttle, Archer N., Warren
Tuttle, Clarence, Groton
Tuttle, Horace F., Acton
Tyler, Alonzo W., Peabody
Tyler, Nathaniel P., Sterling Junct.
R. No. 1

U.

Underwood, Herbert P., Gleasondale
Upham, F. A., Three Rivers

V.

Van Deusen, N. S., Ashley Falls
Vinton, G. N., Sturbridge
Virginia, Mt. Orchard Co., Inc.
Charlottesville, Va.
Vose, C. H., East Templeton

W.

Wait, Minor S., Hampden
Wakefield, Alonzo C., Orange
Walker, Geo. A., Box 82, Westford
Walker, Henry P., R. D., Hudson
Walker, Herman F., Lynn
Washington St.
Walker, Wm. B., Pratts Junction
Wallace, F. S., Bradford
178 Salem St.
Wallace, Thomas C., W. Somerville
83 Irving St.
Wallace, Wm. N., R. No. 2, Ludlow
Walton, Perry, Belmont
Ward, A. W., Auburn
Ware, Arthur L., Framingham
Box 53
Ware, Henry, 82 High St., Brookline
Warner, Goodwin, Concord Junction
Warren, Edward, Leicester
Warren, Henry H., Stow
Warriner, A. A., Warren
Washburn, Handel E., E. Freetown
Waters, Edw. A., W. Boylston
Waugh, Prof. Frank A., Amherst
M. A. C.
Webb, Chas. R., Shrewsbury
Box 21
Webber, H. T., Harvard
Webber, R. M., Wilbraham
Webster, Louis A., Blackstone
Weeks, A. H., Somerville
52 Boston St.
Weeks, Lewis C., Falmouth
Wehle, Harry B., Southboro
Westcott, Wilmarth A., Hopedale

Wetherbee, Mrs. A. C., Worcester
 Station A., 31 Brattle St.
 Wharton, Wm. P., Groton
 Wheeler, A. B., Berlin
 Wheeler, Chas., Framingham
 Wheeler, D. E., Leominster
 Wheeler, F. A., Bolton
 Wheeler, F. Sherman, Berlin
 Highland St.
 Wheeler, Geo. F., Concord
 Wheeler, Gilbert H., Bolton
 Wheeler, Dr. Homer J., Boston
 92 State St.
 Wheeler, Wilfrid, Concord
 Wheeler, Wm. E., Berlin
 R. D., No. 27
 Wheeler, Wm. J., Worcester
 21 Forest St.
 Wheelwright, Wm. B., Boston
 95 Milk St.
 Whitcomb, Herbert A., Northboro
 Whitcomb, Levi, Northboro
 Whitcomb, Nahum H., Concord Jct.
 R. No. 1
 Whitcomb, Ralph H., Amherst
 White, Mrs. Catherine M. E.
 Westwood
 White, F. L., So. Deerfield, N. H.
 White, Henry K., Lowell
 250 Nesmith St.
 White, Dr. Leon H., Wellesley
 White, Walter E., W. Boylston
 White, Warren, Holliston
 Whitelock, Wm. M. E., Marlboro
 10 Farm Rd.
 Whitney, Chas. A., Upton
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 116 Sagamore St.
 Whittier, Dr. F. F., Boston
 149 Tremont St.
 Wieren, Geo. Van, Framingham
 R. D.
 Wilbur, Walter M., Marlboro
 Wilcox, Howell G., Boston
 18 Pearl St.
 Wiley, H. S. & Son, Cayuga, N. Y.
 Willcutt, Walter G., Plainfield
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 90 Columbia Rd.
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 Wilder, Henry J., Washington, D. C.
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 Williams, Geo. F., Fitchburg
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 Williams, Wm. S., Ashfield
 Wilson, Chas. A., Medway
 Wing, Clinton, Ashfield
 Wingett, A. H., Lenox
 Winn, Ricker & Co., Boston
 93 F. H. Market
 Winn, Willard A., Worcester
 11 Berkshire St.
 Winship, Fredk. H., Wakefield
 Jordan Ave.
 Winsor, James, Greenville, R. I.
 Winsor, Thos. K., Greenville, R. I.
 Wister, John C., Germantown, Pa.
 Wister St.
 Witherell, Warren F., Winchester,
 114 Church St.
 Wolschendorf, Geo. E., Whitman
 R. D. 2
 Wood, Benj. F., Boston
 246 Summer St.
 Wood, Burt T., 128 Allen St., Athol
 Wood, C. M., Upton
 Woods, Wm. A., Groton
 Woods, W. J., Echo Farm, Paxton
 Woods, W. L., Westford
 Wright Wire Co., Worcester

Y.

Yeaton, Geo. A., Augusta, Me.
 York & Whitney, Boston
 P. O. Box 3456
 Young, Edwin B., Hinsdale, N. H.
 Box 594

LIST OF NEW MEMBERS ADDED AT THE BOSTON MEETINGS

January 20, 21, 22, 1916

- | | |
|-------------------------------------|--------------------------------------|
| Atherton, Percy A., Harvard | Ferguson, Thos. W., Stow |
| Atkinson, J. C., Mattapan | Flint, Ephraim B., Lincoln |
| Alcott, Geo. J., Bridgewater | Finney, D. G., South Sudbury |
| Allen, Edward B., Lynn | Field, Chas. T., Jr. Shelburne Falls |
| 46 Sachem St. | Goodnough, Mrs. R., West Roxbury |
| Adams & Dodge, Boston | 1702 Centre St. |
| 17 N. Market St. | Gaskill, Ralph H., Segregansett |
| Belt, Mrs. Sarah Elizabeth | Grafton, Louis, Randolph |
| 63 Clifton Pk., Melrose High'ds | Guy, John H., Sharon Heights |
| Brown, Roger W., Bedford | Gray, Aldrich Co., Boston |
| Buxton, Ray P., R. D. 1, Amesbury | 33 Commercial St. |
| Bridgham, H. W., Concord | Gilmore, E. D., Attleboro |
| Brown, G. P., Barre | Gleason, Dr. E. F., Boston |
| Bailey Francis C., Watertown | 636 Beacon St. |
| 334 Mt. Auburn St. | Globe Rubber Works, Boston |
| Bradshaw, E. G., So. Sudbury | 45 High St. |
| Bray, Prof. C. D., Boston | Harriman, Mrs. K. F., Boston |
| Tufts College | Art Dept., Boston Herald |
| Bullock, Archer E., Onset | Hunt, Hubbard E., Marlboro |
| Cogswell, W. Cleveland | Church St. |
| North Scituate | Harrington, Edward I., |
| Clark, Oliver J., Medfield | East Weymouth |
| Case, Miss M. R., Hillcrest, Weston | Foughton, D. G., Littleton |
| Connelly, Michael, Medway | Hickey, Daniel S., Roxbury |
| Collins, J. W., Westminster, Vt. | 19 Copley St. |
| Cox, Harold C., R. D., Wakefield | Hutchins, Gordon L., Concord |
| Child, Henry T., Woodstock, Ct. | Hammond, Carlton D., South Easton |
| Chandler, Geo. H., Mansfield | Hall, A. P., Rochester, N. H. |
| Clarke, Fred L., South Sudbury | Kershaw, Geo. W., Lakeport, N. H. |
| Clapp, Edwin B., Easthampton | R. D. |
| Cole & Co., New York City | Kimball, Francis E., Lexington |
| 115 Warren St. | Kinney, F. D., Worcester |
| Chace, Benjamin S., Swansea | 267 Oliver St. |
| Cousins, Mrs. A. C., Roxbury | Lee, James W., West Tisbury |
| 50 Walnut Pk. | Lund, Miss F. B., Boston |
| Chute, Mrs. Arthur L., Boston | 590 Beacon St. |
| Marlboro St. | Lovenberg, Chas., Providence, R. I. |
| Davis, John A., Sterling Junction | 372 Lloyd Ave. |
| Davis, Harry E., Sherborn | Lundstrom, Mrs. C. M., Fayville |
| Dodd, Dexter T., Hudson | Mayo, Walter B., Sherborn |
| Dorsey, Bernard P., Marlboro | Middleton, Frederick H., Hudson |
| 147 Hudson St. | Morrison, F. W., Linwood |
| Eaton, Winslow A., Lincoln | Murray, Chas. A., Arlington |
| Everett, Dr. E. E., Boston | 81 Westminster Ave. |
| 427 Marlboro St. | MacDonald, Henry P., Holbrook |
| Evliverdge, Avery J., No. Grafton | Makepeace, Wm. J., W. Barnstable |

McDermott, Mrs. Timothy, Milton	Sweeny, Edward W., Westboro Chestnut St.
McNeil, F. J., Dansville, N. Y.	Spaulding, Philip R., Weston
Mitchell, E. W., Stuyvesant Falls, N. Y.	Spinney, F. W., Haverhill -
O'Brien, Edward, Norwood 4 Railroad Ave.	Steere, Enoch M., Chepachet, R. I.
Fage, J. W., So. Lincoln	Storrow, Mrs. James, Lincoln
Dudley, Palmer B., Milton, N. Y.	Swenson, H. A., New York City 204 Franklin St.
Fark, Fred W., Chelmsford	Titcomb, W. H., Littleton
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Pike, Wilbur C., Salisbury	Upham, J. Edward, Boston 15 India St.
Pinney, Chas. E., Louisville, Ky. Kentucky Tobacco Prod'ts Co.	Vanderbuilt, Wm. H., Peabody
Pope, Edward M., Providence, R. I.	Wales, Miss Helen, Beverly
Rapson, Miss Alice, Cambridge 18 Martin St.	Walkes, Raymond P., Taunton Box 74
Rich, N. H., Rochester, N. Y.	Ward, Ellwood W., Southboro R. D., 1
Rogers, J. W. R., Canton	Washburn, Paul, Boston 8 Congress St.
Ropes, E. C., West Newbury	Wetherby, Geo. R., Stow
Sabine, Stephen W., Groton	Wetmore, Chas. Ingles, Westford
Seagraves, Harry S., Winchester	Williams, Donald, Sherborn
Shedd, Albert E., Littleton	Wood, James, Topsfield
Smoots, John P., Box 315, Quincy	Wright, Harry Andrew, Springfield

If your name is incorrectly listed please notify Secretary. If you have a summer and winter address have postman forward mail as we can list only one.

MASSACHUSETTS
FRUIT GROWERS'
ASSOCIATION INC.



REPORT OF THE
23rd Annual Convention
HELD IN
AUDITORIUM, SPRINGFIELD, MASS.
1917

Published by
The Massachusetts Fruit Growers' Assn., Inc.

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Twenty Third Annual Convention
OF THE
Massachusetts Fruit Growers' Association, Inc.

Municipal Building, Springfield, Mass.
February 11 and 12, 1917.
Morning Session

Vice President Munson in the Chair.

THE CHAIRMAN: We are a little unfortunate this morning in that our President has not been able to come here, and it falls upon my shoulders to open the meeting.

We are very fortunate in having a man like Professor Sears, who has taken considerable time out of the pleasures he has derived from many of his trips and has been willing to give us the benefit of this last one that he has taken and gotten the new ideas and he will give us this morning some of the results that he has been able to find there and some of the things that they are doing in the different fruit growing sections through which he has traveled, and it gives me very much pleasure to introduce at this time Professor Sears.

FRUIT OBSERVATIONS IN THE WEST

**F. C. Sears, Professor of Pomology, Massachusetts
Agricultural College, Amherst**

Mr. Chairman and Friends: I am certainly very glad indeed to have this chance of talking to you people again.

In our work at the College we divide our courses into two general classes. The first are those courses which we term cultural courses and which are supposed to aid a man generally, to make him a better citizen, to teach him to use better English and things of that kind. Then we have what we call our technical courses which help him to be a better poultryman, a better fruit grower or a better dairyman. Now I think the talk I am going to give you this morning will be a "cultural" talk. I do not think that I will tell you much that you can take home to your farms and put to any practical use but I do hope that perhaps it may be of interest and not too tiresome and that while it is going on you will perhaps get some ideas that will give you a better understanding of the fruit situation in the country, and perhaps give you a little renewed courage in pushing ahead in the work.

I might say just a word about my trip in general. We have a pleasant custom at our institution when a man has been there seven years (and they have stood him as long as they can) they let him off for six months or a year to go away and learn something that is worth while. So this year it came around to my time to get off. I had planned to go across the Pond and see the other side but circumstances prevented that, of course, and so I decided to "see America first." I think it might perhaps be interesting to some of you to tell you something about the sightseeing side and social side of the trip, which to me was decidedly pleasant, but I am not going to do that. I am just going to outline the trip briefly so that you may see where we went and get some idea of the places we visited.

We went West, stopping at Niagara Falls and Chicago for sightseeing. Then visited in Kansas, my old home, and next spent two months in the Rocky Mountains, in Estes National Park. We were in a cabin seven miles from a grocery store and two miles and a half from a postoffice, right out in the wilds. If you drove in to our cabin, when you wanted to go out again you had to go out the same way.

there was no other way. There were all sorts of wild animals around there (beside ourselves), and we certain had a mighty fine time.

But the real trip, the real fruit growing trip, began after that. I went to the West Coast, stopping first at Walla Walla, Washington, and from there went to North Yakima which is, as you know, one of their leading fruit sections.

From Yakima I went back to Walla Walla and then up to Pullman, Washington, which is the seat of the Agricultural College. From there I went to the Agricultural College, of Idaho, at Moscow. Next by way of Spokane to Wenatchee. Here I spent four or five days. As you all know, Wenatchee is one of the leading orcharding sections of the Northwest. After visiting Cashmere and a lot of the other local towns I went up the Columbia River into Canada. That was an extremely interesting trip because it got me into the newer developments where they have profited by the mistakes of some of the older sections like Wenatchee and are doing things in a more satisfactory way.

This took me through Brewster Omak, Okanogan to Riverside, and on to Oroville which is close to the British Columbia line. There the railway transportation stops and you get through into British Columbia the best way you can. I spent two days trying to get through (some fifty or sixty miles), and finally induced a man who had a Ford to take me and a couple of Indians through for a little less than his Ford cost him. That took us up to Okanagan Lake in British Columbia which is the largest and finest of the British Columbia fruit sections. I then went to Penticton at the south end of the Lake and from there to Kelowna which is probably the leading fruit section.

From Kelowna I went to Vernon which is a great section for fruit. Then down to Vancouver by way of the Canadian Pacific and by boat to Victoria and Seattle. At Seattle I stopped and acted as one of the judges in their Land Products Show, which was an interesting experience.

Of course, Seattle is not particularly a fruit section, but there was a great deal of fruit at the show. From there I went to Puyallup, which is probably the greatest small fruit town in the world, and saw some very interesting things, particularly their co-operative association which runs several canneries and two stores which each do a business of a thousand dollars a day, and a number of other things that would be interesting if we had the time to spend on them. From there I went to Portland, Oregon and out to Hood River where I spent nearly a week. That, of course, is another section we have all heard about for years, and personally if I could not live in New England I would rather live in Hood River.

I visited the Willamette Valley, famous for its English walnuts and its prunes and I was much interested in looking over the prune situation there to find that there was a great difference in prunes.

Now, I spent four years at college and six or eight years after college before I was married and practically all that time I took my lunch with me in a pail and I suppose that 75 per cent of the days I had prunes for dinner, so that I thought I had a thorough course in prunes. But in the Willamette Valley I found out there that there were various types of prunes depending upon the particular plum from which the prune was manufactured. I had always felt like the Kansas City Star which said that some western paper had tried to interest them in what they called Prune de Lux. They said there was nothing doing, however, "prunes was prunes to them," they said, "no matter how dey looks." That was the feeling I had always had; there was just one kind of prunes and that was the kind I didn't care for. But I found on going through their prune drying establishments that there were some which you would enjoy eating out of hand, very delicious.

From there I went to Corvallis and looked over the Agricultural College, and an extremely interesting college it is, one of the most interesting and best equipped in the

United States from the standpoint of the fruit grower.

From there I went to Medford, Oregon, which is in Southern Oregon, and is one of the most famous pear sections in the world. From there I went to California, stopping at Los Molinos up north of Sacramento, then down around San Francisco, making Stanford University my headquarters and going from there to San Jose and Watsonville and some of those other towns.

Watsonville was really the only one interesting to me as an apple grower, as it is the only section down there that really is, you might say, famous for apples. I was very much surprised at the development I found there at Watsonville. It is only a little town, about half the size of Northampton, but they told me that there were 87 large commission and co-operative associations there handling this crop.

From there I went to Fresno and across to the Yosemite Valley and did a lot of tourist stunts which I won't worry you with, but which were mighty interesting. I told Mrs. Sears the next time we were on a honeymoon trip we would go to the Yosemite, and any of you who are not married yet I would recommend it to your consideration.

I came back by way of the Grand Canyon and various other places through Arizona and New Mexico and Kansas. There I joined the family and went to Washington, D. C. and spent three weeks and one of those weeks I spent in Virginia, and West Virginia and the North Carolina section looking at the orcharding there.

Now, that will give you an idea of some of the sections I went through and I am going to confine myself just as strictly as possible to the orchard end of it, but as I said in the beginning, I do not think I will tell you anything that will do you any good on your home farms, but perhaps something that will give you something to think about and possibly cheer you up a little bit if you are discouraged. I do not know that you are, I hope you are not, but it may do no harm to cheer you up a little in taking up the work for the coming year. I shall pick out a few isolated phases of

the business out there to talk about and say a few words on each of these, rather than to talk generally covering all the ground.

I was naturally looking for their handieaps as a Westerner would if he came here. He would comment on our many poorly kept orchards; on our old, decrepit trees; on our poor spraying methods in too many cases and on our poor methods of packing and marketing. No doubt he would see more things to criticise in our methods and conditions than I did in theirs. We must all admit the wonderful progress they have made, a progress which has benefitted the orchard industry of the whole country. But, naturally, as I said, I was looking for the things they had to contend with and these were some of the things that interested me.

First, the "boom," if we may call it that, and I think it would certainly warrant that name. There is no question whatever that their boom is pretty thoroughly collapsed. I was out there in 1910 and at that time everything was orcharding. Nobody talked anything else. If you went into a drug store, for example, looking for post cards you found every variety of fake (and otherwise) fruit-growing post cards; a man driving a four-horse team hauling an apple on a wagon; a carload of about three apples; a car with a couple of dozen raspberries on it, and all that sort of thing. And the women's hats looked like apple boxes or peach baskets instead of coalhods or dish-pans as they do in our part of the country. (Laughter.)

You found the leading fruit growers were presidents of the banks or the street car companies and things like that. They were putting the prices up and bragging about their apples selling for 25 cents apiece and \$1.00 a dozen in the Chicago market. Their customers felt like the man I heard of recently who bought a pound of butter for his wife and it cost him so much that he took it around to the jeweler's and had it engraved before he took it home. That was the feeling everybody had on the apple business at that time. That has entirely changed and I believe it has given way to

a more healthy, rational condition. I want to just mention four or five things as illustrating this change.

In the North Yakima district I was told by the inspector there that they had pulled out and cleaned up 2,000 acres that had been set to orchards there because it was not doing well, was not profitable, principally because it was a wrong type of soil. Of course, 2,000 acres is not a great deal, but it is a help.

I traveled for a long distance east of Wenatchee, coming down the Valley there into Wenatchee through a section which had been one of the boom sections, and had been set out, practically the whole section, to orchards. And all the trees are dead. These orchards have been absolutely abandoned, turned over to the prairie dog or the coyote. I inquired into that when I got into Wenatchee. They said most of those propositions were boom propositions, development propositions, that had been handled,—well we know how they are! They organize a company and buy up three or four thousand acres of land, get some water on it, then go to some other good section nearby and get their best fruit and then stick up a sign in Washington Street, Boston. "This is the kind of apple we are proposing to grow. You can buy the land at \$500 an acre and pay so much a year." Then when they got them under way they found they didn't have water enough and at the end of the five-year period when the orchards came into the hands of the purchasers they went out and looked into the situation and found there was the orchard set out all right, but not a sufficient amount of water to keep the thing going. They either had to give it up and drop the whole thing right there or else put a lot more money into it to get a sufficient amount of irrigation water to take care of it. In all this section I have just mentioned they decided the cost of getting the additional water was not warranted and the best thing they could do was simply drop it.

In Medford, Oregon, I saw a smaller affair that interested me a lot. I was driving out with the Inspector there

in his Ford and we came to a block of trees, which a man was just clearing up, a block of orchard trees. The inspector said there were 27 acres in it, Spitzenbergs 18 years old. They were just then grubbing them out and the Inspector told me the story of it. It seems that this orchard of Spitzenbergs were on a heavy type of soil, and when the apples came into bearing the man found he had great, big, coarse, uncolored Spitzenbergs which did not bring the prices that Spitzenbergs on a better type of land did. The man had paid \$20,000 for the orchard. The inspector had talked with him about the matter several times and tried to show him that as he was putting money which he got out of the rest of the farm into that orchard the longer he kept it the worse off he was. Finally the man decided to pull them out.

Medford, as you all undoubtedly know, is the most famous pear section and right near this 27 acres which the man was pulling out I saw a block of 10 acres which belonged to a Chicago woman. I do not know how long she had owned it but they said she had paid \$28,000 for the 10 acres. I do not need to tell you you could buy that for less if you wanted it now.

Another very interesting case came to my attention through one of my old students who was teaching out there. This was the instance of the Methow Valley. Six or eight years ago they had grown a few apples up in there and they started to develop the region. There was no railroad up the valley at that time and their cry was "Come in ahead of the railroad and develop your orchard and when your trees come into bearing you will be all ready to ship out your products and everything will be lovely." They offered raw sage brush land at \$250 an acre and lots of people went in and bought and got in ahead of the railroad—in fact, so much ahead of the railroad that they are still ahead; it hasn't come along yet. Today you can buy these fine bearing orchards for a good deal less than \$250 an acre.

Perhaps these are enough instances of the boom side. You can find any number of cases fitting into those different

classes. On the other hand it is only fair to the Western folk to present one or two instances of the other side of the case. When I was in Wenatchee I asked the inspector if he could show me an orchard that was sold at a high price and was still running, that is, giving returns on the price. He said, "Yes," he could. So he took me to a block of land owned by a man named Schleidermantel. He was a German, I suspect, partly from his name and partly from his making money out of his orchard. He had five acres for which he had paid \$3,000 an acre. He bought it at eight years, and it is now fourteen years old. He had been allowing himself \$500 wages for his work, which, of course, is not a very high wage, but he had been putting that aside; and then had made 10 per cent on his investment. It is hard to believe that he could do that, but that is what they said he had done and they had the figures to prove it, paying himself \$500 and then laying aside 10 per cent interest on his investment of \$15,000.

Another case—the only other I am going to mention—is down in Medford, Oregon, a pear orchard. It isn't there now, but might just as well be. It was an orchard of seven acres of Anjou pears. The owner was several times offered and refused \$2500 an acre for it. He said repeatedly that if he knew where he could buy more orchards like it at the same price \$2500, he would be very glad to buy. He was getting a good return on that valuation. But a few years ago when the fire blight became very serious and when they introduced more drastic methods of inspection, having people cut out the fire blight when it appeared in an orchard—this man resented the work of the inspectors and pulled out his orchard, and when I was there it was a nice field of alfalfa and undoubtedly returning him something, but nothing like, of course, what he could have gotten for a pear orchard. The inspector who told me the story said there wasn't any reason in the world why that pear orchard should not be alive today, and giving practically as good returns as ever on the investment. So there were two

cases (and, of course, plenty of other cases might be found where the prices had not been so high), where the orchards were still returning an excellent interest on the investment.

It may be that it was unkind in me, as hospitably as I was treated out there, to go around looking for their troubles, but since I was not at all responsible for the troubles and would have been glad to help them out if I could, I do not think they will hold it against me, and I want to take a moment to speak of the troubles that they have out there which impressed me most. They interested me and I think they will interest you, showing some of the handicaps under which they are laboring.

One thing I saw very commonly there was sun scald on the fruit. We had this in some of our orchards here a few years when we had extremely hot weather. The upper surface of the apple will show a brown area where the tissues are simply baked. That apparently was fairly common. That isn't particularly surprising to me, and I do not suppose to you, because we know something about the climate they have there, that it is for the most part a wet and dry season; starting in sometimes the last of October and raining much of the time until well into the spring and then it stops raining and they do not see any more clouds until October again. With that type of climate and the heat that would develop under those conditions, it isn't at all surprising that the fruit would at times be scalded in that way.

A second trouble which was much more serious it seems to me is what they call out there "collar rot." Of course, we have what we call "collar rot" too. Anything which attacks the tree at the surface of the ground is usually called that. This type they had there **so far as any one had an explanation of it was considered due to irrigation.** I saw many blocks where perhaps anywhere from a dozen trees to an acre up to half or two thirds of the trees on the acre would be affected in that way. Of course, it probably meant if you could discover the trouble on that many trees,

that a great many other trees that had not begun to show it, would soon do so. It was one of the things that, if I had been a grower there, would have worried me, because it is one of those things affected by the soil conditions, and far more difficult and serious to handle than a trouble which attacks the leaves or branches.

A third difficulty which was very common was the aphid. I was rather surprised to see how general it was out there. You would find trees in almost every orchard that were affected, and as far as I saw them, fully as general in those well-kept orchards as we have in our Massachusetts orchards which are not so well kept. It was apparently one of the most serious orchard pests at the present time.

Another thing very closely associated was the woolly aphid. This was becoming very common in some sections. A good many trees in Hood River were attacked, more particularly on the water sprouts. I was talking to one of the men who has charge of the local experimental station and he said that he considered it one of the most serious things they had to contend with for several reasons.

First, because it was an insect that was hard to kill by spraying; second, because the materials which were necessary were relatively very costly; and third, because the spraying for it came at a time when growers were tired out with their spraying for other pests. He was afraid he said, that they were going to have very serious trouble in controlling it.

Another trouble, and one which they nearly all considered as their most serious one, was fire blight. Of course, we have that here more or less and know something about it, but nothing to compare with what they have out there. However, in two or three sections (in Medford, Oregon, for instance), they have it under control so thoroughly that they do not consider it is a serious matter.

I was told by one of the inspectors there that they considered they had solved that question, that if their growers

would only do what they have been told to do there wasn't any question about controlling it. I went around to many orchards and in no case do I recall an orchard that we went into where we did not discover plenty of it. In many cases I should not have discovered it, but the inspector with whom I was travelling would point it out to me.

Perhaps this one instance will give you an idea of how troublesome it is. I went to one 40-acre block of pears. The inspector told me if we could find the fire-blight-man at this orchard he would be an interesting man to meet, and he certainly proved so. I found out he had spent his whole season of six months looking after the fire blight in that one 40-acre block. In addition to that the field inspectors go through the orchards every few days looking for it and if they find any they mark the tree, call the owner up by telephone and tell him where they found it.

We found this man digging about the roots of a tree. He had a hole perhaps three feet deep about the tree and was treating the roots. I asked him how much time he had spent on this particular tree and he said he worked on it about two days and a half. Now, it was not a particularly good tree, there are just as good trees in Massachusetts, yet not many of our people who had a pear orchard would think it was worth while to spend two days and a half or even one day on a single tree.

The last of these "troubles" which I am going to mention is winter injury. I think next to the collar rot, and perhaps, the fire blight, that would be the thing which would worry me most. I saw more of it in British Columbia than I did on our own side of the line, but too much of it everywhere. Sometimes in the worst sections one would see half, or even three-quarters of the trees that were affected with winter injury. In some cases the trees were very bad and in other cases just showing a little yellow appearance, but always enough to indicate that that tree was damaged. Last year they had an unusually severe winter and most of the injury came from that season.

I do not need to tell you people who are interested in the orchard business that when you get winter injury in the orchard it is a serious matter; you never know where it is going to stop. It is a good deal more serious than some diseases which can be treated. I talked with one grower in Kelowna, British Columbia, where I saw the worst injuries of this kind. He gave me the following figures which I think very interesting.

	1915	1916
Gross returns - - -	80 tons	10 tons
Fallwaters - - -	2 cars	None
Ontario - - -	400 boxes	50 boxes
Jonathan - - -	1400 boxes	None
Prunes - - -	2 1-2 tons	A hatful
The next grower to him	1400 boxes	40 boxes
The second grower to him	1750 boxes	200 boxes

That would be an illustration of the decline through practically this one difficulty alone. When you got up to Vernon, British Columbia, you found much the same conditions there. Personally I would rather have almost anything trouble my orchard than a serious case of winter injury.

The next question I want to say a few words on is the labor question. I think it might be included under the section I have just been discussing, their "troubles," because it seemed to me one of the serious problems that faced them there. We all know it is serious enough with us in New England, but it seems there they are peculiarly unfavorably situated. If you think the situation over, you will see that they are bound to have more difficulty than we do.

In the case of Wenatchee, for instance, you travel nearly all day, two thirds of a day, three-fourths of day, on a good fast train to get to Wenatchee, from anywhere else, that is, anywhere else of any size, coming in from Seattle on the other end and from Spokane from this end, and in that time you travel mostly through a sage brush country. All this country where it is taking up anything but ranching is

developing the orchard business and is wanting labor at the same time. In Wenatchee itself, there is almost no chance whatever for her to relieve her labor scarcity by drawing from outside settlements. Our situation here is almost the reverse. You can't go anywhere but you are fairly close to reasonably large towns while we cannot always (in these days when we are making shells and bullets) get the help we want, they get almost none and the only thing they depend on is their local help and the hobo element which drifts in there.

You will find they employ in their orchard work generally one of three different types of labor, usually keeping fairly close to one or the other. First, you will find in some sections that the Japs are the common laborers and perhaps you go into a packing house where there is nothing but Japs except the foreman. I should say that was the most common type of labor. In other sections the Chinese is the common laborer and where I found the Chinese I found the owners usually are very well pleased with them.

The Chinese were usually preferred to any other type of labor as I got the consensus of opinion out there. The Chinese are not so combative as the Japanese, not so likely to get into trouble, easier to handle; and we all know the reputation of the Chinese to imitate, if you show them how to do a thing once they know how to do it always.

I remember when I was out there in 1910 judging at the Canadian Apple Show, the car that got the prize was a car of Jonathans from Kelowna which was packed by two Chinamen. It seemed that every apple in the earload was exactly like every other one, and every box was packed in the same way. That is not surprising to any one who knows the Chinese characteristics. You probably remember the story of the woman who got a new Chinese cook, and she went out to show him how to make coffee the first morning he was there. She wanted the coffee settled with an egg so she broke one and as the first one wasn't good she threw it away. Then she broke another one and used it to settle the

coffee. About two months after that she happened to go into the kitchen when the cook was making the coffee. He first broke an egg and threw it away and then put in another one to settle it. He had been doing that for two months. Now, they carry that same characteristic into their apple packing. You show them what you want done once and it is always done in the same way after that. Of course, the Chinese have not been allowed to come in there, the labor class, for years, so that there are only the older men and the children who have grown up since this law was passed so the Chinese labor is not very extensive.

Then, in addition, there is the white labor. That might be sub-divided into two classes, the hobo element from Southern California and anywhere else where work is scarce, and the local white help. In some sections you find the custom is for everybody in the settlement to come out and help on the fruit work. That is, you will go into a packing house and if the man has a number of children they are all out helping. The oldest daughter perhaps has charge of the packing house and knows more than any one else about packing. The oldest boy is out in the orchard managing the picking, and the rest of the children of working age are helping somewhere. In other sections they do not do this but depend on what local help they can pick up with this white element that I spoke of, the hobo element that drifts in there.

Hood River perhaps is a good example of the labor situation. I do not think the Hood River is nearly as bad as many other sections. I spent four days there going around with the head inspector and he didn't talk to a single owner who didn't want more help than he had,—two packers, four graders, six men to pick in the orchard, and so on. Practically all of them would have a notice on the roadside "Labor wanted \$2.50 a day and board," or something like that. This inspector told me that everybody throughout the whole valley was nervous over the labor shortage. I think that was about the 10th of October, and four days

after that I cut the following clipping from one of their papers:—

“The agitation to have the North Yakima High School close so that the students may help relieve the labor shortage and save the apple crop still continues but does not gain much ground with the School Authorities. Such action has been taken by the Wenatchee School Board and many of the High School students at Walla Walla are out to help with the harvest. Superintendent Davis (he was the School Superintendent there in North Yakima) is opposed to closing the schools unless the emergency is greater than appears. The apple crop was heavier than anticipated and the season a few weeks later. The rush of picking and packing is on and the need for help very urgent.”

That was on the 14th. Then on the 19th this item from Hood River:—

“Hood River fruit growers have circulated a petition asking the business men to close their stores and the school to permit the clerks and students to pick apples. Rancher Wilson Fiske alone lost 3,000 boxes of apples on account of the labor famine. The business men promised to contribute automobiles to convey the volunteers to the orchards. Unless the emergency is met the ranchers face staggering financial losses.”

Now, just imagine the Hampden County Improvement men going to the business men here in Springfield and asking them to close up their stores in order to help Mr. Bird to harvest his apples, and not only that but to furnish automobiles to take the help out.

The wages that they were paying did not seem to me unduly high. The average wage ran about \$2.50 as a rule for their packers, but generally somewhat lower than that for graders. That rather surprised me because I think a grader requires more brains than a packer, but that was the way they were running. In a great many cases they used women as graders. In a very few cases did I find women as packers; but in a great many cases they used them as graders. In a great many cases they paid by the box for packing, and the prices were fairly uniform throughout the sec-

tion there.

If the apples were turned over to the packer and packed orchard run (if nothing had been done to them), they paid about 7 cents a box, $6\frac{1}{2}$ to 7 cents a box. In that case a man had to size them, grade them and pack them. In another case they would run the apples through the sizer and they would then come to a man all one size, but he had to pick his three grades out of that. In that case they paid about 5 to 6 cents on the average. Then in a third case they had been run through a sizer and also graded and in that case they paid $3\frac{1}{2}$ to 4 cents. In one house they were paying $3\frac{1}{2}$ with a bonus of half a cent if the packer stayed throughout the season.

Just a word on soil management. Not that I am going into details at all, but just one thing in particular struck me as interesting showing a tremendous change since I was there in 1910. I was there late in the season then. I think it was the first week in November, and I do not recall that we saw a single orchard even as late as that that had any real cover crop on the land. I do not believe there was one per cent of the orchards where we saw anything grown on the land, just perfectly bare, thoroughly cultivated.

This year, I have no accurate figures of course, but I believe that 75 per cent of the orchards were in sod, and I shouldn't be surprised if you would find that it was 90 per cent. That shows a tremendous change in those six years. These sod conditions varied almost as much as they do in our Massachusetts sod orchards. I found a great many orchards in ordinary, plain hay sod, but all through the Northwest even up into British Columbia they had orchards planted with alfalfa. That seemed to be the popular thing to do, and then the growers branched off in various directions, that is, their practice varied a lot.

The ideal practice and the practice the authorities were recommending was to start either in the spring or fall and use a disk harrow and chop up the soil until you wouldn't imagine there could be any alfalfa there. Then they would

put on the water and in a very short time the alfalfa would spring up and come along just as evenly as though nothing had been done to it. They would allow that to grow until the first crop was ready and that would be made into hay and later whatever grew was disked into the soil. That would be their ideal sod method.

Other growers took two and sometimes three crops of hay out of the orchard. They admitted, all of them, that it was not possible at all to handle the orchard in that way unless you had irrigation water available. If you had to depend on natural rainstorms it could not be done, but where irrigation was available it seemed to be worked out satisfactorily, if they didn't take too many crops of hay.

Just a word or two on their method of handling the fruit. When I was out there in 1910 practically everybody was using some type of pail to pick into. Of course, the picking season was over at that time and what I got was from the growers and from looking about the packing houses. On this trip I do not remember but two or three instances where I found men using a pail, everybody else was using some type of bag.

Now I hope you people will not go home and use a bag. I think it is a barbarous thing to pick into when it can possibly be avoided. A man may pick more boxes in a bag than in any other way. Probably he can but they are bound to be bruised more or less. It simply showed the pressure of the labor question.

Another thing which interested me in this matter of handling fruit was the way they are using gravity carriers for transporting apples to different parts of the packing houses. The wagon would back up to the sidewalk and the boxes would be carried by the gravity carrier clear to the other end of the building where they were piled up on the floor preparatory to loading into the cars. Or they might be carried by this method from the packing room back into the storage room. This method has certainly lightened the labor situation decidedly.

The next thing I want to mention is their inspection work because we are just getting into the troubles of inspection and it seemed worth while to study the situation fairly closely to see what we might learn from them. As you might expect I found all sorts of variations in the type of inspection particularly in the efficiency of it. In most sections the inspection was very efficient. At Hood River they had the best methods of inspection that I found anywhere. I do not see any improvements that could be suggested to it.

The whole inspection work was under one head inspector, Mr. Campbell. He is a man of perhaps 50 years, a practical grower, and a man who knows the business from one end to the other. He spends his time going from one part of the valley to another and doing the general directing. Then, he has five "field inspectors," as they are called, younger men, who travel around the valley on horseback, each man having a section of the valley under his charge. These men are working the whole year and give the farmers much valuable advice on pruning, spraying, picking or whatever may be going on at that time. If they get into any difficulty, if they find apples that are not correctly packed, they may condemn them in which case they must be repacked or else reduced in grade. Or they may send word to Campbell and have him stop at that particular house and look over the situation.

In addition to the field inspectors they have house inspectors at the larger houses who have charge of the inspection work in the particular building. The apples are coming in all the time already packed and as a load is delivered the inspector stands by and says, "I will take that box and that box and this box." Out of a load of anywhere from 50 to 90 boxes he may take five or six boxes. If on examination he finds them not up to grade and decides that something needs to be done he ordinarily sends for Mr. Campbell to come in and look them over. They either have that load of apples repacked or else they reduce them in

grade, that is if they are marked "Extra Fancy" they reduce them to Fancy, or if Fancy, they pull them down to Choice. In no case do they allow the apples to go back to the owner to be repacked. They are repacked right there. I had the importance of that impressed on me very strongly at Wenatchee.

A man brought in a load of apples and the inspector looked them over and said, "Here, Mr. Jones, these will have to be repacked." These won't do, we cannot pass them, you will have to pack them over." He had quite a talk with him about the defects of one kind and another, and the man was very pleasant about it, and loaded them up and went off. A fellow was standing by, one of the local men, apparently, said, "How do you know that Jones is going to repack those when he gets back to his warehouse? Smith told me that last year you condemned a lot of his and he took them back and put about six or eight of them into every load he brought in and they all got by without repacking." You can see how that would be. In the Hood River scheme they don't give them a chance to do that, but repack them right at the central warehouse.

Another thing they insisted on very strongly and that was that the inspector should never do any explaining to the teamster that brought in the load. The explanation was all given to the owner. The owner was called up by the telephone or interviewed personally if possible and was given to understand why the apples were condemned and if possible they got him to come in and look over that particular lot of apples. In 99 cases out of 100 on looking over his own apples he would admit they were not right and would go back and fix it up.

That is all I had in mind to say about the western district. Since most of you seem to be still awake, I should like to say something about the Southern district which really interested me more than anything I saw out West and which is so much nearer to us it seems more likely to prove a competitor of ours than the West. I will take just a min-

ute for this. Many of you know about the section down there, doubtless many of you know more than I do about it.

I knew they were developing a big orchard industry there, but I had a notion that you would go in there and find, way back in the mountains, some little orchards perched on the hillside growing some very nice apples. I never had any thought of danger from their competing with us. They have two ranges of mountains, the Blue Ridge on the east and on the west the Alleghenys. East of the Blue Ridge you get into some such mountainous sections as I had in mind where you don't find large areas, but you do find some very fine orchards. I was in one orchard that they said contained 200 acres. That was the big orchard of the section but there were many other orchards 20 and 40 and 50 acres. But it is in the Shenandoah Valley between the Alleghenys and the Blue Ridge that they are developing the biggest part of the industry.

Some of you have heard me talk about the Annapolis Valley in Nova Scotia. Some of you undoubtedly have been there. As you come into this Shenandoah Valley it is not at all unlike that or the Connecticut Valley here in Massachusetts, only instead of being level as both of those valleys are, the ground floor of the valley is a gently rolling country and you go—I don't know how far I did go—but several hundred miles through that country and you never are out of sight of fine orchards.

I came home thinking that New England was good enough for me. I didn't see anything anywhere that to me compared with our conditions when we consider them all. Of course, we have our troubles and no doubt a Western man would see more here than I did out there. A great many of us don't do as our neighbors think we ought to do in growing and handling and marketing our crop. We want to improve of course, but when you consider the whole situation we have a good deal to be thankful for.

Mrs. Sears and I said before we left that the best of our trip would be coming home, and we found it that way. And

we came home not only satisfied with the orchard business, but satisfied with the country and the people and even the climate.

I do not know whether any of you read Walt Mason or not. He writes what some people call poetry, and what I usually think is worth reading whether you call it poetry or something else. He was out in Colorado about the same time we were. After I came home I picked up in a paper this little thing which he wrote after he came back, and which in a way just about sized up my sentiments:—

I have seen such sights of wonder
 In Colorado's hills,
 Wild canyons deep as thunder,
 And peaks that gave me thrills
 That I am weary, very
 Of sights that are sublime.
 For the old flat prairie
 I am longing all the time.

The mountains rise in grandeur
 Each with their snow capped dome,
 But back in old Empory
 A fellow feels at home;
 And when he's done his labors
 And earned his fifty cents,
 He pow wows with his neighbors
 Familiar kindly gents.

The mountains grand and hoary
 Thoughts high and noble bring,
 But back in old Empory
 There is a creaking spring
 Where I sit in my slippers
 On pleasant autumn nights
 And read of pirate skippers
 And most entrancing fights.

And often when I am gazing
 On peaks that pierce the clouds,
 On mountain roads amazing
 Roamed by the tourist crowds,
 I sigh like all the nation
 Forgetting where I am,
 To see the Katy station
 And look on Sodens dam.

We hear the grand old singers
 Whose stanzas are sublime
 And though we know they are dingers,
 They tire us out in time
 And then we want a story.
 By some plain, common skate
 And so for old Empory
 Methinks I'll emigrate.

THE CHAIRMAN: I want to make one announcement before we enter into the discussion: that is, this afternoon the meeting will start at one o'clock in this room instead of 1.30 in order to give us a chance to take in some of the other meetings that are going to take place this afternoon and which will be held in this room also.

Now, the remarks that Professor Sears has made have probably made some of us think, and perhaps some have questions they would like to bring up on the different subjects mentioned. One or two things that I noticed while he was talking may be not of any real value, to anyone, but the impression on my mind after hearing about the various troubles they were having out West and so forth it might come to some of our minds that we were getting off pretty easy here in the East in the way that we were growing fruit, and perhaps if we took it too seriously about the difficulties they were having we might think we could go on in the same way we are going on and still get by forever. I do not believe that can be true and I think the time is coming when

a man producing fruit of an inferior quality is going to run against a snag within a comparatively short time; and it is up to us as a Fruit Growers Association to put some effort into better production and a better quality of goods from our orchards.

I hope that any of you who were taken with those remarks about troubles out there, you won't take them so seriously that you will allow your orchards to go on and keep on raising the same inferior fruit that you know is raised around New England. New England is the best country that I have heard about raising fruit and we have the best markets here that I have heard about and I do not see why we cannot raise the best fruit.

Professor Sears has been away twice on these trips now and he has come back twice saying he was very well satisfied with New England and what New England is doing and twice out of three times generally goes, Professors Sears. I think that is very true.

Now, before we go any further, before I forget this, the question was sent in from a man who evidently could not be here: It says, "If this reaches Springfield in season I would like the question asked if any member has had any successful experience in keeping partridge from budding trees?" If anybody here has had any experience or has controlled this trouble, why we would be glad to hear it.

A MEMBER: I would like to ask if that can be postponed until the evening session.

THE CHAIRMAN: I thought I would like to ask it here, thought that somebody who would not be here this evening might have something to say on it. I will bring it up again this evening. I would like to say here further about the two meetings that are coming, the one this evening bids fair to be a very lively one and it is going to be one that the members from the Massachusetts Association will take part in and give their experiences and give a good chance for discussion about things that have been going on in Massachusetts in a practical way. Now, is anybody

here who would like to bring up a question or ask anything to get further information?

A MEMBER: About that partridge question, one of my neighbors has had success with a shot-gun.

THE CHAIRMAN: I think that is probably an answer to the question, although it seems too bad to have to kill them if we could find some other way out of it. I do not know as I can, I have had the question asked before.

A MEMBER: I would be interested to know from Professor Sears what sort of a bag was used, and their methods in picking.

PROF. SEARS: The bags they had, as you might expect, were all sorts. A common one was a bag made, I should judge, from the common two bushel grain sack. I should judge manufacturers took that and added a snap on one side of the bottom which could be snapped into a ring on the front end of the bag. When he got it full and was ready to empty it, took it off his neck, unsnapped this, and the apples went out the lower end of the bag. This was the most popular type. I saw it everywhere from British Columbia to California. And then there were all sorts of modifications; plain, ordinary bags, and various other types.

A MEMBER: Was any damage done to the apples dropping them into a bag?

PROF. SEARS: I should say the greatest damage would be done in moving around through the trees and bumping them against the ladder. I am aware there are a lot of bags used in our country here. I have talked with our growers who have used them any number of times. Some, of course, think they are all right. But a great many growers admit that they may damage the apples if they are not carefully handled. They say that when they use the bags themselves they never damage the apples but that their hired men might damage them more or less. I have always thought a bag ought not to be used; at the same time, when you find good, practical growers using it, it is

certainly a pretty strong argument in favor of its use. As I said before, I think it was largely due to the fact that labor was very short with them and they thought they could get more apples picked if the men used the bag.

A MEMBER: I would like to ask Professor Sears in regard to their inspection. He gave us different methods they are using. Do you think they are proving to be all they desire, and which method do you think is the better?

PROF. SEARS: I do not think there is any question but that they are proving a great success. As I said before in discussing the Hood River method, I think theirs is the most satisfactory, the most complete. Here is one man who has charge of the whole business. I do not know whether I mentioned it before this morning or not, but Mr. Campbell hires and fires the whole bunch. They are responsible to him, not responsible to any society or any one else.

A MEMBER: Those are officials of the organization or the State?

PROF. SEARS: Most of them are officers of the Association, but in addition are police officers for the State.

MR. MacDOUGALL: In the Shenandoah Valley are they using sizing machines for packing and barreling fruit?

PROF. SEARS: Yes, at Sen. Lupton's place, with its 350 acres of orchard they packed 15,000 barrels. They were using the Price grader, the one I spoke of which throws the apples. They packed this year with a gang of men 600 barrels a day, and under the old regime the best day's work they ever did in packing with the same gang of men was 203 barrels, so practically the sizer there had increased the rate to about three times.

THE CHAIRMAN: Sec'y Wheeler of the State Board is going to give out the certificates of awards for the 1916 Orchard Competition at this time, to the winners who may be present, as follows, after which the meeting will adjourn till 1.30 p. m.

CLASS 1. PEACHES.

No entries.

CLASS 2. PEARS.

Section 1.—For best orchard of not less than 1 acre: First, Fred Steele, Stoneham, \$25; no second prize; third, W. H. Atkins, South Amherst, \$10.

Section 2.—For the best crop from a single tree: First, W. A. Root, Easthampton, \$10; second, J. Corey & Son, Truro, \$5.

CLASS 3. APPLES.

Section 1.—For the best orchard of 1 acre of standard apple trees; trees must have been planted in fall of 1911, spring or fall of 1912 or 1913, or spring of 1914: First, J. H. Hardy, Jr., Littleton, \$25; second, R. L. Everit, Barre, \$15; third, Patten Brothers, Sterling, \$10. (Honorable mention and gratuities of \$5 each, John Chandler, Sterling Junction; J. T. Geer, Three Rivers; W. D. Gleason, Sterling Junction; C. A. Wilson, Medway.)

Section 2.—For the best orchard of not less than 3 acres; trees must have been planted in fall of 1911, spring or fall of 1912 or 1913, or spring of 1914: First, O. C. Searle & Son, Easthampton, \$25; second, John Chandler, Sterling, \$15; third, tie between A. S. Geer, Three Rivers, \$5, and J. M. Burt, East Longmeadow, \$5. (Honorable mention and gratuity, H. A. Dunbar, Richmond, \$5.)

Section 3.—For the best apple orchard in bearing, size of orchard not specified; no trees planted earlier than the fall of 1901 to be eligible: First, Edward F. Belches, Framingham, \$25; second, W. H. Atkins, South Amherst, \$15; third, Cyrus D. Ordway, West Newbury, \$10.

Section 4.—For best old apple orchard renovated: First, O. C. Searle & Son, Southampton, \$25; second, Wright A. Root, Easthampton, \$15; third, Sumner L. Howe, Marlborough, \$10. (Honorable mention and gratuity of \$5 each to Naquag Farm, Rutland; Ralph F. Barnes, Marlborough; the Misses Noyes, Methuen.)

Section 5.—For the best yield of marketable apples from a single tree planted in fall of 1901 or later: First, W. A. Root, Easthampton, \$10; second, W. H. Atkins, South Amherst, \$5.

Section 6.—For best yield of marketable apples from a

single tree planted in spring of 1901 or earlier: First, W. H. Atkins, South Amherst, \$10; second, O. C. Searle & Son, Southampton, \$5.

AFTERNOON SESSION

Vice President Jenks in the Chair.

THE CHAIRMAN: There has been some change in the program. We are going to combine with the marketing Session this afternoon. The first speaker is Mr. O. M. Taylor, Horticultural Foreman, New York Agricultural Experiment Station Geneva, New York, who will discuss "Small Fruits." I have known Mr. Taylor for several years and have known of his work for a great many years. I think very highly of him, and the people of New York State think very well of him and they know him better than we do. It has been some time since we have had a chance to hear Mr. Taylor in this section of New England and we certainly welcome this opportunity.

MR. TAYLOR: Mr. Chairman, Members and Friends of the Massachusetts Fruit Growers Association, before taking up the subject as announced on the program, I wish at this time to express my appreciation for the opportunity of meeting with the Fruit Growers of Massachusetts, and it gives me pleasure in bringing to you the New Year Greetings of a sister state and also of the twin societies, the New York State Fruit Growers, which had their meeting last week in Rochester, and also the meeting which will be held in the near future of the Western New York Horticultural Society, and the Secretary of that Society wished me to give you his warmest greetings and an invitation to attend their meeting which will be held January 24, 25 and 26, and asked me to bring a few programs of the meeting. I also bring you the greetings of the New York State Experiment Station at Geneva, and if any of you, either by auto trip or by rail.

have the opportunity of coming nearer the station you have the warmest invitation from the Horticultural Department to drop off and visit the station; and if any of you are there during the ripening season of either tree or small fruit you will have the invitation to test with us if they are ripe, some of the fruits of the many varieties, which are growing on the Station grounds.

In taking up the subject which is announced for this afternoon, "Small Fruits". I would have preferred to have passed out slips so that each one of you might have in your hand a hundred, more or less, questions connected with small fruits so that at this time we might discuss the thing, or the subject in which you were particularly interested, but I understood from your secretary some time ago that a paper was expected, and for this reason I will do my best to put you to sleep during the next few minutes by reading a paper, and if the atmosphere becomes a little too drowsy during this paper I will request that a window be opened and if there is any danger of the draft blowing upon any of you, I will ask that the window be opened behind the speaker as he perhaps is better prepared than was the speaker of the morning session. (Applause).

SMALL FRUITS.

**Mr. O. M. Taylor, New York Experiment Station,
Geneva, N. Y.**

The subject of small-fruits is too wide and too deep to permit of its consideration in detail at this session. Covering as it does a large number of groups of berries each with habits of growth and requirements different from its neighbor, yet with certain inherent tendencies in common, we can perhaps well afford to take a somewhat broad and comprehensive view of the important factors underlying the successful culture of the fruits concerned.

The term "Small-Fruits" is elastic and may be used to include a dozen or more distinct fruits but at this time it is used with reference particularly to such fruits as the strawberry, blackberry, dewberry, raspberry, including red, black and purple, the currant and the gooseberry. All of these fruits are grown to a greater or less extent in Massachusetts and it is obvious that they are not all of equal value. Such a statement is emphasized when we turn to that dry but illuminating reservoir of information, the government census, and find the following figures for Massachusetts, with reference to the fruits under discussion.

Strawberries 2015 acres producing 5,518,867qts. valued \$495,438

Blackberries and

Dewberries	287	"	"	307,987	"	"	31,454
Raspberries	388	"	"	376,136	"	"	55,757
Currants	243	"	"	213,810	"	"	19,904
Gooseberries	42	"	"	57,827	"	"	5,007

It is well known that these fruits are not found equally distributed throughout the length and breadth of the commonwealth, but that some parts of the State appear to be better adapted than others to certain fruits. This is due partly because of natural, favorable environments of climate and soil and partly to man-made agencies having to do with transportation, markets and available labor. Small-fruits must move swiftly; railway facilities, including refrigeration service when necessary, must be efficient and not too expensive; markets must not be too distant and must not be controlled by growers in regions more advantageously situated; and the available help must be adequate. We are finding more and more that Small-Fruit growing is an exacting business and that profits depend fully as much on the skill used in selling the product as in its growing.

Climatic and soil conditions are of supreme importance; for when these fail, all efforts are nil, and these two conditions pre-determine where Small-Fruits shall or shall not be grown. The plants must be able to accommodate themselves to all the varying climatic conditions and find

them congenial or they quickly become unhappy strangers in a foreign country.

The two great factors of climate are temperature and rainfall. Many varieties of raspberries and blackberries are at the mercy of the cold winter and fare poorly during the winter months, even when assisted by all the skill of man. Varieties vary in susceptibility to cold and careful selection, combined with skillful cultural treatment and protection may aid somewhat. Currants and gooseberries are usually quite hardy, the strawberry suffers but little when well protected by a winter covering of snow or mulching supplied by man while raspberries, blackberries and dewberries more quickly show the disastrous effects of low temperatures.

Hardiness is composite. It is dependent on but one factor, Soil affects hardiness. Warm, gravelly, sandy or light, loamy soils, not too wet are more conducive to a well-matured, strong, firm growth than a cold, wet, heavy clay. The degree of moisture in the soil may give a favorable or unfavorable condition for winter killing.

Frost strikes in deeply in wet soils, causing root-injury, while in such soils the growth is soft and sappy. Extremes of temperature with high winds may cause excessive evaporation from the plants, which must be supplied by the soil, or winter injury follows. Plant-food supplied by manure or fertilizers may tend to increase or decrease plant hardiness. If their use causes a rank, soft, immature growth, winter injury ensues. Half-starved, underfed plants, weakened through lack of nourishment, are more susceptible to winter-injury than those that have fed from the "full dinner pail." With some of the Small-Fruits cover-crops may aid somewhat in protecting the roots from cold, causing the wood to ripen more quickly in fall and in diverting surplus moisture. Varieties of Small-Fruit vary not only in the time of maturity of the wood, but also in their inherent ability to withstand cold. Some are by nature hardy; others are by nature tender. Winter-injury may develop because

the plants are weakened from ravages of insects or of diseases. The degree of immaturity of wood, no matter from what cause, is usually correlated with the severity of winter injury. The blooming time of strawberries is an important factor in some localities, as late spring frosts may take heavy toll as shown by mute, blackened faces.

Small-Fruits sometimes suffer from hot weather as well as from cold. Strawberries and gooseberries especially are susceptible to sunscald when the fruit is exposed to high temperatures in the full blaze of the sun, the red raspberry showing the scald to a lesser extent, and then usually only when accompanied by showery weather.

RAINFALL.—This is the second natural factor essential to success with Small-Fruits. The plants may suffer too much water or as is more often the case especially at fruiting time, heavy losses may occur through shrinkage of the crop as the ripening season develops. Long, continued, cold, wet weather, as well as heavy winds at blossoming time interfere with the proper pollination of the blossoms, with a resulting decrease in yield; and an excess of moisture just as the fruits are ready for harvest takes heavy toll of the fruit both on the bushes and as it is harvested and marketed, as was the case in New York State the past season with strawberries and raspberries. Thousands of quarts of fruit moulded on the plants and thousands more were consigned to the dump on arrival at destination or arrived in such a mussy condition as to scarcely pay for harvesting and marketing.

SOILS.—Leaving now the question of climate with its twin subjects of temperature and rainfall, we come now to a consideration of soil for Small-Fruits. Is there a soil best adapted to each of the fruits under discussion and if so, what are the soil qualities that make it best adapted to one fruit and not to another and how may we determine what soil is best adapted to the strawberry, the raspberry the blackberry, the currant or the gooseberry? Fortunately, most of these fruits do well on a wide range of soils provid-

ed such land be well drained, well aired, fairly well stocked with available plant food and in such a physical condition as to permit of an unrestricted root-run. Yet to some extent the different Small-Fruits are particular as to soils. The gooseberry and currant are more at home in a cool, rather heavy type of soil, than in one which is too hot and too sandy. Dewberries, on the other hand, prefer a light, warm, sandy loam, while fortunately strawberries and raspberries are quite cosmopolitan on a wide range of soils between the two extremes. Studying the question still closer we find that varieties themselves have preferences and the one variety does best on one type of soil, as for instance the Gandy strawberry prefers a clay loam, while another variety of the same class does much better on some other soil type. It is, however, exceedingly difficult to determine accurately what particular varieties grow best in their particular soil as all of the factors which adapt a soil to a variety and a variety to a soil are not apparent and their adaptability can most accurately be determined only by trial.

THE LOCATION.—The leading factors which determine the most desirable locations for Small-Fruits have already been mentioned. In addition to these, other questions are intimately connected with that of location. The ideal Small-Fruit location includes not only good local market but at the same time is provided with ample facilities either by water or rail for shipping to other good but more distant markets. Light and warm soils with southern slopes may be of some value to hasten the ripening season, while the heavier, cooler soils with a northern exposure may delay the harvest season to take advantage of the later markets; gentle slopes are more desirable than the steeper hillsides and an altitude slightly above the adjoining country at least on one side aids materially in securing both surface drainage and what is of equal importance good atmospheric drainage. Bodies of water adjacent to the Small-Fruit plantation may to some extent offer protection owing to their equalizing effect on temperatures both in summer and

winter. Windbreaks seldom prove of much value. Woodlands and hills may to some extent offer shelter from storms and winds, but under unfavorable conditions the windbreaks may prove a disadvantage causing more harm than good especially to the strawberry at blooming time.

PROPAGATION.—Time forbids taking up in detail the propagation of the different Small-Fruits. Fortunately, the methods are simple as compared with those of tree-fruits, and most growers readily increase their stock under personal supervision. Briefly stated, strawberries are increased by using the new plants developed from the runners; red raspberries by the use of suckers which spring up along the row; black raspberries, purple raspberries and dewberries by using the new plants secured by burying or “tipping” the ends of the canes in the soil in the fall, when properly matured; blackberries by the use of suckers or by plants grown from root-cuttings made by cutting the larger roots about four-inch lengths and growing in nursery rows for one or two years; currants usually by making cuttings eight to ten inches long, in the fall, and planting deeply either in fall or spring about four inches apart in nursery rows, where they remain one or two years; gooseberries by cuttings as with currants or more commonly, especially with English varieties, by mound-layering in mid summer, drawing up the earth, in and about the bush and canes. Roots spring out from the covered wood and at the proper time all shoots thus rooted are cut from the mother plant and are grown in nursery rows for one or two years before setting in the commercial plantation. Currants are also sometimes mounded.

SELECTION OF PLANTS.—The best plants are none too good and the Small-Fruit grower, especially when he grows his own stock is in position to select nothing but choicely good plants to set. All weaklings from whatever cause should be discarded. A good, large, strong, fibrous root-system is a decided asset to any plant, and the little attention required to select such stock is repaid many times

over by the sturdy, ensuing growth. Other things being equal the best start is usually made by propagating from plantations which are approaching but not yet past the prime of life. The selection of stock plants from old, worn-out exhausted beds should be frowned upon. The strawberry should be taken from beds after their first full season's growth before the plants have exhausted themselves by fruiting.

We are already being taught humility, in the question of "pedigreed stock" and "improved strains." Theoretically a most enticing and alluring proposition, yet in actual performance many of these so-called "improved" and "pedigreed" high priced plants often fall far from the mark and are not one whit better and sometimes are inferior to the class of plants already described as desirable for setting.

CULTURAL TREATMENT.—The preparation of soil and of the plants for setting, the time, distance and manner of setting, the depth of setting and all such operations are kindergarten methods to those in the harness and are not difficult of performance; however, they cannot all be followed by rule of thumb and are almost as diverse as the number of the men in the business. It is uphill work to care for plants in land not thoroughly prepared at the start and sometimes it is necessary to begin preparation a year in advance by deeper plowing, by using a hoed crop to decrease the weeds in foul land or by underdraining. The best of plants soon degenerate into worthless stock and have a profitless existence if the soil conditions are not right. When the land is in first class shape the plants should be set as promptly as possible when conditions are favorable. The time of planting is variable. Under New York conditions strawberries, black and purple raspberries and dewberries should preferably be set in the spring; red raspberries and blackberries may be set in fall or spring but preferably in the fall owing to the earliness of the unfolding of the buds. Large-growing varieties and rich soil mean a wider distance of planting while dwarfish plants and poorer soils may re-

quire a closer planting. Plants should not be crowded. It is poor economy to overcrowd, such a condition favoring a product inferior in yield, in size and in general attractiveness while providing favorable conditions for the rapid multiplication and spread of insect and fungus pests. There are no sod-mulchers among Small-Fruit growers as there are among some of the tree-fruit growers. Cultivation is a universal requisite of all the classes of fruits under discussion. Early, frequent and thorough stirring of the soil by plow, disc or cultivator is the rule, the observance of which is modified by character of soil, frequency of rainfall and development of plant.

In the first and sometimes the second year of some of the Small-Fruits, inter-cropping is permissible, using such hoed crops as beans, cabbage, potatoes and the like, such products aiding materially in furnishing an income while the berry plants are developing, after which time the entire ground should be given to the berries. Cover-crops may seem to some out of place among Small-Fruits yet in the established plantation, the strawberry excepted, they may be used to advantage as has already been suggested in the discussion of hardiness. When properly grown they add somewhat to the sum total of humus, and increase to some extent the supply of plant-food especially when the legumes are used, the clover and the vetch taking the lead among such plants, followed in lesser value by oats, barley, cow-horn turnip, rape, rye and buckwheat. Combinations of seed may be used. We have found very satisfactory about 15 pounds of clover seed per acre or twenty-five pounds vetch, or 1 bushel oats or barley.

IRRIGATION.—There are certain enthusiasts who feel that Small-Fruit growers generally should equip themselves with some system of irrigation whereby an artificial supply of water may be available whenever needed. Under New York conditions, however, with the uncertainties attendant to frequency of natural precipitation, and with the possibilities of more thorough cultural operations including a larger

supply of humus in the soil and careful cultivation to conserve moisture, the latter methods will in a period of years usually be more economical and satisfactory except in a few unusually favored localities where from uncommon weather conditions or peculiar markets an irrigation system may prove of value.

FERTILIZERS.—Would that it were possible to have on tap but one kind of plant-food or but one formula for each of the fruits under discussion. Unfortunately, such a condition does not exist and in the nature of things cannot maintain. With varying characters of soil and climate and with natural likes and dislikes of plants, diverse needs and requirements, the question of what fertilizer to use becomes one of the most baffling of all questions confronting the grower. No sooner does one grower demonstrate that a certain treatment is most efficient on his farm but some neighbor "goes him one better" by some other treatment or as is more often the case, attempts to imitate the recommended plans only to end in disaster finding them nothing but mountains of chaff which are blown to the four points of the compass by the first trying winds of climatic and soil conditions. Doubtless some growers are not getting the worth of their money in fertilizers. The kinds of fertilizers, and the amounts to use are almost as diverse as the number of growers who use them. Of one thing we are certain. There is no one kind of fertilizer best adapted to the strawberry, another for the raspberry and so on, that will hold for all soils, localities and seasons. The Small-Fruit grower must experiment for himself on his own farm as to the possible need for the different fertilizers containing forms of nitrogen, potassium and phosphoric acid and must not forget that fertilizers will not take the place of humus from stable manure or cover-crops plowed under and also that it is of equal importance to look to his drainage, the physical condition of soil and his cultural methods.

PRUNING.—Operations of pruning are simple as compared with those of tree-fruits. Saw, knife and shears

supply the only equipment necessary. Free use of the knife must be made with gooseberries and especially with currants to keep the canes from overcrowding, to stimulate and develop new growth and at the same time to remove some of the older wood so that there may be a uniform and continuous supply of young wood coming on to take the place of the older and less vigorous stock which quickly loses its flush of vigor, after the removal of two or three heavy crops of fruit. The fruiting canes of raspberries and blackberries should be removed and destroyed soon after harvest time, to give the new growth more room and to destroy insect or fungous foes which may be present.

Time forbids a full discussion of pruning details. The summer pruning or pinching out the terminal growth of black raspberries and blackberries to secure well-branched canes (the red raspberry is an exception to this rule) the cutting back of these laterals the following spring, the height of pruning the canes and other methods connected with pruning vary in detail depending on conditions and are too well known to require full presentation at this time. The tops of the plants of all the Small-Fruits under discussion are cut back or shortened-in when set, for at transplanting time the stock has suffered severe root-pruning and the tops should be correspondingly diminished.

INSECTS AND DISEASES.

The Small-Fruit grower has his share of troubles from insect and fungous foes. Plants do not thrive when beset by insects or left to the mercy of disease. In some cases only foliage or fruit may be affected, but in others the plants are destroyed or rendered worthless. Leaf-eating insects such as the worms on currants and gooseberries or the sawfly of the raspberry readily succumb to applications of arsenical poison; the dreaded San Jose scale on currants and gooseberries is kept in check by lime-sulfur, winter strength; soft-bodied sucking insects like the currant plant-louse are destroyed, when hit, by tobacco extract such as the Black Leaf 40 nicotine solution. Certain fungous troubles as

leaf-spot of strawberries and also of currants and gooseberries are held within bounds by applications of bordeaux mixture or lime-sulfur and gooseberry mildew by the repeated use of potassium sulphide. In some cases the free use of the knife lessens the numbers of cane—and plant—destroying borers. Unfortunately, there are troubles of a more serious nature. Anthracnose takes heavy yearly toll of the cane-fruits, cane-blight, yellows, root-knot or crown-gall and orange-rust flourish unrestricted, their virulency depending on the climate, the season, the locality, the weather and the variety. Concerning these troubles unfortunately at present there is no satisfactory cure, remedy or preventive, once the disease becomes established, and such afflicted plants sooner or later reach the rubbish heap, the sooner the better. With some of the insects, their reproduction goes on rapidly by leaps and bounds and when weather conditions are favorable the reproductive spores of disease are multiplied and spread broadcast by countless millions making it almost impossible to hold such troubles in check without the most thorough treatment at the proper time, and with the right materials. The full details of such work we leave with entomologists and plant pathologists.

HARVESTING AND MARKETING

The major difficulties of Small-Fruit growing do not end with growing the fruit. Success is as dependent upon proper harvesting and marketing as on anything else. The time when the fruit is ready for picking, the care observed in harvesting, the neatness and attractiveness of the package and of the fruit in the package, the selection of the best markets, all play an important part in determining the amount of profit or loss. Unfortunately ripe fruit cannot be shipped satisfactorily so that it must be picked at a stage slightly in advance of full maturity although the harvesting of gooseberries may begin long before full maturity has been reached, and currants for jells are also harvested while yet partly in the green stage. Most Small-Fruits are perishable by nature and untoward weather conditions—high tempera-

tures with too great humidity and too frequent rainfall—may spell disaster to the strawberry and red raspberry grower as was the case in parts of New York State the past season.

YIELDS AND PROFITS

Productiveness is a decidedly elusive and variable factor subject to change without notice, and dependent partly on things within the control of the grower but unfortunately partly dependent on some conditions entirely beyond his control. It may be influenced by variety, rainfall, temperature, character of soil, amount of available food either in manure or fertilizers, amount of humus in the soil, the cultural treatment given and the degree of freedom from insect and fungus pests. Average yields are low as compared with the high water mark reached by some growers, yet at present we are concerned more particularly with averages. The average yield of strawberries is about 3000 quarts per acre, red raspberries 1400 to 2000 quarts, black raspberries 1600 to 2400 quarts, blackberries 2000 to 3000 quarts, with dewberries yielding considerably less, currants 100 to 150 bushels and gooseberries 200 to 400 bushels per acre.

Costs and profits are still more difficult to ascertain involving as they do not only many of the factors already mentioned but in addition there must be taken into consideration the exceedingly changeable costs of manure and fertilizers, cost of the cultural items, the value of the land, taxes, the equipment required including horses and tools which are always used in connection with other lines than Small-Fruits, interest on investment, loss through depreciation, every item connected with harvesting and marketing the fruit, and last but not least the price received for the product together with length of time required to bring the plantation into bearing and the duration of its profitable existence. Suffice it to say snap judgments on profits are guesswork pure and simple and some of the factors of Small-Fruit growing become a game of chance from start to finish, never alike in any two seasons or on any two farms

even during the same season. With the difficulties in determining profits so apparent the striking of the balance sheet at this time is left to others. It must be said, however, that barring accidents, the intelligent pursuit of Small-Fruit culture by those mentally equipped and favorably located should yield a handsome return on the investment.

WHAT TO PLANT

We now come to our last topic, intentionally placed out of its natural order because of its importance. Knowing that climatic conditions are favorable and with the necessary cultural knowledge at hand, what varieties shall be set? Seemingly a simple question, its correct solution means the difference between success and failure, for the best of plants, set and cared for under ideal conditions may prove absolutely worthless if the variety has not the inherent qualities both in plant and fruit that make it adapted both to its environment and to the purpose for which grown.

Early, mid-season, late and even fall-bearing varieties of all sorts of colors, shapes, sizes and flavors are available or described in horticultural publications, catalogs and the like. Shall many of these be grown or but few; and how are we to make intelligent selection from the long lists of varieties? Each year sees a large number of new varieties at the front, claimed to be superior to the old standbys. We know that many varieties of much value in years past are no longer grown and we know that some varieties most popular today will be the castoffs of tomorrow. The multiplicity of varieties is emphasized by the following record of the number of kinds of Small-Fruits at the present time on the trial grounds of the New York Agricultural Experiment Station at Geneva; Strawberries 69; red raspberries 29; black raspberries 23; purple raspberries 5; yellow raspberries 1; blackberries 40; dewberries 8; currants 35; gooseberries 74.

If plant and fruit habits were stable under all conditions, the selection of varieties would be simple. But we find that varieties that succeed admirably in one place may be worthless elsewhere. Under different environments and

under unlike surroundings the same variety may change both in plant and fruit-habits. Adaptation, therefore, should be determined before the extensive use of any variety in the commercial plantation. Information of value may be available by a study of the kinds already doing well in the immediate locality under apparently similar conditions, yet a still more accurate test is the trial of a few plants before setting extensively. No variety has all the qualities equally developed that make perfection. The test plot should be a regular fixture in the commercial Small-Fruit plantation and the newer, most promising kinds should be tested in a small way and their local value determined.

Time forbids a discussion of particular varieties of the fruits referred to, interesting though it might be. Suffice it to say that doubtless many kinds of value in New York would not be so well adapted to Massachusetts and vice versa. As a rule American varieties of fruits and not foreign varieties are best adapted to American conditions and varieties of western United States adapt themselves but poorly to the conditions of the East. It is equally true that varieties have their likes and dislikes in different parts of the same state or county. The following lists, therefore, are only suggestive, are incomplete and indicate but a few of the varieties, standard and also newer kinds which in one place or another have made good in New York:

STRAWBERRIES:

Amanda	Exeelsior	Mascot
Barrymore	Gandy	Michel
Bederwood	Glen Mary	Ozark
Belt	Golden Gate	Prolific
Brandywine	Good Luck	Rough Rider
Chesapeake	Indiana	Sample
Columbia	Monroe	Stevens
Dunlap	Marshall	Williams

FALL BEARING KINDS:

Americus	Progressive
Francis	Superb

RED RASPBERRIES :

Cuthbert	June
Empire	Marlboro
Herbert	Marldon
	Perfection

BLACK RASPEBERRIES :

Black Pearl	Kansas
Cumberland	Ohio
Diamond	Palmer
Eureka	Plum Farmer
Gregg	

PURPLE RASPBERRIES :

Columbian
Royal Purple
Shaffer

BLACKBERRIES :

Agawam	Kittatinny
Briton	Lawton
Eldorado	Mersereau
Erie	Snyder

DEWBERRIES :

Lucretia
McDonald

CURRANTS :

Boskoop Giant	Filler
Champion	Perfection
Chautauqua	Red Cross
Cherry	Red Dutch
Diploma	Wales
Fay	White Grape
	Wilder

GOOSEBERRIES :

Chautauqua	Pearl
Downing	Poorman
Industry	Whitesmith
Josselyn	

In conclusion.—This long yet incomplete discussion of

Small-Fruits must come to a close and it ends where it began with the statement that the subject is too wide and too deep to permit of detailed discussion in one session. An attempt has been made to set forth briefly some of the important factors underlying their culture. Interpretations and applications are dependent largely on the human equation. It is the man behind the enterprise—the guiding hand—that must be reckoned with in the final determination of results. The culture of these classes of fruit especially for home use should be fostered and encouraged to a wider extent than is the case at present and wherever there is a garden spot of sufficient size, our tables should be filled to overflowing with both tree-fruits and Small-Fruits, so that we may with Wordsworth repeat:

“So down we sit, though not till each had cast
Pleased looks around the delicate repast.”

THE CHAIRMAN: I am sure that Mr. Taylor has presented this interesting subject in a very able manner and has given us a lot of things to think about and many things to put in practice. Now, we have just a few minutes left for a brief discussion. Any of you who have any questions to ask may do so at this time, and Mr. Taylor will answer them. Anybody that desires to ask questions should give their name and address.

MR. MacDOUGAL of Northampton: I would like to ask Mr. Taylor what are his principal sources for nitrogen and phosphoric acid for raspberries and blackberries, and approximate amount.

MR. TAYLOR: As was indicated in the paper, the question of fertilizers is an impossible question to answer satisfactorily. Under some conditions the best supply of nitrogen is from well decomposed stable manure. Under other conditions it may be secured either from nitrate of soda, or dried blood, although it is rather expensive to use forms of nitrate of soda at this time, and with the present price of either the potash or the phosphoric forms of fertilizer, it is a question as to whether the small fruit grower or

tree fruit grower is warranted to use large amounts of these materials, and I would hesitate to even suggest certain amounts for the reason that on that particular soil the amount of potash might not be needed. On another particular soil the amount of phosphoric acid might not be needed. It would be largely guess-work, pure and simple, to indicate amounts which would be found satisfactory. This can only be determined by trial under the soil conditions.

MR. CLAPP of Northampton: I would like to inquire if any difficulties have been experienced in removing the cover crop in the spring, when you use clover or vetch.

MR. TAYLOR: There will be difficulty experienced if in sowing the seed the sower has been careless and the seed has fallen in among the plant row, or among the hills. It is quite important that the seed be sown carefully between the rows and if this is done there should be no trouble in plowing it under. It is important that it be plowed under before it is tall enough to interfere with its being well covered.

MR. WILFRID WHEELER: I would like to say a word in relation to that point. In the last few years instead of sowing a cover crop and leaving until spring, we sow oats for strawberries, gooseberries, raspberries and currants, sowing them the latter part of September or even as late as the early part of October. Under ordinary conditions a growth of six to eight inches of the oats will be reached and they will protect the land. I found in strawberry plants that some have gone through the winter without any other protection. The earlier you sow them of course the heavier the growth you have. You have to keep up some cultivation late in the season and you cannot sow them as early as you might like to, but the early end of September or even October will give you a good cover.

MR. TAYLOR: One of the difficulties we have found in New York State in the use of either oats or barley in the strawberry bed, for instance, has been in periods of drought, —and we cannot foresee these,—and there might not be enough moisture the last of September and during the

month of October for both the strawberry and this cover crop, and the cover crop will take it first and the strawberry suffer.

MR. WHEELER: That is right.

MR. TAYLOR: Under some conditions the cover crop growth of both the oats and barley is not sufficient to thoroughly protect the strawberry plants from the freezing and the thawing that will take place in early spring.

MR. WHEELER: I do not advise it entirely, although we find our soil very heavy and there is no danger of the robbing of the soil of its moisture.

MR. JENKS: I might say I have been using Mr. Wheeler's suggestions in my raspberries, blackberries, and currants, but carrying it one step further and planting Canadian field peas to get some Legumes. (the field peas.) Our difficulty has been serious, to add nitrogen to the berries the following spring.

Any further questions?

MR. MacDOUGAL: I would like to ask Mr. Taylor what he recommends for a trellis for raspberries and gooseberries.

MR. TAYLOR: Conditions differ decidedly in New York State. In Western New York you will scarcely find the trellis. In Eastern New York in the Hudson Valley you will find the trellis the rule. This is partly due to the fact that in the Hudson Valley particularly they grow a number of small fruits on the same ground and in order to keep them within bounds they use the trellis and the rule in the Hudson Valley where they use the trellis is a series of posts with either one wire to which are tied the canes, or with two wires side by side, the canes being supported between the two wires, which are fastened together at intervals to keep them from spreading.

MR. JENCKS: Mr. Chenoweth and myself had the pleasure of going through the Hudson Valley last summer viewing raspberries at the height of the season and came back impressed with the desirability of staking all our red raspberries, and as they were getting a fine quality berry

throughout large gardens, we could see their conditions were not so unlike ours, so we started into it. We couldn't see but they were beating us out on quality and size by their method of planting, and staking and pruning, so felt we should recommend that some of our people here try it on a small scale. I would like to hear from Mr. Taylor further, his height of stakes, number of plants to the stake, and the distance apart of the stakes.

MR. TAYLOR: That will depend largely upon the variety used, upon the richness of the soil, and upon several other factors. In the first place many of the Hudson Valley people grow their plants in hills. There is no question but that by growing them in hills with a stake in the centre, limiting the number of canes to from five to eight—the lower number being preferable—and by giving intensive cultivation both ways they get a more superior product in size and general attractiveness, and that a better appearance will be secured rather than by growing them in the matted row. The experience has been that the size and general attractiveness, has been at the expense of yield, and in Western New York without these trellises we usually secure a large yield, but the product is not so high grade, and does not have the finish as where grown in hills. Now, the height of the stake would depend upon the character of the variety grown. Last season it was my pleasure to be in one plantation in the Hudson Valley where the Empire, a new red raspberry which was introduced in the fall of 1915, was being grown, and it was almost impossible for me to reach the top of the stakes, and I saw pickers stretching out their hands trying to pick large berries of this variety which were so high that they required stakes at least five to six feet high to properly support the canes. Other varieties require stakes from four to five feet.

MR. JENKS: It seems to me most of us people are fairly well situated to nearby, local markets. Last year we had the markets here all to ourselves, but in past years we have had to compete against The Hudson River people and they

have been sending their berries in here and selling them for lower prices than we could afford to. It is going to be up to us in succeeding years to grow a better product for our local markets.

MR. WASHBURN: I would like to ask if the speaker has had any experience with white pine blister rust.

MR. TAYLOR: We have had experience at the Geneva station where we have been compelled once to wipe out our entire collection practically of currants and gooseberries and start it over again. We have done so willingly. This has been our own personal experience. There is considerable agitation, of course, at the present time in regard to what shall be done with reference to the white pine blister rust, not so much because of its harm to the currant and to the gooseberry but because of its damage to the white pine, and at the present time we are recommending that those who wish to grow the black currant wait until those in authority who are specially interested in our laws have determined what the attitude shall be. Efforts are now being made to practically prohibit the growing of the black currant and in some localities the growing of the other currants until this white pine blister rust is under control. As I understand it—I am not an authority on this, but the white pine blister rust does not spread from white pine to white pine. It must spread first from the white pine to the currant or gooseberry and then back, in some way, through the spores from the currant and gooseberry to other white pines and after a white pine is once infested it ultimately will be doomed.

MR. JENKS: We have a crowded program for the remainder of the afternoon and I think, perhaps we had better bring this interesting discussion to a close here. I would call your attention to the trade exhibits that are down in the basement. Most of you have already visited them. The trade people solicit your attendance and patronage and the Fruit Growers' Association recommend the same.

Among the exhibitors were:

- G. P. Read, Inc.—New York City.
 Barnes Brothers Nursery,—Yalesville, Conn.
 Maloney Brothers & Wells Co.,—Dansville, N. Y.
 W. & B. Douglas.—Middletown, Conn.
 J. W. Adams Nursery Co.,—Springfield, Mass.
 Frost Insecticide Co.,—Arlington, Mass.
 F. B. Pease Co.,—Arlington, Mass.
 Kentucky Tobacco Product Co.,—Louisville, Ky.
 Bacon-Taplin Co.,—Springfield, Mass.
 Kelly Brothers Wholesale Nurseries,—Dansville, N. Y.
 Graves Hardware Co.,—Springfield, Mass.
 Friend Manufacturing Co.,—Gasport, N. Y.
 A. H. Heberle,—Rochester, N. Y.
 Niagara Sprayer Co.,—Middleport, N. Y.

I am sure the fruit growers are very glad of the opportunity of joining in with the State Board at this time and listening to their most interesting program taking up the marketing phases in which we are all interested, and I will turn the meeting over to Mr. Wheeler, Secretary of the State Board of Agriculture.*

THE
OXFORD BEARS' FRUIT GROWERS' ASSOCIATION
 E. E. Conant, Mgr., also Manager of the Maine Fruit
 Growers' Exchange, Buckfield, Me.

I think perhaps the best way to begin my talk is to tell you something of the conditions among farmers in my State. They are about the same as in any other section of the country. While the agricultural prosperity, as measured in terms of production is equal to that of any part of the country, little effort has ever been given to placing the products of the soil on the market in any businesslike manner. Generally speaking, the farmer disposes of his crops in the same hit or miss fashion as is common the country over.

*Through the courtesy of Sec'y Wheeler of the State Board of Agriculture we are able to give Mr. E. E. Conant's lecture in full.

Several years ago, conditions among the apple growers in our locality were especially bad. Nearly all of the crop was disposed of to local buyers who made their own price. This price the grower had to accept or let his apples rot in the cellar. Under this method the farmers were bidding against one another, always working to their disadvantage, and playing into the hands of the buyers. When a lot of apples consisted of several varieties, the price was usually fixed at the figure offered for the least desirable kind. The grower would sell to the buyer who would pack the largest number of barrels from the lot, throwing out as undesirable the smallest number. This, of course, resulted in a very low standard of packing. The few farmers who consigned their apples to the commission houses in the cities were no better off. Ignorance of commercial practices and market conditions resulted in the returns being no better than for apples sold to the local buyers. Cases are on record where the transaction resulted in a complete loss. The returns received for apples disposed of under this system—or, better, lack of system—were so meagre that it is little wonder that the trees received only casual attention. There was little incentive for a man to prune, spray, cultivate, and generally improve his orchard when he could receive little more than the cost of production no matter how good his fruit.

It is not my purpose to enlarge upon conditions. Most of you are familiar with the case of the farmer as an independent unit, without knowledge of conditions, trying to sell his crop. I shall, rather, try to show you what one small body of men have been able to do through organization. The first step in advance came with the appearance in our State of representatives of English receivers of apples. These men were desirous of getting Maine apples on the foreign market, and competed with the local buyers for the crop. One house in particular sent its representative into our section year after year, encouraging the farmers to export their apples, and pointing out the possibilities of the

foreign market. It was customary for these English houses through their agents to advance to farmers a certain amount per barrel, usually as much or a little more than the local buyers were offering. The apples were then shipped in the farmer's name, to be sold on commission by the receivers across the water.

After making the sale, account sales were made up and returned to the growers together with remittance for whatever the apples net over and above the advance. The individual farmer in exporting his apples was at a disadvantage and often fared as poorly as his neighbor who sold to the local buyer or consigned to some domestic commission house. In passing I may say that the apples put up for export were packed rather poorly, and were not a good advertisement for Maine apples. At the same time, well graded and packed fruit when exported gave the farmer very satisfactory returns. The main thing for which we have to thank our English friends is that they opened our eyes to the possibilities of a market across the water. Owing to the fact that only large growers were able to make up car lots, the smallest unit economical to ship, it became customary for several of the smaller ones to get together making up a shipment. While there was no attempt at organization, this was a step toward cooperation.

In the spring of 1911 a young man from our town took advantage of the opportunity to attend a short course in fruit growing given at the State College at Orono. There he learned, among other things, of the successful operation of the well known cooperative associations in the West. He came back with wonderful stories of how these organizations were overcoming the obstacles of distance and unfamiliarity of market conditions and were handling crops so as to return the grower a profit sufficient to encourage the growing of better fruit.

The young man began by interesting his brothers in a scheme for better marketing. On numerous occasions there were lively discussions, and it was finally decided to form

a cooperative society with seven brothers as charter members. This was in the summer of 1911, and marks the beginning of the Oxford Bears' Fruit Growers Association. Much valuable assistance was give us by the State Department of Horticulture, through Mr. A. K. Gardner, the State Horticulturist and Mr. G. A. Yeaton, Assistant. From the success attained by the organization, it is apparent that from the start the founders were on the right track. The chief essentials for success in cooperation were present, and I wish that you would mark these few necessary things.

First, as shown by existing conditions, the association was born of necessity.

Second, there was a sufficient supply of fruit being grown in the neighborhood to assure us of enough business.

Third, it was possible for us to hire as manager one having some knowledge of marketing.

Fourth, and most important of all, I consider, we had as members men possessing the true cooperative spirit, a progressive outlook, and a willingness to stand back of the organization through thick and thin.

We incorporated our association under the laws of our State with a capital stock of \$1,000, this being divided into two hundred shares of five dollars each. Each grower subscribes to two shares of stock upon being elected to membership. This entitles him to vote at all meetings of the association. Only matters pertaining to the general policy of the association are voted on in the regular meetings of stockholders. Most of the business is transacted by the Board of Directors in whom we place considerable responsibility. These Directors are five in number and are chosen annually. Only two new ones may be elected at any one time. This Board elects the officers of the Association and hires all of the employees, fixing their compensation. One of the most important things that the Directors do is to determine how the fruit shall be packed, and they have full power to reject any lot not considered up to the standard. Since so much depends upon the Board of Directors, we are

very careful in choosing them. As these men practically give their services, receiving only one dollar for attendance at each meeting, they must be men unselfish, broad minded, and alive to the interests of all the members. We have always been able to secure the services of men of this sort.

After organization the first thing to do was to define exactly the place and purpose of the association. As set forth in our by-laws, our object is three fold:—

1. To secure to the fruit growers of Oxford County vicinity all possible advantages in marketing their fruit.
2. To build up a standard of excellence.
3. To create a demand for the same.

Our aims are not confined to these few things, however. Broadly speaking, the purpose is so to cooperate in our business that we may not only render valuable service to our members in every way, but that we may also, by setting an example, help in establishing a better community spirit.

We early recognized the necessity of establishing a name for ourselves. We began by selecting a name for our organization which should be distinctive, and at the same time representative of our section of the country. After choosing the name Oxford Bears' Fruit Growers Association, we immediately set about to design a trade mark by which our brand should be known on the market. This trade mark appears on the label in every barrel and on every box of apples packed by the Association.

It stands for QUALITY FIRST, the phrase we have taken for our motto. We have never had a special appropriation for advertising. We believe that honestly packed fruit placed on the market under a brand name will advertise itself. Our experience has borne out the truth of this statement. The label and what it stands for have been enough. One thing that has enabled us to establish a name for ourself is the making up of car lots of seasonable varieties. By this I mean that at a certain time, when a variety is in prime condition, we are able, by drawing on the various members, to make up a car lot, thus securing the minimum

freight rate. The individual grower, in order to make up a shipment of desirable size has to hold some varieties until they are somewhat past season. Association apples can be shipped in proper season to meet market demands. The fact that our Association apples are on the market year after year keeps the buyers on the watch for them and they know what to expect. An individual's apples may be ever so good, but if the brand is unknown the price will be less than that realized by those with a reputation. To illustrate this point I will say that this year we started in early to export our apples.

From the middle of October until the Christmas Holidays nearly every boat docking in Liverpool had in its cargo one or two cars of Oxford Bear apples. The buyers were expecting them and were willing to pay a premium of two shillings per barrel or more for them. Almost invariably we received a cable after each sale. "Sold Oxford Bears' Apples Absolutely Top of Market."

It is with no light effort that we have built up and maintained our reputation. Insistence has ever been made that all fruit put out under our name should be honestly graded and packed strictly according to law. Our Manager is ever on the alert and the packers are carefully watched to see that their work is done as well as possible. Of course it is impracticable to inspect each barrel of apples put up, and the packers, being human, sometimes err. However, I will say that we have so far succeeded in maintaining our standard that we have seldom received a complaint and never have had a shipment turned down.

Frequently our apples are sold at auction or private sale without showing a sample, solely on the reputation of the Oxford Bear brand. When cars for export are shipped, we cable a variety list to our English receivers and frequently the apples are sold before landed at a premium of two to three shillings over the top prices realized at auction for the same varieties on the same sale.

One of the chief things our manager does is to make a

careful study of the market. All information as to crop conditions throughout the country is obtained early in the season. This is supplemented about harvest time by reports of crop movement and prices on various markets, together with cold storage reports and all other information available. We receive the market report issued daily by the United States Office of Markets and also the Canadian Telegraphic Report. These we find of great value. With all of this information at hand we are able to form a good idea of crop conditions, and know something what to expect for prices.

Since it has always been customary for our people to export a large percentage of the crop, we have been particularly interested in every bit of information obtainable as to conditions in England. Most everything we knew prior to 1913 came to us through the representative of our English receivers. In the fall of 1913, however, it was decided that it would be worth a great deal if our manager could see for himself just how apples were handled on the foreign market. Accordingly, plans were made for the trip. As I was at that time manager of the association, it was my pleasure to make the trip.

About six hundred barrels of Oxford Bears' apples were on the same steamer with me. Before leaving home, I had seen these apples harvested, packed, and loaded into the cars, so I knew just what they were like. I was now to follow them through the whole process of marketing. I was met in Liverpool by the representative of our English house who had so often visited me at home, and whose guest I was during my stay in England. Under the guidance of this man I was shown the ins and out of the Liverpool, Manchester, and London markets.

On the docks in Liverpool I met the same apples I had seen so carefully packed. They were being inspected by the buyers there on the docks, and I had a chance to note in just what shape they arrived. Some few of them I noted were slack on account of faulty cooping. This put me on my

guard and since then more care than ever has been given to coopering, the result being a very small percentage of slaeks.

For several hours at a time on two or three occasions I sat in the auction room where apples were selling. I also had a chance to meet many of the fruit brokers and large buyers, as well as a number of retailers. From personal observation and conversations with these men I was able to gain more of an insight as to market demands, preferences, and so forth, than I could have learned in several years reading up on the subject. Most important of all, I learned that the English buyers are able to distinguish between an ordinary apple and a well graded and packed article, and that they show this by their willingness to pay more for the latter sort.

We have not, however, been interested solely in the export market. For several years our manager has made a trip to Aroostook County in our own State and has succeeded in building up a nice little business there. A number of cars were placed there this fall.

I will now attempt to tell you a little of the actual operation of our Association. Early in the fall, at the time crop reports are coming in from various sections of the country, the manager puts in several days visiting the orchards of the members. He notes about how large a crop and what varieties and quality each will harvest. By a careful estimate he is able to tell somewhere near what the crop will be—how many hundred barrels of Baldwins, Greenings, or other varieties he may count on, and how they will run as to grade. At this time also he gets a better idea of price by talking with the growers.

As the apples are harvested, crews are organized to do the packing. These men are hired for the season and paid so much per day and board. The Association pays the packers, charging their time to the growers at cost, and they are boarded at the expense of the men whose apples are being handled.

A crew usually consists of three men, one of whom is

foreman. Each crew is provided with sorting tray, barrel press, baskets, stencils, and other things necessary for packing. In addition to the regular stenciling, consisting of variety, grade, and Association name, each crew has a number of its own to go on the barrels. This is for the purpose of identification in case any fault is found with the barrel. After stenciling what is to be the face end of the barrel, it is turned over and before the pulp-head is put in one of our barrel labels—such as you see here—is placed in face down.

Our system of loading cars for shipment is as follows:— We do not pool our varieties and grades for the season, but rather on each sale. By this I mean that every grower receives the same price for number one Baldwin, number two Greenings, or whatever the grade may be. Of course it happens under this arrangement that one man may receive a different price for apples of a certain grade than his neighbor whose apples go to another sale. To counteract whatever difference there may be, we try to be as fair as possible, dividing up the shipments, and plan never to have all one man's apples on a single sale, but to split them up. Perhaps I can best illustrate this point by showing how it has worked out this present season.

Early in the year, before anyone could tell what turn the foreign market would take, we sold several cars at very good prices F. O. B. shipping point. As it happened, apples exported began to bring unprecedented prices, we wished that we had shipped everything we had. However, the orders taken early had to be filled, so to average things we loaded a certain part of each member's apples in export cars and a certain part in those cars sold for a cash price.

I am going to pass around for your inspection several of the cards we use in keeping a record of shipments. For every car shipped one of these cards is made out. These are copies of actual records in our office. We find them very convenient in keeping our accounts correctly. A proper and well ordered system of accounting is very essential to the success of any business, and is particularly desirable in

the case of a cooperative society, where the records are open to inspection by the members at any time.

After the apples are hauled to the cars for shipment the individual member has nothing more to do with them. The Association looks after the whole business of marketing. It attends to the billing, invoicing, tracing of cars, and, in short, everything pertaining to shipping. It also, in the case of export stuff, sees that space is obtained on the best steamers to the most likely markets. The Association also collects all moneys from the sales, paying the grower for apples delivered by him. We have always found it well to keep our members supplied with money during the season, paying them on account from time to time. We are able to do this because of the prompt manner in which money comes in from our sales. Immediately upon consummating a sale, the foreign agents make up our account and cable the amount due us to our credit at the bank.

It has never been our policy to increase our membership merely for the sake of having our amount of business look big. We have thought it best to limit our growth, keeping it healthy and within manageable limits.

At the present time we have thirty members. Since organization we have returned to our members nearly \$100,000. This present season we shall handle nearly 8,000 barrels, and return the members \$30,000. One thing we think remarkable. In doing this large amount of business, we have never lost account of a single barrel or box, and **what is still more remarkable** we have never lost a cent in bad bills.

While the most important achievements have been in the marketing of our crops, we have also been able to save our members considerable by purchasing supplies cooperatively. We buy fertilizer, lime, spray materials, barrels, head liners, pulp-heads, and other materials in large quantities, thus taking advantage of discounts. Last Spring, by immediately accepting an offer, we saved sixty dollars on a ton of lead arsenate.

At Hebron Station, our shipping point, we have built a storehouse one story high with about 2800 square feet of floor space. This building we have found very useful both in shipping season and for the purpose of storing supplies we have bought. This season, when the car shortage was troubling, our members were able to keep right on hauling their apples and putting them into the building. Then when a car or two was set in it was an easy matter to hustle the apples out of the building and into them.

One of the activities of our Association is its winter meetings. These were formerly held at the homes of some of the members, but now at the storehouse.

The meetings take the form of a general discussion of any matters of interest in the growing or marketing of fruit. They are held monthly and serve to keep up the interest through the winter. All of the Bears turn out for all day. The wives of our members provide a lunch and a general good time is enjoyed by all. Our biggest get-together is the annual field meeting. This event is held in the summer time in the orchard of one of our members. It is widely advertised and everyone is invited. We have had the attendance of as many as five hundred at one of these meetings. We have been very fortunate in obtaining speakers and have had some programs of exceptional interest.

I have now told you at some length of the main activities of our Association. There are a good many interesting stories connected with its life that I would enjoy telling you if time would allow. It is sometime said that success is made up of failures. In our six seasons of activity, all has not been easy sailing. Mistakes have been made, but they have not been serious mistakes, or at least, we have discovered them in time to correct them.

In closing I will say that I attribute what success we have had to four things.

First. We have had leadership, not of a few, but of many, as manifested in the true spirit of cooperation.

Second. We have always employed a good system of

accounting.

Third. The Board of Directors and the Manager have always been businesslike in their methods.

Fourth, And all important, Square Dealing has formed the Cornerstone of all our business.

EVENING SESSION

President Margeson in the Chair.

The hour has arrived to call our Evening Session to order. Mr. S. R. Parker, County Agent Leader, is going to speak on the 1916 State wide Spraying Campaign. The campaign is over and Mr. Parker is going to tell us something about the results.

THE 1916 STATE-WIDE SPRAYING CAMPAIGN

Mr. Sumner R. Parker, County Agent Leader, Amherst, Mass.

The purpose of the 1916 spray campaign was four fold; First, to improve the apple crop. Second, to prove the value of spraying. Third, to introduce better methods of spraying and Fourth, to unite the educational agencies interested in pulling together on some common enterprise.

It was called a state-wide spray campaign but it was state-wide probably only in so far as County Agent Work was concerned.

In each county several demonstrations were started in order to secure data necessary for the work in that particular locality. Special lectures were given on this subject, a new spray calendar was issued by the Department of Pomology at the Massachusetts Agricultural College, a set of lantern slides was also prepared to illustrate the common diseases and insect pests which it is necessary to combat. A special system of records was devised in order that the cost, the increase in the amount of fruit and the profit per tree could be found in order to report to the grower the amount of profit he might expect to receive from his investment in spraying.

It will be readily seen that it was quite difficult to secure unsprayed trees in orchards of orchardists who were convinced of the value of this practice already. It will also be seen that it was necessary to get check trees on the farms of those men who were less successful in their orchard practice with the exception of a few. The County Agents gave between 55 and 60 public demonstrations to show the farmers the necessity of thorough work, proper equipment and material to use. These were taken from various parts of the state. These records in no way approach Experiment Station data in degree of accuracy but they do represent the actual cost to farmers to do on their own farms an operation that is a common farm practice.

From these records it is found that the cost of spraying per tree varied from 12c to \$1.08 or an average of 52c, the increase in fruit from less than $\frac{1}{2}$ bbl. to 4 bbls. with an average of 1 and 38-100 bbls. The increase in value was from 40c loss to \$10.12 gain or an average of \$4.50 per tree. It will be noticed that there is a great variation in these figures but it is believed that the variation is no greater than the variation in cost of almost any farm practice as performed by the various farmers.

It is interesting to note that the high cost per tree was on an orchard of old trees never before sprayed. The low cost per tree was on a young orchard of trees that had been well cared for and the spraying was done in a careful and up-to-date way. From this data we can gather that a man who has an orchard of fair sized trees and does not spray can estimate that it will cost him about 50c per tree and he may expect about 1 and 1-3 bbls. increase and with the prevailing price of apples at this year's level the increased value of the fruit would be about \$4.50 per tree. This piece of work has demonstrated to those in County Agent work that there is a big advantage in all working toward a definite end as the information obtained is much more convincing than that secured from a single county. It has also been a great help in making a good farm practice common

practice. (Applause).

THE CHAIRMAN: Are there questions to ask Mr. Parker, at this time in regard to the spraying campaign? We have spraying up again tomorrow morning, so probably we won't take time for this now.

Mr. Miles, will you speak to us at this time, please? Mr. Miles wants to speak to us about the American Pomological Society.

SEC'Y MILES of Connecticut Pomological Society: Ladies and Gentlemen, I do not know just what part you have got to in your program as I have just come in.

THE CHAIRMAN: You will work in here all right.

MR. MILES: I asked your President if I might have just a moment to give you a word tonight. First, I want to bring to you the word that we down in Connecticut, of the Connecticut Pomological Society, are trying to keep busy in this same line of work in which you are interested. I am very sorry our President, Mr. Staples, is unable to be present on account of sickness. He would be very glad to bring you greetings of the Society, and also to invite you to come to our winter meeting which is to be held early in February, the 5th to the 8th, but I will personally give you a very cordial invitation to be with us on any of those three days or all of them if you can. We will try to have as good a meeting as you do and I think from the plans we have outlined it will be a little better than our usual winter meeting.

As I remember it a few years ago before your Massachusetts Fruit Growers' Association was as strong as it is today, a great many of you fruit men came to Connecticut to get information and to help us with your information. Of course, that day is largely past and you have all and more than we can give you right here in your own State, but, nevertheless, we shall be very glad to see any one of you down there. I think I can assure you a very profitable three days' visit.

The subject that your President has mentioned, that of the recent meeting of the American Pomological Society is

the matter that I was asked to bring to the attention of your Association. Perhaps some of you know, perhaps others do not, that about two months ago a special meeting was called by the American Pomological Society to take up the matter of organizing all the horticultural interests of the country. It was first thought it would be a good thing to reorganize the old American Pomological Society. I do not need to say very much in explanation of the work of that Society. It is very well known indeed to you Massachusetts people. I think you are largely the originators, some of you,—perhaps those who are not with us today, some of the old fruit growers who have passed away, were largely the originators of that Society, and you are very familiar with its good work.

There has been, however, a feeling that the commercial side of horticulture has not been taken care of by that society. The amateur side, the matter of variety and instruction along those lines has been pretty fully covered, but the commercial side of marketing of our fruit products has not been given the attention by that Society that it warrants.

There was a meeting two or three months ago on that and it was felt that the Society should get together and see what could be done to put things on a business basis. The outcome of three days' conference was not to reorganize the American Pomological Society, but to take steps to organize all the horticultural interests of the country into one large federated body. The outcome of the discussion went a little further,—an organization was formed, perhaps a temporary one, we ought to say, with officers elected; and the organization plans of the Congress were left in the hands of a committee to be worked out. All that we can say to the State associations at the present is that we want them to take an interest in this matter, discuss it at their annual meetings, and if they shall feel that it is best for them, to take out membership on the basis of State organizations.

The plan is the market gardeners, the fruit shippers, the

florists' interests and horticultural interests of all kinds shall be put into one large National body with headquarters probably to be made at Washington, and a monthly journal which will be distributed to all the members, and the work taken up in a large National way.

I remember one of the speakers at the Conference brought out this point very forcibly that in the matter of legislation which we all know is coming in horticultural affairs more and more every year that it could be best handled by a large organization of this kind and that the information needed in framing up legislation,—and that legislation will be necessary in the next few years,—could much better be gathered and distributed by an organization of National scope, and I think that is one point we ought to keep in mind in our consideration of this National project.

The matter has not gone very far. The other day I was in receipt of a draft of the organization plans from the Committee and I can say from that they are planning for something that will be of interest to all of us and I believe will be of especial benefit to us here in New England. We know all the States are pretty well organized at the present time in a State way and in a district way, but the federation of all these interests into one large National body is yet to come and that is what this proposition contemplates.

I said to your Secretary, Mr. Brown, today, when you were holding your business meeting in February I hoped you would take up this matter in a business way and would decide to become affiliated with the National body as the State of Massachusetts. I do not think, Mr. President, I need to take any more of your time because, as I say, the plans are not yet quite far enough along to give you any detailed idea of what will be worked out, but in a general way, it will cover the points I have mentioned.

I think that it is the plan to send somebody from the American Pomological Society to each one of the States' business meetings of the different States to solicit their approval and membership in this National body. In our plan

the membership shall be on a State basis. That is, if your Fruit Growers' Association should vote to become a member of the Congress, that would automatically make all of your members in good standing members of that Congress on the payment of a very small per capita tax, two or three or four cents. Every one of your members would receive the benefits of the Congress direct.

I want to close by renewing the invitation which I gave to you and your members to be with us in Connecticut when we have our annual meeting.

THE CHAIRMAN: I think we are indebted to Mr. Miles for the information he has brought us, and we are glad to receive the greetings from the Connecticut Pomological Society, and feel that Mr. Miles can carry our greetings to their meeting if we are not present.

Now, we will have Mr. R. E. Annin Jr. speak to us on the Massachusetts Apple Law.

THE MASSACHUSETTS APPLE GRADING LAW.

E. Edwards Annin, Jr., Chief Inspector, State House, Boston

When the call first came from Secretary Brown for someone to come to this meeting and talk on the apple grading law, Mr. Wheeler turned to me and said "You go." I know inspectors are not very popular people. You never see many flowers at their funeral. Now, I have been brought up a Presbyterian, a breed rare in New England, but we pride ourselves on our ability to find a verse of scripture that will always fit the case when in trouble, and the passage that seemed to best fit my case will be found in Daniel 6:16—"And the king commanded, and they took Daniel and cast him into a den of lions." But looking along a little further I came to the 22d verse and was comforted when I found that in the morning Daniel was still in the ring "for the Lord had sent his angel and stopped the mouths of the lions." On looking over this audience I see that there are many more angels than lions here tonight.

In speaking of the Massachusetts Apple Grading Law to the Massachusetts Fruit Growers' Association it will not, of course be necessary to go over the law itself in detail or take up such points as the reasons for its passage or what it was hoped the law would do. The law has now been on the statute books since June, 1915; it has been in full force and effect since July 1, 1916 and it is to be presumed that you men who are really those most interested are fully cognizant with its provisions. I do want, however, to take a moment

or two to emphasize the fact that this is a very **simple** law. There has been an impression among a few growers—not many—that the law was a complicated affair and difficult to pack under. Nothing could be further from the truth. This law in essence has just two branches—does just two things—first, it establishes standard grades for apples and second it requires certain marks to be put on closed packages. That is all there is to the bill.

Now what are those grades. They are defined in legal language in the bill. A fancy apple is defined, for example, as a well matured hand picked apple of normal shape, good and reasonably uniform size, sound, above medium color, free from disease, insect and fungous injury, bruises and other defects. Now that definition is complete and adequate and correct, but what does it mean? An apple packer hasn't time to say that definition over to himself every time he wants to pack an apple and it isn't necessary he should. An apple packer hasn't time to measure every apple with a slide rule, look at it with a microscope and extract its square root with a set of logarithm tables. Time is precious. A grower must have such a correct and sharp mental picture of each of these grades that he will know at once when he sees an apple on the table where it belongs, just as easily as if he were sorting out nickels, dimes and quarters.

In interpreting these various grades, we have done this, and the simplest way to state what a fancy apple is is that it is the sort of an apple which the far West ships here in the Western bushel box, a highly colored, blemishless apple; and needless to say there are mighty few of them raised here in Massachusetts at the present time.

It is not expected or hoped that for the present many apples will be packed under this grade, but it was felt that one grade should be established which would enable our growers to compete with the Western grower. This grade is really an ideal to strive towards—a difficult ideal—but not at all an impossible one. Now one other point to emphasize in regard to the Fancy Grade is that the apples must

be high colored, that is fixed by regulation and with the redder varieties is 75% color.

The A grade requires, in brief, a good looking apple with one-third color. Before this law was passed it was the custom of the trade to pack apples as number ones and number twos. This A grade apple about conforms to a good No. 1 apple, except that it is a little higher in color. The old No. 1 grade would take a great many apples from the center of the tree which while sound and of good size have not enough color for the A grade. Notice that no particular size is required for the A grade—there is simply the requirement that the size of the smallest apple be stated on each package.

Now, I have stated that this A grade is a good looking apple. People ask us "how much sooty blotch—how much Baldwin spot" in the A grade. The answer to that is not enough to injure the appearance of the apple. This A apple is not a Fancy apple, but is a good looking fair colored apple. Notice that the color requirement is not high—only a third. Some people seem to have had the idea that it was unreasonably high. Remember that any blemish that will injure the appearance of the apple will throw it into the B grade.

The B grade is the useful grade—a sound, fairly clean apple with no color requirement—this apple does not have to be particularly good looking, but it must be useful; any defect which seriously injures its usefulness will put it in the ungraded class. But a defect which will come off when you peel the apple will not throw it out of the B grade.

Those, it seems to me, are fairly simple and definite ideas of the three grades—the Fancy Western boxed apple—the high colored for the Fancy, the good looking No. 1 with a third color for the A, and the No. 2—the useful apple for the B.

Now the second thing this law does is to require certain marks on closed packages of apples. This is the branding part of the law. Each of these marks is essential—each tells

some necessary piece of information about the contents of the barrel—there are no superfluous marks.

The first of these required marks is the name of the State—Massachusetts—it is certainly important that Massachusetts fruit growers should advertise the name of the state where the product is produced.

Then comes the name of the grade—of course, the most essential of all the marks—the one the buyer will look at first, as he wishes to know what kind of apples he is buying.

Then comes the minimum size—the size of the smallest apple in the barrel—size is an important point for the buyer and he wants to know what he is getting in this respect. Notice that this statement of minimum size is not the size of the average apple—it is the size of the smallest apple. There is no requirement as to uniformity of size except in the Fancy grade, but a wise grower will of course, put apples of approximately the same size in the same package.

Next comes the statement of quantity—the words 1 standard barrel—this is required not only by the Massachusetts law but by the Federal net weight amendment.

Last, but not least, comes the name and address of the packer—certainly a man should be willing to stand back of his packing—and if he is desirous of building up a reputation as a good packer, should be anxious to stand back of it.

There is the law—three grades for apples—simple—easy to understand—every barrel to be marked with certain necessary marks, and these marks to be put on in a certain uniform order. This question of uniform is important because it makes for uniformity. In time everyone in the business will know just where on the barrel head to look for each particular mark.

I want to say a word in reference to the enforcement of the law. You know that it is a legal maxim that everyone is presumed to know the law. That, of course is the only possible rule—a person should not be allowed to get off by pleading ignorance of the law. But this year we have had to frankly abandon that maxim in regard to the apple grad-

ing law. Here was a new statute—without precedent back of it. There are 37,000 farmers in Massachusetts and 27,000 of them report bearing apple trees. Of these probably not less than eight or ten thousand have some apples to sell.

Now evidently the first thing was to "get this law across," not only to the farmers but to the Commission merchants, the buyers, packers, dealers, in fact the whole apple trade.

This was a big job and while considerable educational work was done on this law in 1915, there was a lot left to be done this year.

Part of this was done by demonstrations of the law at fairs, at Grange and Farmers' Club meetings and in this work the farm bureaus and county leagues and the county schools were of great assistance.

A lot of personal work was also done by our inspectors and the inspectors in the county have been at the beck and call of all who wished to call on them for assistance and advice.

The principal part of the work in enforcing the law, however, has been the actual inspection work. That has been done in this way. We have covered the Boston market almost every day since the 18th of September and the Springfield and Worcester markets about once a week.

At Boston we have also tried to keep in touch with the export trade and see the apples on the docks. Our inspectors are provided with blanks on which to make reports—these blanks show the owner, packer, number of packages and other necessary facts and whether the lot was correctly or incorrectly marked.

Now our work this year has been first of all to get growers to mark their barrels at all—in the first of the season the principal fault was that many of the shipments were not marked at all for any grade, and in such a case it was of course not necessary to look at the fruit—for it was obvious that the packer had violated the law. Now when we find that barrels are marked correctly as to form, then of

course it is necessary to open the barrel and see if the fruit conforms to the marks.

Violations are reported to the office and then our procedure has been either to have an inspector call the man up by telephone or go and see him personally or else, and this has been done in most cases, send him a letter pointing where his mistake has been—how his barrels were wrongly marked and how they should have been marked in order to be correct. For this letter, of course, we had to use a form on which was left a blank to be filled in for each particular case. We had a number of very nice letters from growers and the spirit exhibited has certainly been very helpful. We also have had a few kicks on these letters, but not nearly as many as we expected. A few growers seemed to think they were being “hounded” because they received one of these letters, but in reality this method of enforcing the law was the most lenient and reasonable one we could adopt. The law states specifically that any violator of the law shall be fined. In merely calling a first offender’s attention to this mistake we have not only been giving the grower the benefit of every doubt as to his intentions, but have also been trying to help him to profit by his mistake.

I know in one nearby state where they have adopted an entirely different method of enforcing the law—they have already collected fines to the amount of four or five thousand dollars. We did not believe that was the best way to enforce the law this year because of course it was essential to make the law a success to get the support of the fruit growers and not to antagonize them. So far it has not been necessary to prosecute any cases. We hope it will never be necessary. This board has enforced a nursery inspection law and enforced it thoroughly for fifteen years without a single prosecution and, with the support of the fruit trade, there is no reason why we cannot do the same with this law.

I do not want to give anyone the impression that we do not intend to prosecute if necessary—just the opposite is

true. The law is there and we would not be doing our duty if we did not enforce it. What I do mean to say is that this first year we have taken into consideration the fact that most growers were of course ignorant of the law and so we have tried to lend a helping hand and teach them the law. It might be said that our inspectors have done two sorts of work—the inspectors in the country preventive work; the inspectors in the city remedial work. What I mean is this—the inspectors in the country by visiting farmers and seeing shipments of apples at shipping stations were able to prevent a great many violations of law by showing packers how to mark their apples and seeing that it was done correctly. Of course, when an inspector in one of the city markets finds a lot which is incorrectly marked the shipment is by that time far away from the packers and it is too late to prevent a violation, the only thing to do is to call the packer's attention to it and show him how he can mark them correctly next time.

Now with cold storage apples the nature of the business allows us to do preventive work. When apples are removed into cold storage they are apt to stay there for some time and so it is possible for us to order the owner of incorrectly marked apples to mark them correctly before offering them for sale and with correctly marked apples to send the owner a certificate of inspection, which practically gives him a clearance card to sell the apples.

Now, the effect of this law cannot as yet be clearly seen. It has not been in force long enough. Certainly during the first two months the effect of the law on prices was negligible—the only effect was that more apples than ever were packed in open packages by growers who seemed a little afraid of the law. In fact the law probably affected the price to the farmer very little this year. During the last month, however, the law has begun to have an effect on apple prices to some extent in that graded apples move fairly freely, while ungraded apples stay on the sidewalk so to speak.

Of course the word ungraded on a barrel means that

“anything goes”—it’s like putting caveat emptor—let the buyer beware, right on the barrel—and the buyers do beware. That is why the man with a fair percentage of good apples is foolish to pack them ungraded—because then his apples are coming into competition with all sorts of fruit.

Now I want to speak for a moment of a few mistakes growers are making with respect to the law. The first, the biggest mistake, is in trying to dodge the law either by packing in open boxes or marking all apples ungraded.

Some people seem to have been afraid of this law—afraid it was difficult—afraid it was complicated—afraid that the slightest mistake would result in a jail sentence, though as a matter of fact there is nothing anywhere in the law about jail sentences—the maximum penalty being a fine. I have tried to show that this is a simple law and that we have tried to enforce it in a reasonable way.

In reality this law is a new tool which the state has put in the hands of the fruit growers to use, and of course if they decline to use it nobody else will. You cannot expect to use a new and untried tool with as much skill as when you have had it for sometime. If you were a carpenter and were given a breast drill and had never seen one you of course would be rather awkward about using it at first—just so with this law. It was to be expected that growers would make mistakes in using it at first, but if you are ever going to learn to use it you have got to begin sometime and certainly the very best time to begin was the first year of the law, when those who are enforcing it are trying to give you the benefit of every doubt. If you keep in mind that this law provided a grade for every kind of apples and then make an honest try at putting the apples in their proper grade, you will be surprised to see how easy it is to pack under the law.

Another mistake growers are making—and it is really the same mistake in a way—is packing or marking all their apples ungraded. Now in some sections the crop was so poor that perhaps this was necessary, but of course it is a practical question, as to whether you have enough clean

stock to make it pay to sort the apples, but if a man has a reasonable proportion of clean stock he is certainly making a mistake to throw A, B and Ungraded apples all together and mark them "ungraded," because his ungraded apples are going to come into competition with the ungraded apples of a man who has already sorted out his As and Bs. In other words, unsorted apples, a large proportion of which are too good for ungraded, are going to come into competition with culls.

Growers are making some slight mistakes in marking under the law. While these mistakes are not particularly important, still if you could see the difference between a really well marked barrel and a sloppily marked barrel you would admit it was worth while to make your markings as neat and complete as possible. We find for instance that a number of growers are leaving off the words "one st'd Bbl." This is absolutely essential and required, as I have said by the United States Law as well as by our own law. Other growers are using the word "standard" where the apples are marked ungraded. I think this is a point which perhaps our circular has not made sufficiently clear. The names of the grades are Standard Fancy, Standard A, Standard B. All other apples must be marked "ungraded" which means, of course, that standard should not be used for this grade.

The future success of this law rests almost entirely in your hands. You are the people who pack the apples. The inspectors don't pack them. All they do is a little of the dirty work. Remember that the success of any law depends on the public opinion that is back of it. Law doesn't make public opinion. Public opinion gives to law whatever validity it has. We have plenty of laws on the statute books now that are not enforced because public opinion is not back of them. You cannot enforce a prohibition law if everybody wants to drink. You could not enforce a Sunday closing law in Berlin or Milwaukee.

A very good example in this state of law which has not public opinion behind it is the law with reference to working

on Sunday. It is against the law in Massachusetts, to pick strawberries on Sunday; to cut asparagus on Sunday; to pick cranberries on Sunday. That law is not enforced. There are probably a good many people here who have picked strawberries on Sunday, but I doubt if any of them were ever prosecuted for it. I can look out of my window in Concord on most any Sunday in the asparagus season and see people breaking the law, but I could never earn much by turning State's evidence against them. The reason is that in our present state of industry it seems necessary to do certain pieces of work on Sunday, and so public opinion has gone by this law.

Down in the New York Produce Exchange, where they deal in wheat and oats in large quantities, a man will come into the wheat pit and say "sell 100,000 wheat at \$1.25; a man on the opposite side of the pit who wants to buy wheat will nod his head or put up his fore finger and say "you're on." Now, there is a contract by which one man has agreed to sell and the other to buy 100,000 bushels of wheat, but the contract is not enforceable at law because it is not in writing, and every contract for the sale of goods of over the value of \$500 must be in writing in order to be enforceable. But that contract is enforceable—in fact, and similar contracts are enforced every business day in the year on both the stock exchange and produce exchange. What enforces them is not law, but the public opinion of that exchange and no man who tried to squeal on such a contract could do business for very long.

In the same way the success of this law is dependant on the support which the fruit growers are willing to put back of it. It is up to you a great deal more than it is up to us. If the fruit growers of Massachusetts decided that this law is no good and that they don't want it and that they wont conform to it, they can make it look like a lead nickel in a very short time, and if that is your sober opinion—that the law is no good—the thing to do is to repeal it and repeal it at once, but if you decide that the law is going to be a

benefit to the fruit trade, then the thing for you to do is to back it right up to the limit.

Remember that as long as the law is in force every barrel which you pack which does not conform to the law hurts the reputation of Massachusetts as a fruit growing state and hurts indirectly every other fruit grower in Massachusetts, because of course if buyers find that the words "Massachusetts Standard" don't mean anything they are going to fight shy of Massachusetts fruit.

Every barrel which you pack which does conform to the law adds to your reputation as a fruit grower and indirectly helps the reputation of every other fruit grower in Massachusetts, and the way in my opinion for the fruit growers to conform to this law is not to see how many apples below grade they can get by in the A grade, but to see just how good a barrel of A grade apples they can put up. Of course the first way of conforming will get you by, but it will not build up a very desirable reputation for you as a fruit grower or for Massachusetts as a fruit growing State.

I don't want you to think from what I have said that we have not appreciated the support we have had this year from the growers and dealers and everybody connected with the fruit trade, because we have. If the law has had any success this year, and some people say it has, the credit is yours because you packed most of the apples. A great majority of the fruit growers of the state have given the law very good support. If they had not the law would not have had the slightest success.

Of course there have been some criticisms of the law, but not nearly so many as we expected. Some professional critics attributed all their ills to the law. The fact that their apples were poor—that they got a poor price—was all laid on the law. This law has limitations, of course; it is not going to bring about any millenium in the apple growing business. The millenium will never come by legislation. This law will raise no apples; it will not change bad apples into good apples and it will not change poor packers into

good packers. The packers have got to do that for themselves. It is almost unnecessary to say that before packing A apples you have got to raise A apples, but the principal thing that this law will do, if you get behind it, and help those who are trying to enforce it, is that it will prevent cider apples and rotten apples and crab apples from coming into the market and masquerading as A apples and hurting the market for the real A apples.

Now, we who have tried to enforce the law have of course made many mistakes, for which I am very glad to accept the responsibility.

In closing I just want to thank the fruit growers of Massachusetts for the support we have had; to ask for still better support another year, and to suggest that you keep in mind the fact that this is a simple, easy, reasonable law, and that in order to learn to use it you have got to begin sometime, and why not now?

THE CHAIRMAN: Are there any questions anyone would like to ask Mr. Annin at this time in regard to the Massachusetts Grading Law?

MR. GEER: I should like to inquire about the different sizes of fancy apples we shall pack. Supposing we have a lot of different sizes, some 3- $\frac{1}{4}$ and some 3- $\frac{1}{2}$ all in the same barrel of fancy apples.

MR. ANNIN: The law says that they shall be of reasonably uniform size. Now, I should say if you had a barrel of fancy apples, some 3- $\frac{3}{4}$ and some 3- $\frac{1}{4}$ that would be all right, because none of those apples are so small that anybody would complain.

MR. MANN: You allow a variation of more than a half an inch in a fancy apple, 2- $\frac{3}{4}$ to 3- $\frac{1}{4}$ inches.

MR. ANNIN: I said that would be allowable.

MR. HUBBARD: I would like to ask what remedy a consumer would have who bought a barrel of apples of a commission man in Boston that had passed inspection and did not prove to be right. Of course, they can't look at every barrel of apples, it is impossible, that comes into the

Boston market. Some must get by them.

MR. ANNIN: What remedy would the consumer have who had bought apples that were not marked right? We have had one or two cases come up where the consumers notified us they bought apples and thought they were not up to grade. We have looked them up in those instances. In one case found the apples were perfectly all right, and in the other that they were bought in open packages. Their remedy would be to notify us. We would go in there and we would look at the barrel and see who packed it, and take it up with the packer. The packer is the party responsible. We believe the consumers can be of a great help in the enforcement of this law by creating public sentiment in favor of it.

THE CHAIRMAN: I wonder if it wouldn't help if the consumer would make his complaint on getting these apples rather than putting them in a hot cellar basement for a month before putting in a complaint.

MR. ANNIN: We should certainly take that into consideration. One case we had where a woman in Chelsea notified us the other day she had some A apples that were very poor. We sent an inspector over there and found the reason was that she had a barrel of apples marked B which were windfalls, and very much larger than those As. The A were perfectly good apples but she thought that because the B were larger she was stuck on the A. (Laughter.)

MR. GEER: I would like to ask something about a certain section in the grading law, about the closed package. I would like to have a little information as to what closed package means.

MR. ANNIN: Our test as to closed package has been this. If it is necessary to break any fastening to get into the package we call it a closed package. If it is not we call it an open package. The closed barrel is, of course, a closed package. The Boston Bushei box with three slats across the top, the way some apples are exported we call an open package for the reason you can look in and see the

fruit without removing the slats. I should have said in the first place the test is whether you have to break a seal or fastening in order to see the fruit. If you can see the fruit without breaking the seal or fastening then we call it an open package.

MR. MANN: Wouldn't the same definition of a sealed package be if it is mailable under the Postoffice it would be mailable under this law?

MR. ANNIN: I should think that would depend upon whether it was sealed or not.

MR. MANN: It cannot be sealed, if it is mailable it is an unsealed package. Would you call that an open package?

MR. ANNIN: An open package, yes. Merely to untie a string would not be to break a seal or pull any nail.

MR. SEARS: How would you rule on a Boston bushel box, with three slats, and under that some heavy paper?

MR. ANNIN: We have had that question come up. We ruled that was an open package because you can lift that paper and see the apples in it fairly well.

MR. HANSON: I have some trade in Connecticut and it is fancy trade, but several different kinds of apples in a barrel. I have shipped apples since this law went into effect without any marking whatsoever. I would like to know what should I mark a barrel that is absolutely fancy, but with three or four different kinds of apples in a barrel?

MR. ANNIN: According to the law as it stands now you would have to mark that ungraded because the law states that fancy apples A and B must be only one variety in a package. Now it seems to me you could get around that by notifying your consignee that you have to mark it ungraded under the law and state what quality the apples are, or you might put some explanatory sign on the barrel.

MR. HANSON: I would like to ask one more question. Why shouldn't the middle man or the commission man if he is found guilty, be punished, as well as I?

MR. ANNIN: The reason is because Section 15 of the

law states that no person who sells or distributes shall be guilty if it shall appear he acted in good faith as a distributor. They do get out under the law as it is worded now.

MR. HANSON: Why don't they do as they do out West when a shipment gets by the inspector and the consumer finds it is not absolutely up to the standard and the inspector then is notified and he comes and pours kerosene on the shipment. I understand it is done out West in places. Why couldn't we have something to that effect. If it is good in the West, why wouldn't it be all right in the East?

MR. ANNIN: That seems to me altogether too drastic, in my personal opinion. If we find a shipment of apples marked A, for instance, we can notify the owner that we do not think that they come up to grade and that he ought to mark them down one, that is, mark them B. It seems to me absolute confiscation to destroy his apples. The law provides a penalty of a fine. I would like to hear a discussion on that, but it does not appeal to me at all.

MR. HANSON: Because he would rather lose the shipment than have to go to court and pay a fine of \$50.

DR. GILSON: Can I ship apples anywhere in the State from outside without stenciling?

MR. ANNIN: You can.

DR. GILSON: Can you ship them in from other States without stenciling to the Boston market without the Massachusetts stenciling on them?

MR. ANNIN: Yes.

DR. GILSON: What is the minimum size under the statute for A? Can you put in any under the minimum size, 2- $\frac{3}{4}$ inches?

MR. ANNIN: The minimum size for A is not 2- $\frac{3}{4}$. There is no size specified for A.

Dr. Gilson: Can we put in less than 2- $\frac{3}{4}$?

MR. ANNIN: In the A grade you have to mark the minimum size on the barrel. There is no specified size for any grade except fancy.

MR. MANN: It seems to me the law is on the packer all

the time, whether he is a producer or a speculator. Now, suppose I sell 10 barrels of fancy apples. They are shipped to Boston under my name and put into a cold storeroom in one of the Boston fancy stores beside a steam pipe and kept for three weeks and taken out and inspected and found wrong, who is to blame, who will be punished, the packer whose name is on it?

MR. ANNIN: It seems to me that would be a matter of defense for you, Mr. Mann.

MR. MANN: It seems so, but somebody ought to be the goat.

MR. TAYLOR: May I say a word on this subject? I feel like saying one word because I consider that this subject is one of the most vital subjects which may come up during your session. As some of you know, New York is in its second year on the enforcement of this State law, and this year has been a very unsatisfactory year for its enforcement, due to the epidemic of scab. I believe you have had some scab also and this fact made it extremely difficult to pack under the law in desirable grades, and in certain quarters there is a sentiment which has emanated in particular among certain growers who have had fungous stock that they could not pack as they wish and these growers are making an effort to discredit the New York State law, giving the idea that it is not popular among New York growers.

Now, the facts of the case are that last week the New York State Fruit Growers went on record as being heartily in favor of the continuance of that law, and going on record that they wished it continued one year more before any steps were taken to remedy defects. It is recognized that there are defects in that law and it further happens that human nature is alike all over, and there are people in New York State who would get around the State law as I suppose there are in Massachusetts. In fact, it reminds me of the young boy who was fishing and it was at the time of the closed season for bass. The Game Protector was taking his

walk down the stream. He came across this boy sitting on the bank dangling a string in the water. He said to the boy, "What are you fishing for?" "Suckers." Have you caught any?" "No." He stood there watching developments and nothing developed, but as he watched he noticed a little swirl in the water down by the roots of a tree and going down to make a closer observation he discovered a string leading into the water and pulling out the string he discovered what was at the other end and found a half a dozen splendid bass. He said to the boy, "How is this? I understood you were fishing for suckers." The boy answered, "I was, but these plaguey bass kept stealing my bait, so I tied them up until I finished fishing for suckers." (Laughter.)

Now, I wish to say in closing that last week as the final result of an attempted case to enforce the law the Supreme Court ruled that the New York State law was unconstitutional and it has been put up to the Legislature to so read into it certain words that it will be constitutional* The mass of the New York State Fruit Growers are heartily in favor of it.

THE CHAIRMAN: We are pleased to have these remarks by Mr. Taylor.

MR. MILES: Briefly, what are the points on which it was claimed unconstitutional?

MR. TAYLOR: It was not decided.

MR. MILES: I would like to inquire also if apples packed under the Connecticut law are saleable in Massachusetts market without any changed marking or vice versa?

MR. ANNIN: Yes, they are. Our law only refers to apples packed in Massachusetts, except if a grower in another State chooses to use the Massachusetts law he can, but it is optional with him.

MR. WILDER: I hope that this law will be thoroughly tried out by the fruit growers of Massachusetts. I thorough-

*Note: The speaker was in error. The New York law has not been declared unconstitutional.

ly believe there are plenty of people who are willing to pay the price for the fruit if they can get the goods, but the trouble is they haven't been getting them; one thing at the top, another thing at the bottom, and another thing in the middle of the barrel. There are lots of people who if they cannot afford to pay the price for Fancy or for A, if they can get B's and know they are B's and are sound and all right, will be glad to pay the price for them. I believe it will take time, but I believe it will bring more money to the growers and it will be helpful all the way through.

THE CHAIRMAN: Any other remarks?

MR. TAYLOR: If anyone wishes to look further into this New York State law and find out the defects, if you will drop a card to Mr. C. S. Wilson, Commissioner of Agriculture, Albany, he will send you, I am sure, full details.

MR. CHASE: I would like to ask the inspector why he puts more stress upon the fact that people are afraid of the law. I would like to ask him if he doesn't think that is a wholesome thing.

MR. ANNIN: Yes, I certainly think it is. But what I meant was they are afraid to use it, afraid to pack under it, work under it.

MR. HUBBARD: I would just like to say I was one that was afraid of the law until the inspector came around to my place and looked the apples over. I haven't been afraid since.

THE CHAIRMAN: We are glad the mouths of the lions are being closed.

MR. SEARLE: I would like to ask if it would be necessary for the producer selling direct to the consumer, to grade and stamp each barrel of apples?

MR. ANNIN: According to the law it is necessary. I do not know on what points the New York law was declared unconstitutional, but I should say that if it is unconstitutional on any point, that that is the point. That is my personal opinion. If you make a contract with another man to sell

him a barrel of apples, it seems to me that perhaps you have the right to mark any way you and he agree. You are not putting them into the open market, but making a special contract with him. Now, according to the wording of our law, they would have to be marked under the law, but as I say, it seems to me that perhaps that is the point on which the constitutionality of the New York law was attacked, that it impaired the right to contract.

MR. SEARLE: I have been endeavoring to find out about that in Springfield but wasn't able to. We sell very few apples headed, most are open, but I would rather give up the private trade than to bother with sorting and stamping. That is the way we feel personally.

MR. ANNIN: I understand. There wouldn't be any object in marking them if the barrel was left open, but if it was closed according to the wording of our statute, the packer would have to mark them even if private trade.

MR. MANN: That is the point I was thinking of. I have some friends in Boston. They send up and ask me to send down a barrel of nice apples, not of one kind, part eating apples and part cooking apples. I can't head them up that way and ship to them, because I am afraid of these inspectors. I do not dare to do it.

MR. CHASE: It seems to me a very serious defect in the law that is arbitrary and unjust.

MR. MANN: Of course, I do not suppose it would be enforced like that.

THE CHAIRMAN: Now, I think we will hear about "How to find a Market, and what to do to Interest the Buyer," by Mr. John Hardy, Jr.

HOW TO FIND A MARKET AND WHAT MUST WE DO TO INTEREST THE BUYER

John Hardy Jr., Littleton, Mass.

Emerson says, if I remember rightly, that "If a man can preach a better sermon or make a better mouse trap than his neighbor, that the paths of all men will lead to his door." This maxim undoubtedly was right in Emerson's day and to a large extent is just as true to-day, but I should certainly suggest that this man advertise and not keep too quiet about what he can produce. A man growing fruit should make up his mind just what kind of market he wants to cater to, whether to play the export game or to supply a retail trade or to deal entirely with wholesale buyers. For the first, that is, the export trade, one should find out what varieties the people of England, Scotland or Germany prefer. In our state Gravenstein, Wealthy, Ben Davis and Baldwin are the kinds which attract the most attention from the foreign buyers, but our McIntosh are selling finely there if shipped promptly as soon as picked.

It seems rather ridiculous for undersize, poor colored Ben Davis apples to bring more than the wonderful Western boxed apples, but common sense says if these people want Ben Davis, and will pay for them, let them have them. In the export trade one certainly needs a long pocket book and wonderful courage but year in and year out if one will watch his chance, pack his fruit tightly and ship early or very late, it is generally a paying proposition and from the present outlook, for several years to come there is no question but what the prospect is very bright for exporting.

In my own case I made up my mind at the start that it would be much better to know what I was going to get and have some idea as to how I stood and the great bulk of my trade has been with wholesale houses or large retail dealers though one always has to supply more or less retail trade in the way of private customers. The trouble is with most of us that, although we try to grow as good fruit as possible we should think about the sale of this fruit from January to January and make the acquaintance of all the buyers we can and not let them have a chance to forget us. It's easy to invite them to come out and see an orchard in blossom and get them out again in summer, and feed them pretty-well and casually stroll through the orchard and let them see the fruit developing.

Some three or four years ago a man got on the train and sat beside me. It was about the 10th of October and he had a bag which he seemed pretty careful as to where he placed it and finally he turned to me and asked me if I would like to see some real apples. Of course, I said yes. And he produced seven Baldwins certainly $3\frac{1}{2}$ inches in diameter, finely colored, and, said my friend, I have seven hundred barrels of Baldwins exactly like them and am going to Boston to sell them.

I hated to dispel his dream but I told him he ought to have had those apples sold two months before and also that I knew that no buyer in the city would believe his story. Think it is a fine idea for one to have a brand or trade mark but be very sure that you are able to always back the brand up by the quality of goods and you can't fool the average buyer more than once.

Of course, if a man wishes to develop a strictly retail trade, he must grow nothing but the best and must make up his mind to have to care for an endless amount of detail in billing out single packages and catering to particular people together with doing a large amount of advertising by mail. It's a good game for the man with small or medium sized orchard but a nuisance to a large shipper.

The weakest form of marketing is to send goods in blindly to be sold on commission and I do not believe many business houses could continue long if they followed such methods. If one is not far from market and can call up the commission house at frequent intervals and they take enough interest in him to be willing to tell him when to hold back and when to rush fruit in to them it may not be a very bad method.

With the crop survey that the Government is engaged in at the present time, it makes it much easier for a man to find out in what localities fruit is short and get acquainted with some one in such places and sell his fruit to advantage. I have sent carloads of apples to Northern New York when the rest of New York State was glutted and have done very well. Also on peaches.

There are numbers of good sized towns in New Hampshire and Southern Vermont where I have had surprisingly good luck in selling; every year in September growers are all at sea as to what to expect for our Baldwins, and often times the first buyer that drifts into a district and mentions any kind of a price, no matter whether it is a fair one or not, establishes a price for the whole district. How many times I have had a buyer say, "Well, I have stolen Smith's apples for four years, but suppose Smith may wake up some day."

Any article of commerce well bought is half sold and we should remember that the man who can grow and handle his crop with the lowest possible expense is the man who stands the best chance of making a profitable sale. Too many of us have no proper place to store fruit and must rush the crop off and sell it at a time when the market is at its very worst.

A case comes to my mind of a man who sold his wonderful windfall apples for \$15.00 on the ground and these same apples were bought by another party for \$40.00, all picked over and packed into barrels and then sold to a third man for \$225.00 before they were loaded on cars. Looks rather blue for the first man in the case but he had no idea as to

whom to sell them, not having developed any trade for them.

It is a pity that whenever there is a chance during a season of an abundant crop that more is not done in the way of getting in touch with Boards of Trade, Women's Clubs, etc., in the different towns and cities and by making arrangements with store keepers for a window display of our fruit, letting people know that they can buy it to better advantage and at a price that will give the grower a fair return.

There is going to be a wonderful chance for development of South American markets and it is surprising how many Californian people are anxious for our apples, and why shouldn't the Panama Canal be as great a chance for us as the far western growers seem to think it will be for them. If we can't make a reasonable profit within the next ten years, we will be fearfully slow.

From all indications our Massachusetts grading law is going to make a great deal better feeling between grower and buyer, but we certainly should get together and establish some sort of price for our products because the buyers certainly know pretty near what they are going to offer long before they come to see us.

No man can do anything unless he thinks he can and if one does not believe in what he has to offer, it is hard to make the other fellow believe in it. You can't catch many flies with vinegar but a little molasses helps wonderfully. What you do go after, go after hard and remember that the big profits come from repeat orders from customers who are pleased because you have treated them squarely and this is nothing more than plain common sense.

Your buyer is very apt to be indifferent to start with but if one is enthusiastic enough himself as to what he has to offer, it is apt to be a catching disease. It is hard to interest a man who has always smoked five cent cigars in fifty cent cigars but it is not so hard to sell him ten cent ones and I believe the greatest success in the future for fruit

growers should be to work to supply the greatest market of all which is the one consisting of the people in average circumstances who are fond of apples, and apple pie, and whose youngsters eat a dozen apples a day and not worry so much over the trade which uses a dozen 10 cent apples a week. (Applause.)

MR. HARDY: If you would like to ask any questions I will try to answer them. I used to be a salesman but I am growing apples now, and I have never had any trouble in selling what I had to sell. I told this little story about those \$15 apples, that is my own case.

A MEMBER: Which end were you on?

MR. HARDY: I bought those apples for \$40 and I sold them for \$225.

A MEMBER: I didn't know but what you were the \$15 man.

MR. HARDY: No, no. The other fellow was.

MR. MILES: How about the peach industry in New York, satisfied with the market?

MR. HARDY: I do not think they work it right. If a man has peaches to sell he ought to develop a retail trade for them. Two years ago you could not sell a peach in Boston for 40c a basket, but I sold about 3,000 baskets in Fitzwilliam at 90c f. o. b. Littleton.

A MEMBER: What would you have done with 30,000 or 40,000?

MR. HARDY: Simply gone to the end of the earth to sell them.

A MEMBER: How do you handle them, on cars?

MR. HARDY: On the cars, yes.

THE CHAIRMAN: I think the time is passing and we will hear about:

THE PEACH BASKET FOR MARKETING APPLES

Mr. J. T. Geer, Three Rivers, Mass.

I am not going to take up much time, as the hour is

getting late. I feel as if I was one afraid of that Apple Grading Law because I am putting most of my apples in open packages. We used to ship all our apples in barrels to Boston and Springfield, but we had quite a few McIntosh come on a few years ago. I do not like to put McIntosh into barrels so well, you know they are a very tender apple, so we looked around to find some other package.

I bought a couple of hundred boxes to try the western style of packing apples. I guess I have most of those boxes now, except a few I sold empty. We did not find them satisfactory at all for several reasons. Finally I thought I would try a cheap basket like that peach basket. I was advised to by a party who had followed that practice. So I got some peach baskets, and of course, could not send them open by any conveyance that we had on hand so I got some screen cloth, some red netting—first got pink netting—because the apples did not show as well as through red netting. That is what you want.

I put up a shipment of 25 baskets of these and took them to the station and sent them off. A day or two after the station agent said they would not accept any more baskets unless they had closed covers, wood covers. So I was up against it then. I did not know just what to do, did not have any other way to send them, any auto truck running out there, being about 18 miles from Springfield, so I talked with the commission man in the city.

He said, "I will send a truck out and get your apples and give you the same price as if you sent them by freight." I asked how many the truck loaded, and he said about a couple of hundred to the load. That was in the fall of 1915, and it was quite satisfactory, a good deal more so than barrels at least, and more so than the western boxes, but it is not perfect.

When I came into the city here I saw a lot of apples just being unloaded and they put them on the floor and then set others on the edges, tying them up and a lot of them got bruised. I noticed they were handling quite a

number of McIntosh apples that way setting the upper baskets on the edges of those below which is not satisfactory.

I was reading in one of the papers recently of a package, a larger basket than the 14-quart peach basket, and as the bottom is out, one can practically face them like a barrel. I was very glad to see some on exhibition downstairs. If you are interested, look at it, it is going to be a pretty good thing. I haven't tried them yet, but I think we will next year if we have any apples.

Of course, we are quite careful about grading them. Anyway you can see through the cracks and so forth and see what you put into the basket. We shouldn't care much about the Apple Grading Law if we put them in barrels, but I do not care much about the basket for winter apples like Baldwins or later apples, but a pretty good thing for the early fruit, McIntosh and those varieties. It has been very satisfactory with me, but not perfect as I say. I am looking for something else and this package downstairs looks good to me.

THE CHAIRMAN: I would like to ask if they have the same size you have been using?

MR. GEER: The same size, and some twice as large. 14 quarts, and some 32, and some are larger.

THE CHAIRMAN: What size basket would you recommend, the larger or smaller?

MR. GEER: I do not know whether the large ones will sell for enough more to pay to use them or not.

MR. MILES: What is the cover?

MR. HUBBARD: On these downstairs they are wood covers fastened so you can face them on the bottom. The bottom comes out of the basket and they have a cover fastened on the top. You can face them just like a barrel of apples. When you open them the top is off and you have a nice faced package, looks better than those built with the screen cloths.

MR. ROGERS of Conn.: Our market has for some years used the peach basket. This last year we sold a lot

of our early apples in them and of course brought them into a nearby market on a truck and got big money, more than we would out of a barrel. I believe the time is coming when the average person, the consumer of the apple, wants something in a bigger package, or something cheaper. Now, your peach basket is only seven baskets to the barrel. The price per basket is more expensive than it is per barrel. People want a good apple at a reasonable price. We are certainly going to grow the apples and we want to grow them for that class of people that is going to use lots of apples. We want to give that class of people good apples at a reasonable price, which I believe can be done at a profit.

MR. HANSON: I would like to ask you if you ever had any complaint from the commission men about shipping apples in baskets, being too small a package. I mean this way, that commission men would rather handle a barrel of McIntosh than seven baskets of the same apple. I am quite a specialist in fall apples and most every time the commission man would preach to me that the basket is too small, that he would make more money on the barrel.

MR. GEER: That has not been my experience, Mr. Hanson. The commission men have told me they would rather handle baskets. I haven't any trouble that way at all. I had letters this fall from several commission men that I have not traded with lately that they wished they could have some of our baskets of apples. I haven't had any trouble in that line at all, no, sir.

MR. WHITCOMB: I would like to ask the speaker what advantage he thinks this bushel basket has over the bushel box for shipping to the commission man?

MR. GEER: By the bushel box, you mean what they call the Boston bushel box?

MR. WHITCOMB: Yes.

MR. GEER: I do not know exactly. I have talked with several storekeepers in Springfield about them. I thought I would try them. I have friends who send apples to Boston where they are used entirely, but I haven't been able

to get any storekeepers in Springfield interested in the Boston box at all. The bushel baskets go pretty well with wood covers or peach baskets or something of that nature, they like them better.

MR. ROGERS: In the Boston market we ship all by bushel boxes. We find they pack better than the basket and the cheap peach basket is an awful package to send by freight or express or truck. The bushel slatted box is very satisfactory to handle. It is less expensive and I can't conceive of an ill-shaped basket being as acceptable either to the consumer or commission man as a box.

THE CHAIRMAN: It seems to me at present the preference is for the basket to the box in Springfield, so we need to be in touch with our market to see what they desire.

MR. SMITH: I would like to say that I think in Springfield the market for fancy apples in 14-quart peach baskets, is more largely developed than any place I know of. That is the package they are asking for here, so the growers give it to them.

THE CHAIRMAN: If there are no further comments we will hear of

THE HEATH CO-OPERATIVE APPLE EXCHANGE

Mr. J. H. Putnam, County Agent, Franklin County, Mass.

Mr. President, Ladies and Gentlemen: You have asked me to speak about the Heath Apple Exchange. Now, the Heath Apple Exchange is a very small affair. In fact, it is so small it is hardly worth talking about when you consider the volume of its business, but when we consider the principle for which it stands, it is worth talking about.

Beginning in 1915 they started to pack under the new Massachusetts Apple Grading Law. They had an expert come from Nova Scotia down to school them in the packing and assist in superintending the packing of the apples. We packed about 1100 barrels that season. It was rather late when they got them all packed and as you know the apple market slumped. People who sold early in 1915 got good money for their apples and then very suddenly the

bottom fell out of the market and the bottom fell out before the Heath Apple Exchange had their apples ready to sell.

They shipped their apples into cold storage through a commission man who held them in storage and sold them when he thought the market was ready for them, and did very well. The apples were sold in Hartford largely, and considering the conditions under which they had to sell, the lower market, they got out of the 1915 crop just about even. To give you exact prices—I do not know as these are secrets, might just as well give them to you—the A grade returned \$3.20 f. o. b. shipping station; \$2.20 for the B. grade, and \$1.95 for the ungraded. Now, this is in 1915. Out of 1100 barrels about 90 barrels, less than 10 per cent, packed A; B grade was 249, and 727 ungraded. So you see more than half of the apples went into ungraded, did not grade up to B, yet I suppose the 1915 crop of apples around Franklin County was rather better on the whole than this year's in quality. That was hardly an auspicious beginning. Those men could have sold their crop to the early buyers for more money than they got out of it after all their trouble, but while Heath is not a very big town, and it is one of the little towns back on the hills, it has the right kind of people there and they stuck and came back this year.

They had a few men who believed in the undertaking and instead of throwing up their hands they understood the conditions and they came back. They did not have to hire any outside packer this year and they packed their own crop with the packers who had schooling the year before. Their crop was smaller but they packed about 200 barrels of A grade, and 650 of ungraded. Their whole crop you see was much less than many of our single growers. There are lots of growers in Franklin County who pack a good many more barrels of apples than this Exchange of some 15 growers. They sold these apples f. o. b. shipping station at Shelburne Falls for \$3.25 for A and \$2.25 for B grade.

Now, I know many a crop of apples in Franklin County

that was sold, orchard run, for \$2.00 a barrel that was better than the Heath run of apples. In other words they got as much for their ungraded apples as many of the good crops in Franklin County that were sold orchard run. And this year they more than made good.

I want you to notice also that whereas the year before when they had a better crop of apples 98 barrels of A were packed, we find this year with a poorer normal crop they packed 200 barrels of A apples and the percentage instead of being less than 10 was nearly 25 per cent of A grade apples. They realized that it costs no more for the barrel to pack that \$3.25 barrel of apples, it took no longer to pack it, cost no more to haul it to the station than the one they sold for \$2.25, or the year before for \$1.95, and that their profits depended upon the quality of their apples largely. That is, in packing in 1915 this Association learned the real value of good apples to themselves how much more they were worth, so they are taking a good deal more interest in growing their apples, and are going to grow better apples next year than this year; I am very sure of that.

The cost of packing the first year was 20c a barrel. That is excessive. Of course, they paid this man from Nova Scotia good wages and he, of course, did not do a great deal of actual work. He was selling his knowledge and his ability rather than his labor so it made rather expensive packing the first year. This year they cut the packing down to 16c per barrel, 4c less. That is too high, because there are other places where the apples were packed and were just as well graded in the County for 12 and 13c a barrel. That was about the same price given by Mr. Conant as the expense in Maine for packing apples. They go from farm to farm to pack the apples. These farms only averaged about 60 barrels to a farm.

Now, what are the advantages? There is no question but what they could sell those 900 barrels of graded apples at much greater advantage than any one man. The first great advantage is in selling. When they got the volume

they could sell by the carload and get much more for their apples than an individual.

I have already called your attention to the value of grading the apples to the men in encouraging them to produce better apples, and they have also realized much more for apples graded than if they had not graded them. The buyer who bought the apples last year, or rather the commission man who got the apples wished to know if they would send him their apples this year, but they made a cash sale f. o. b. at the railroad station, so did not sell to him. The buyer who went up and looked the crop of apples over told me that it was the finest crop of apples grown in Franklin County. He went all over that County and that there wasn't a crop of apples anywhere that compared with Heath apples.

Now, as a matter of fact there were crops and crops of apples in this County that there were much better than Heath apples, but they were put up ungraded. He saw them as they lay ungraded.

There is no question but the Heath crop looked better when properly graded. They have now got a reputation for their apples. Before that occasion the towns all around had a better reputation for apples, but today they have made a great reputation for apples, properly packed. Without question they can find a market next year without any stretch at all.

There are only two faults found with this co-operative packing that very much can be said about. One is the expense and the bother of having a gang of packers around. The wives do not like to have a big gang of men come out to do the packing. They have to board them and the men have to hay and feed the horses in the barn, which is a nuisance. That is one objection, but I do not think it is a real objection. I think the value is very much more than the loss.

Another thing is the average apple man up in our county dislikes very much to see an apple he don't sell.

He can't bear to see an apple left at home. A man came into our office while the Apple Inspector was there and we talked over his crop which was saleable for \$2.00 a barrel. There were 1,000 barrels at \$2.00 a barrel. He was offered \$2.25 for them if he would sort them and grade them a little closer. He would rather take the \$2.00 and let them all go. We sat down and did a little figuring. We figured supposing he threw out 20 percent of those apples which would be 200 barrels and have 800 left at \$2.25, which would be \$1800. That leaves \$200 less than he got for the 1,000 barrels at \$2.00. He is \$200 short but he saved 200 barrels at 40c, that is \$80 of his \$200; he has 200 barrels of apples at 30c or 40c for cider. He didn't have the expense of packing and heading those barrels which would be 15c per barrel more, so he would have actually received as much for his 800 barrels as he did for his 1000. He would have more money in his pocket if instead of the 1,000 barrels he had let 800 barrels go, which would have helped the market, but instead of that he was so absolutely constitutionally opposed to having any apples left on the place he would rather sell them for less money and have the man take them off. That is the inborn, ingrained construction of fruit growers. That is one objection they make to this co-operative system. A man after the packers have gone sometimes has about 15 or 20 barrels of apples left. One man in particular was asked why he didn't sell them and he said he could not. He was told if they were perfectly good apples he could sell them, but he said that nobody would buy them like that, but if they were put in with the others they would be all right; absolutely honest in his belief that those apples ought to have been sold although he could not sell them on their own merits.

Now, I think it really reduces the cost of packing. It solves the packing law. That is to say, this Exchange has had no trouble with the packing law. They are not afraid of it at all. They just as soon stencil their apples. They do not question the law at all. It solves the apple packing

law for the small grower without question and I believe it reduces the cost of packing when you pack them right.

There is one other objection; the fundamental thing in making a success of any exchange is the management. You must have the right men to manage the proposition. The big grower who is usually the man of the community who ought to control and manage an enterprise of this kind is the one who don't want to go into it. He is the man who has more apples himself than the whole Exchange is packing. He can run his own business and he can handle his own business; the little fellow is not going to help him and he does not care to help out the little fellow. He is the man who ought to be in the Exchange helping the Exchange along, but this is the way he feels about it; but is coming up against the proposition that these little fellows when they get together are a big competitor for him. Then he finds he has got to get together. That proposition is coming and they are getting big enough when they are combined to compete against him and they are going to do it and when they do it the big fellow in the community who is big enough to handle the proposition will take hold of it and throw his influence and managing ability into this and then they are going to make a big success.

Now, I am going to tell you a little story which I know some of you have heard me tell before, but it was brought to my mind by the speaker this morning from the Oxford Bears. Two years ago I went up to Bangor to the Maine Fruit Growers Annual Meeting. I got on the train at New York and got apple hungry. I thought I would buy a New England apple. I rode all the way from New York, the whole way across New England until I got to Portland, Maine. There wasn't an apple on the train but a western apple. Just think of it. Here is the richest section in the world and here is the best apple trade in the world, is the man who is paying 5c apiece for his apples on the train and not a New England apple could be bought if he wanted one all the way from New York up to Port-

land, Maine. I had a few minutes to wait there. You remember there was a big crop of apples that year and the New England men had hard work to sell their apples, yet right at the door was one good market. I went out to several fruit stands but I could not find a New England apple, nothing but western box apples offered for sale. I got on the train then to go to Bangor on the Maine Central and a newsboy came down through the train and he was singing, "Nice, sweet Maine McIntosh apples." I thought to myself here is my man. "How much are they?" "Three for ten." "All right," I said, "give me three." I put my hand in my pocket and I gave him the smallest bill I had, but the smallest bill I had was big enough so he could not change it. We kind of chewed the thing over and it looked as though I wasn't to get my apples. The boy says, "What are you going to do with the magazine?" I had been reading a magazine on the train. He said "I will trade you three apples for the magazine." I said "You give me the apples and you can have the magazine when I get to Bangor." They were marked and stenciled and wrapped with tissue paper, "Oxford Bears." three perfect McIntosh apples, delicious show apples.

Why could I get New England apples after I got up there? Here was an association which was doing business enough so that they could contract with the Maine Central Railroad and everyone of those apples was of a grade the Railroad knew they could sell to the service. That is why. One man unless he was big enough could not handle such a proposition as that. There is an absolute illustration of the value of co-operation. Now, there are tremendous possibilities for these apple associations. They are not going to start in to be great big associations right from the start but by sticking to it under adverse conditions I feel they are sure to bring success and that they are going to be a big help to our New England apple industry. (Applause.)

THE CHAIRMAN: Any questions to ask Mr. Putnam?

MR. HANSON: Is there a compulsory spraying law in the organization?

MR. PUTNAM: They have no compulsory spraying law in the organization.

MR. HANSON: How do you know how many times to spray?

MR. PUTNAM: Well, they do not spray half as many times as they ought to. I believe that it is a good thing to have compulsory rules. The organization should say how their apples should be grown but this association says simply how they shall be packed. If a man doesn't pack A apples, he doesn't get A apple prices and he soon finds it out.

THE CHAIRMAN: Any other questions to ask Mr. Putnam? I think we have been spraying, packing apples, selling apples, having quite a number of experiences with apples, and I think we have been eating apples, but I think it would be very timely if we might close with a few luscious strawberries and I am going to call Mr. Graton for a few words about a strawberry which he is growing, the new Strawberry "St. Martin."

MR. GRATON: Mr. President, Ladies and Gentlemen, I won't take but a few minutes. It is a little bit embarrassing for me to say the little I have to say on the subject of a fruit that I have developed myself, because it might seem egotistical and presumptuous, but I have been requested to do it so I must be held blameless.

I might say that I am the proud father of a horticultural child, that has paid me many times over, not only financially but also in realizing more than my most sanguine expectations.

This luscious child, I have named St. Martin in honor of my native village in the Province of Quebec.

This berry is the result of seeds sown in summer of 1908 at my former home in Central New York. The seeds sown were from as perfect well ripened specimens as I could find of the following varieties:—Ridgeway, New York, Glen

Mary, Brandywine and Commonwealth.

In due time, twelve or thirteen little plants struggled against a very dry season, and suffered some neglect. However five or six of the most vigorous were transplanted, but in 1909, all were destroyed but one whose vigor offered some promise. In 1910, this plant produced three berries that also were promising. In the spring of 1911, having sold my home, I took up this plant and two of its well rooted runners, and brought them to Randolph, my present home.

Unfortunately, the ground where these were planted was covered with ice most of the following winter, so that but one plant survived; and it too, bore three berries. But the berries were improving as to size, and were also getting darker.

In June of 1914, four quarts of St. Martin's received the silver medal of the Massachusetts Horticultural Society. I received first prize in its class in 1915. That year, owing to the early date of the exhibition, I found just enough of the berries for the required two quarts. I could not have found another ripe berry.

In 1916, June 24-25, I entered it in four classes, and it received three first prizes and one second. And in July 8-9, I entered four quarts, not in competition, but simply to show that St. Martin holds to its large size to the last picking. And it was awarded the Society's gratuity prize of two dollars. On those two dates St. Martin was the only strawberry exhibited at Horticultural Hall.

Up to 1916 the plants have been free from blemishes, but the past season they have developed some leaf spot, which I attribute to the excessive rains of the early season.

The plants are prolific, of long, strong runners, and very prolific of large, dark berries, red to the center. The largest berries are shaped somewhat like a blunt wedge, with slight longitudinal corrugations. Berries that are a little smaller, are heart shaped and well formed.

THE CHAIRMAN: I think there is a matter Dr. Gilson wants to bring to our attention. Is Dr. Gilson in the room?

DR. GILSON: I am glad to be here at this time and hear about this apple inspection. I think when apple growers get hold of it intelligently they won't do without it. There has been a great deal of ignorance and fear about the law but the way Mr. Annin has presented it tonight, the spirit of it, I hope we won't part with it until we have thoroughly tried it. I would like to present this to the Fruit Growers' Association tonight:

Resolved: The Massachusetts Fruit Growers' Association in Annual Convention assembled believe that the Massachusetts Apple Grading Law will work large benefits to the apple business in this State and asks that the law be retained on the statute books.

The resolution was presented as a motion and seconded and carried by a vote.

(The Chairman then called attention to the program for the next day and the meeting adjourned.)

MORNING SESSION

Friday, January 12, 1917.

Vice President Tuttle in the Chair.

Gentlemen and Fruit Growers: Various questions of the fruit growing proposition were before you yesterday and last evening, and this morning spraying will be taken up. I have pleasure in introducing Mr. Davenport, Instructor at Essex County Agricultural School, Danvers.

SPRAYING FOR 1917

By **S. Lothrop Davenport, Instructor in Fruit Growing, Essex County Independent Agricultural School, Danvers**

Mr. Chairman, Members of the Fruit Growers' Association, and others, it is with quite a good deal of pleasure this morning I come up here to speak on the subject of spraying, because I realize that spraying perhaps is one of the most important parts of fruit growing. We have heard a great deal said in the past about the various operations of fruit growing, and we have heard different men speak on the different subjects, telling how important those various phases were, and possibly we get the idea that one or two of those particular lines of work, like pruning, are really the most important parts of fruit growing, and we may also make the same statement as to spraying,—that we consider spraying to be the most essential or most important part of fruit growing, yet, I think most of us will agree at the present time there isn't any one of those operations which is so important in themselves that they can stand alone, that we can expect to be successful in fruit growing by simply carrying out any one of those particular lines. Yet, if there is

any one of the various operations like pruning, thinning, cultivation, fertilization, spraying, etc., I believe that spraying is the most important as it stands alone.

Today, or any other time, if we go down through the markets and look over the fruit that is offered there, I think in many cases you will agree with me that fruit that is perhaps worth about \$2 or \$3 a barrel, if it had more spraying or other spraying at the proper time, it would have been worth more today, even though you had not ever changed the other operations at all. Thinning of the fruit brings us increase in the value of that fruit, but I think you will find that there is no other one operation that would increase the value of the fruit so much as the matter of spraying. Now, this morning we want to take up and discuss for a short time our spraying campaign for 1917, and in planning our spraying for 1917 let us keep in mind our spraying for 1916 and the result of the same.

Now is a good time to discuss spraying while we still have in our possession some of the fruit of the past season and we still have fresh in our minds the large number of barrels of B's and ungraded that we packed this last season, and the few A's and Fancy's. Many places packed their entire crop as ungraded and others put up about 25% of A's and 75% of B's and ungraded. Why so many poor apples we ask? Was it not due principally to the lack of sufficient and proper spraying? Are we satisfied with these results, are we willing to charge the poor results against the weather, or are we willing to place the blame where it belongs on ourselves, and pass a New Year's resolution that this season we will study the situation more thoroughly, plan a better campaign, and carry it into faithful execution to the last letter and by so doing, have some fruit next Fall that we may be proud of. Remember that by studying and profiting by the failures, as well as the successes of the past, we are able to reach our goal in the future.

Now, how and when did we start our spraying campaign this past season? Did we start by spraying after the buds had

started or several days after the blossoms had fallen? Did we lose two or three days repairing our sprayer or waiting for spray materials, new hose, etc., or for fair weather, when we should have been busy, and now wonder why we did not get better results. Now as this is the season of leisure, if there is any for the fruit grower, why not spend some time in planning our coming campaign? Would it not be better to start our spraying campaign by pruning, than by spraying, when we know that sunlight is an important factor in holding in check some of the diseases as sooty fungous, etc. In fact, I believe that sunlight is as important as spraying in the control of this disease, and as pruning can be done at any time, and the important sprayings to prevent this disease comes during July and August, at a time when many of us are too busy with other farm work to do any spraying, it seems to me that we should start our work now by pruning and be so much ahead when spraying comes.

Now let us consider the serious fruit pests of this past season and see what ones we may expect this year. Of the insects the more prominent this past season were the plant lice, curculio, codling moth, tent caterpillar, gypsy moth and of the diseases the sooty fungous, apple scab and the Baldwin Fruit or Brook's spot. I wonder how many of these we may expect to be with us this coming season. After careful consideration I should say that we may expect them all and a few more besides. In fact, we must be on the look out for the Red Bug, Leopard Moth, Gypsy, etc., which are appearing in new sections each year and are considered to be serious pests. I am glad however to say that the San Jose Scale seems to be somewhat on the decline. Do not, however, get the idea that we should entirely discontinue spraying and let the scale take care of itself, for we must not give it a chance to become a pest again.

We need not take any time to discuss the Codling moth, Curculio, Tent Caterpillar, Scab, etc., because you are all familiar with them and know how to control them. Just a word, however, about the sooty fungous, for in some sections

of the state it has been very serious during the past few years causing a loss of hundreds of dollars. It probably will be serious again this season and we must plan to prevent it. In sections where this trouble is serious there is not any spraying, that will increase the value of the fruit so much as the spraying to prevent this disease. But remember that this disease starts late in the season and we must carry on late sprayings in July or August in order to be able to successfully prevent it.

Probably the one disease that gave us the greatest trouble this past season was the Baldwin Fruit Spot. It did a great deal of damage in many sections of the state, in sprayed, as well as unsprayed orchards. This disease is not an entirely new one in Massachusetts as reports have been made of its presence in this state for the last six or seven years. It is, however, I believe, the first season that we have had such a serious outbreak and I am sure that we will see it again next season and must be prepared to prevent it.

The Brook's spot is a fungous disease, the spores of which seem to become established and grow on the fruit about the same time as the sooty fungous. The spots in their first stage as we find them on early apples especially are rather small and located generally around the blossom end of the apple. Later we find on the winter fruit that the spots are much larger and that they extend through the skin a short distance into the apple causing a greenish brown spot. This spot injures the appearance of the fruit greatly and thus the value, however as far as I have been able to find out it does not to any great extent injure the keeping quality of the fruit, when stored under good conditions. This disease may be prevented to a large degree by spraying with a fungicide, as lime-sulfur or bordeaux mixture, during the months of July and August. Two or three sprayings should hold it in check.

The apple scab seems to be wide spread and doing considerable damage and if we expect to grow the McIntosh and other varieties that are subject to this disease, we must

carry out the two or three Scab sprayings. We must spray with a fungicide before the blossoms open, again after the petals fall and at least one more spraying later.

Now, let us consider for a few moments one or two of the newer insects that seem to be gaining ground. First the Red Bug. This bug which has done considerable damage the last few years in New York and New Jersey is a sucking insect like the plant lice. This insect does the greatest damage by puncturing the young apples in May and early June, causing many to fall to the ground and the rest becoming so badly deformed that they are unmarketable.

The insect is about $\frac{1}{4}$ of an inch long when mature and in color varies from red to black. During its early stages it is red in color and looks very much like some of the aphids, but later looks more like a squash bug but much smaller. The best remedy at present seems to be spraying with "Black Leaf 40" 1 pint to 100 gallons of water just before the blossoms open and possibly one after the blossoms fall.

Another insect that I wish to call your attention to is the Leopard Moth. The larva of this moth is a very ravenous feeder and does considerable amount of damage in young apple orchards, by boring into the limbs and branches. The remedy is to look over the trees and cut out the borers.

The Gypsy moth that is so bad in the eastern part of the state is gradually moving west. The caterpillars in this case appear during May and are also very ravenous feeders both on the leaves and fruit. The feeding on the fruit causes many poorly shaped unmarketable apples. This pest may be controlled by heavy spraying with lead.

Having discussed the important insects and diseases that we must be prepared to fight this coming season we are ready to make out our spraying calendar.

First:—Will we give a dormant spray? Yes, if there is any scab in the orchard or if you are badly troubled with fungous diseases, however, I believe in well cared for orchards it would be best to omit at least every other year the

lime-sulfur spray and give more foliage sprays. If, however, we are going to spray for scale we should delay the spraying until the buds have started and we will then not only kill the scale, but the tent caterpillar and plant lice as they will have hatched by that time. Lime sulfur should be used 1 to 8 or 9.

The Second spraying which is very important should come just before the blossoms open to control the scab, Browntails, curculio, canker worms, tent caterpillar, bud moth, plant lice, red bug, etc., by using lime sulfur $1\frac{1}{4}$ gallons to 50 of water adding $2\frac{1}{2}$ to 3 lbs. of paste arsenate of lead and $1\frac{1}{2}$ pint of "Black Leaf 40." The latter only when lice and Redbugs are present.

The Third spraying which is also very important should come just after the blossoms fall, to control the codling moth, curculio, gypsy, plant lice, Red Bug, Scab, Sooty fungous, Baldwin Fruit spot, etc., by using the same materials as for the second.

The Fourth spraying about 2 to 4 weeks later for Gypsy moth, codling, Scab, Sooty fungous, Baldwin Fruit or Brook's Spot, etc., using the lime sulfur and arsenate of lead.

The Fifth spraying from 2 to 4 weeks later should be used in sections where the diseases are bad, and when we have wet seasons, to prevent the diseases as in four by using the same materials.

Now we are recommending four and five sprayings and the question comes up at once, can we afford to put so much time and money into spraying? Yes, I believe we can, in fact I am convinced that in general in the past we have not sprayed enough, we have not put as much money into spraying as we should and that is one of the important reasons why we packed so many barrels of B's and ungraded apples this past season. We know that the cost of 3 and 4 foliage sprayings is only from 10 to 15% of the cost of producing a barrel of apples. We know that under Massachusetts conditions that we can give a foliage spray for

about 4 cents or less per barrel of fruit. Thus 3 foliage sprays would cost less than 12 cents per barrel and four 16 cents. Can we not afford to spend more than from 12 to 16 cents per barrel of fruit for spraying? I believe that we can, in fact I am convinced that we can spend at least 20 cents per barrel of fruit for spraying if necessary and come out far better in the end.

Look at the apples the past season that were covered with Sooty fungous and Brook's spot, worth about \$1.00 per barrel. Would it have been worth while to spend 10 to 15 cents more for spraying and made them worth \$2.00 per barrel? If we must economize let us start somewhere else than on the number of sprayings. Let us keep some accounts and see what our spraying is costing us, and whether it is the spraying that is increasing the value of our apples or not.

Next let us consider for a few moments the spray materials. At the present time we find that there are many spray materials on the market and we find that the tendency is today, to change the liquid and paste materials into a powdered form. Thus we have a liquid lime sulfur and a powdered soluble sulfur, a paste arsenate of lead and a powdered, and the question is which to buy.

In general I would say that this is a question to be settled by the buyer, for most of the materials are good. Of course, it costs to make a powder from a paste and the buyer must pay for it and unless the powder has some advantage for you, it is not economy to buy it. We must, however, buy those materials that can be mixed together making a combined spray rather than those that must be used separately. That is why I am recommending lime sulfur, arsenate of lead and "Black Leaf 40" in the Spray Calendar, because they may be mixed giving us a mixture which is not injurious and at the same time I believe a most economical combination.

One other point we must also keep in mind is that freight is moving very slowly and we must order our spray

materials early so as to have them when needed and perhaps it would be wise to purchase now before the price advances.

Next, in what condition is our spray equipment, have we looked at it since the last time we were spraying? If not in the near future we should get our equipment out, give it a thorough overhauling, getting new parts as needed, so that everything will be in running order the first minute we start in spraying. Nothing I believe does more to discourage spraying than to have things go wrong the first part of the season. Spraying we realize is somewhat of a disagreeable operation at its best, and anything that we can do to make the work easier and more pleasant will give us better and more thorough work, and, of course, better results.

After the spray pump or engine, the hose, rods and nozzles should receive careful attention. The day of using $\frac{1}{2}$ or $\frac{3}{4}$ inch rubber hose, a gas pipe rod and an old nozzle is past. Who cares to draw around all day 50 feet of $\frac{1}{2}$ inch rubber hose, which weighs from 18 to 25 pounds, carry a gas pipe rod which weighs about 8 lbs. with an old nozzle on the end and expect to do thorough and efficient work? Why not use a 50 feet length of $\frac{1}{4}$ or $\frac{3}{8}$ inch cotton or rubber hose which weighs from 8 to 10 lbs., a bamboo or drawn steel rod that weighs about 3 lbs., with a good angle nozzle and then we can spray all day and do thorough and efficient work and also call spraying a pleasure.

In closing I want to call to your attention again:—That we should start our spraying campaign by pruning. Study our own situation and make out a Spray Campaign for the season. Look over our equipment and be prepared. Order Spray materials early. Start spraying on time, using right materials, at the right time and be thorough in our work. And last, remember that spraying is only one of the important operations of fruit growing and in order to be successful we must carry on the other operations as, pruning, thinning, cultivation, etc. I thank you. (Applause).

THE CHAIRMAN: Gentlemen, Mr. Davenport speaks

of pleasure in spraying. I imagine the greatest pleasure we can get out of spraying is on this end of it, to be told how to do it. Those who have had experience know well enough the results of doing it. Also there is a pleasure, with a good barrel of apples because of spraying operations. I am sure now, Mr. Davenport will be ready to answer any questions. The discussion will now open. Parties asking questions will please give their names.

MR. ANNIN: Mr. Davenport, you spoke about putting two to three pounds of arsenate of lead in with your solution, 1- $\frac{1}{4}$ of lime sulfur to 50 of water. Is there any objection to putting a little heavier dose of arsenate of lead in, 5 pounds to 50?

MR. DAVENPORT: I do not know as there is any great objection. Of course it is a case you might say of economy. If you are not going to gain anything, there is no object in doing it, although I realize that in Gypsy sections it is oftentimes advisable to use more than two or three pounds, but I question whether there is any object or any need of putting more than two or three pounds in any other section of the State. We are simply increasing the cost of our spray material without getting any better result.

MR. PUTNAM: I would like to ask the speaker if I was correct in understanding him to consider the Brooks spot and Baldwin spot as identical.

MR. DAVENPORT: No. Notice I said that the Baldwin fruit spot and the Brooks spot are identical. There is another disease which we call a physiological disease, called the Baldwin spot, but not the Baldwin fruit spot, so that we have those two, the Baldwin spot which has been quite common for a good many years, especially on the Baldwin apple, and on other apples; and then the Baldwin fruit spot which is often called the Brooks spot, which is entirely separate. In the first case we do not know what causes the trouble, or we do not know definitely what causes it. In the second case we know that a certain fungous disease causes trouble, so that in the first case we cannot prevent it by

spraying, whereas in the second case we can prevent it by spraying. In the first case the only chance to get away from the spot or get rid of it, is by changing the conditions surrounding the growing of the fruit, etc., not by spraying itself.

THE CHAIRMAN: Do I understand, Mr. Davenport, that the Brooks spot is comparatively new in this section of the country?

MR. DAVENPORT: The Brooks spot, I believe, has been reported in this State for about six years, only it has not been very prominent until this last year. This past season it was very prominent all over the State and the reason why it was so prominent was because we had such a wet season this past year or possibly two years, and as a result it has become very widespread. This morning in the commission houses in Springfield I was quite surprised to find so much of it in the fancy grades of fruit that they were offering for sale for \$4, \$5, and \$6 a barrel. I know of one particular orchard this last year where there were possibly 500 barrels of Baldwins and as you drove by the orchard you would consider the apples worth at least \$2.50 or \$3.00 when packed, or possibly more, and yet on inspection I question whether you could put up one barrel of A's out of 100 barrels of apples in that orchard, owing to the fact they were so badly covered with this Brooks spot and when they came to put up those apples they put them up ungraded because they could not find enough apples that would pack A's or B's. Now, those apples were put into storage and so far they have not shown any decay or deterioration as a result of the Brooks spot.

THE CHAIRMAN: I remember some years ago Mr. J. H. Hale stating that weeds were our blessing in a great many cases, if it were not for the weeds there wouldn't be the cultivation that is often required. Whether this is going to be the fact with the spraying, it is something we have surely got to find out.

MR. WASHBURN: I would ask the speaker about the

red bug. I had something, I would not call it a bug, but some kind of an aphid, I guess they called it. And our County Agent sent it to Amherst. They wrote back and called it the clover mite. I would like to ask if that was the same thing.

MR. DAVENPORT: No, I do not think so. What you had probably was the clover mite. That is quite common in some sections. So far I have been able to find out it does not do any amount of damage.

MR. WASHBURN: They told me the lime sulfur would control it.

MR. DAVENPORT: Yes.

MR. CHASE: I would like to ask what is the best protection for the operator's hand in spraying, the one he holds the nozzle with. This lime sulfur sometimes eats the skin off. Is there any practical thing?

MR. DAVENPORT: I do not know of any. The best thing to do is to keep your hands out of it. I find that by attending to minor details like having all connections tight, and possibly having on your spray pole a drip guard, one can keep out of it. Some have recommended the wearing of rubber gloves, goggles, and things of that kind, but you do not do that very long before you throw them one side and decide you had rather take your medicine.

MR. HANSON: I have apples ready for market about the 25th of July—would it be absolutely safe to spray for sooty blotch about the 1st of July?

MR. DAVENPORT: What is the particular variety of apple?

MR. HANSON: Mine is Red Astrahan first, and then Duchess.

MR. DAVENPORT: Do you find that sooty blotch bothers on them?

MR. HANSON: No, not very much.

MR. DAVENPORT: In most cases of the early varieties of apples it is not necessary to spray for sooty blotch, for the simple reason that the blotch does not usually get start-

ed until quite late in the season. Of course if it was absolutely necessary we would spray and then later when the fruit was harvested, we would wipe the spray material off. Remember, that while the apple is growing, it is going to throw off the spray material, but the minute it approaches maturity any spray material that is put on then isn't going to be thrown off, even though we may have a lot of rain.

MR. ATWOOD of Connecticut; As to the question in regard to using something to put on to protect his face and hands from the lime sulfur, would say we have used vaseline with very good success for two or three years.

THE CHAIRMAN: I can second the motion myself in regard to that.

MR. CLARKE: I think this would help. I do not think vaseline would do it alone. It is a very good thing yet I think the best thing you can have with vaseline is a pair of good mule skin mittens. They won't harden and will protect your hands and wear the whole season through. I have used every kind of a glove, cotton or rubber glove.

A MEMBER: I would say in regard to this protection I have tried vaseline. Two years ago I tried mutton tallow. Now, vaseline for your hands I found did not wear, but the mutton tallow would stay with you a great deal longer and you would instantly tell when that was worn out. You could have a piece in your pocket and you could easily smear the ends of your fingers. Last year I went to the 10 Cent Store and bought a 15-cent pair of cotton gauntlet gloves to put over these thin rubber gloves to take the wear from that, and it was the most satisfactory thing I ever had for my hands.

MR. SEVEY: I was very much interested in the speaker's reference to red bug. I am wondering if the effects of the red bug and the curculio are the very same. My experience last year was not very satisfactory, particularly with Bismarck. I have been laying it all the time to curculio but the description of the red bug seems to fit it much better.

MR. DAVENPORT: There is (showing to audience) a good example of curculio. It isn't very often the curculio leaves the apple in such poor shape as the red bug.

MR. SEVEY: Have you the red bug here?

MR. DAVENPORT: I do not happen to have a sample of the red bug, but the red bug does not leave the large scars on the apple, as the curculio frequently does.

MR. SEVEY: That is not my trouble at all. They are usually on the blow end, particularly the Bismarck. Not troubled on the McIntosh or the others. It is the Bismarck. I am inclined to think that variety may be the difficulty.

MR. DAVENPORT: I do not know whether there is any red bug located in this particular section or not. I know further east from here they have found places where it has done some damage.

MR. GRAVES: I want to ask the speaker if lime sulfur will control scab on McIntosh as well as the vitrol spray?

MR. DAVENPORT: There is one thing I meant to have spoken about and that is this: If we are going to grow the McIntosh,—if we are going to recommend the growing of McIntosh or any of the varieties so susceptible to scab we ought to at the same time tell the man that he has got to keep that tree sprayed with lime sulfur or some fungicide if he wished to get good fruit. Now if you carry out the lime sulfur spraying especially once before the blossoms open as that is when the scab starts—another right after the blossoms fall, and then possibly a third one—three or four weeks later—I do not think you will find any trouble at all in keeping the scab off the McIntosh with the lime sulfur.

MR. CHASE: I would like to ask if the elevation of an orchard has anything to do with the prevalence of apple scab?

MR. DAVENPORT: I think the elevation of an orchard has a great deal to do with all the fungous troubles. If the orchard sets high, and has good air drainage you are not going to have nearly as much trouble from the different diseases as when an orchard sets low and the cool and moist

air settles in around it.

MR. MUNSON: Two or three men would like to have you explain how the apple scab winters or spreads.

MR. DAVENPORT: In the case of the apple scab we find that the disease is not only on the fruit itself but on the leaves and also sometimes on the bark of the tree. The falling of the leaves with the apple scab on them and lying on the ground all winter is one of the chief sources of infection the following year. The following year when we get the spring rains we find the spores on the leaves are thrown into the air. These spores alight on the leaves and on the little stems of the blossoms just before they open and germinate in the moisture there. These develop and give rise to later infections.

MR. NORRIS: Do you know anything about the dust spraying? The Cornell Experimental Station, I believe, has tested it out some and a number of the large New York State growers have been using it quite extensively. Is it going to take the place of some of our liquid sprays?

MR. DAVENPORT: The matter of the dust spray has not become prominent in Massachusetts at all, yet it has become quite prominent in some sections of New York State. I do not believe it will ever take the place entirely of our liquid sprays for the first reason they do not recommend the use of dust sprays on young trees and second they do not recommend the use of dust sprays at the present time for winter spraying, but only for foliage spraying. Thus if you are going to do dust spraying, and if you are going to do liquid spraying, you have got to have two sets of apparatus for spraying which I do not believe is economy on the average place. They claim for dust spraying that it is cheaper on large trees than the liquid spraying, for it is much easier to get around in the orchard because first the apparatus is lighter and second because you do not have the weight of the water. The dust spray machine itself I understand does not get out of order very easily and that is some advantage. In sections where you have to draw your

water quite a distance it would be an advantage to use dust sprays, but so far I do not think they have carried it on long enough to prove to us that we should lay aside our spraying apparatus to buy dust spraying equipment. In the next few years it may be developed so that we will find it advisable to use dust spraying, but as yet I do not think we are ready to take hold of it.

MR. HOWE: I would like to inquire about the red spider, its appearance, living and habits.

MR. DAVENPORT: Do you refer to the red spider, or the red bug? I have never seen the red spider working on fruit trees.

MR. HOWE: I have had something on the scions that looked like a spider, ate the buds right out before the scions got going.

MR. DAVENPORT: I should not say it was the red spider. Perhaps someone else could answer that.

THE CHAIRMAN: Anybody had any experience in this line that would help us?

MR. DAVENPORT: It could not be the red bug, because the red bug does not do a great deal of damage to the foliage, although it does work on the leaves puncturing them but wouldn't do a sufficient amount of damage to injure the scion at all.

MR. COOKE: There is one thing the speaker spoke of here about thinning out trees and letting the sun get in, which I think is very important. It occurred to me we might go one step farther in case of some of these Baldwin spots. I found that it was a case of impaired vitality of the tree and I found that you would create a condition in the tree that would be resistant. Well set and well balanced trees have a greater resistance than a tree otherwise in poor soil. I think many times by keeping our trees in proper shape it will overcome a good many of these diseases, especially fungous diseases, but no effect, of course, on the insect diseases.

THE CHAIRMAN: I believe that is very true, unless

we are apt to get too heavy wood growth, which sometimes has a tendency to bring on certain diseases.

MR. SEVEY: I infer the speaker in outlining this campaign has reference almost exclusively to the apple and not with the same campaign applied to peaches, for instance. Further, that in your fourth and fifth sprays you did not specify whether it was the same material and the same proportions as in number two or three.

MR. DAVENPORT: I was speaking principally in regard to the apple and not in regard to the other fruit. In the case of the fourth and fifth sprays you would use the same materials except you might omit "Black Leaf-40" if there wasn't any lice or red bug. At the same time we might properly omit the arsenate of lead if there wasn't any leaf eating insects. We must keep these facts in mind. Lime sulfur is for the purpose of preventing certain fungous diseases. Arsenate of lead is for the purpose of destroying leaf-eating insects. Black Leaf 40 and Nicotine is for the purpose of destroying any sucking insect. Now, no matter when we are going to spray or what we are going to spray for, if there is not any leaf-eating insects, there is not any object in using arsenate of lead. If there is not any sucking insects, no object in using nicotine solution, for we must hit the insect with the Black Leaf-40 material in order to destroy it. For the diseases we recommend using lime sulfur in practically all of our spray mixtures, as it is a preventive and thus stopping a disease before it becomes well established.

THE CHAIRMAN: I think the question Mr. Sevey brought up in regard to spraying will have a tendency to change around our system of fruit growing to a certain extent. I know in my own case where we have followed general fruit raising, peaches, plums, apples and pears, in order to do justice to one or the other they are bound to conflict and it would seem that this is bound to bring around one man to growing a single fruit on every section large enough to make it worth while, rather than a small number

of fruit.

MR. HOWE: I would like to ask the speaker if he thinks that arsenate of lead has any special value as a fungicide.

MR. DAVENPORT: No. In the case of arsenate of lead we do not consider it has any value whatever as a fungicide. We simply use it as a poison and not as a fungicide.

MR. HOWE: I would like to state one of the speakers yesterday said they believed they found out something, that arsenate of lead would control the apple scab.

MR. DAVENPORT: If that is true I am quite surprised and wonder why we have not controlled apple scab in years past where we have used so much arsenate of lead.

MR. NORRIS: I had quite a little trouble this year on the young trees, two-year trees, with the woolly aphid, something I haven't had any trouble with until this year, and the best way I took care of it was by going through the trees and rubbing it off with my finger. Now, are we going to have a lot of trouble with that in years to come? It seems to be very prevalent in my orchard this year on young trees.

MR. DAVENPORT: In the case of the woolly aphid I do not consider we are going to have a whole lot of trouble. We have more or less of the woolly aphid one year or another but it doesn't seem to be on the increase. It is simply a case where one season we get quite a little, and the next season we do not. I do not know myself what is really the best remedy to keep it down. You take a branch where the woolly aphid is and dip it into a nicotine solution and that woolly material around the outside seems to keep the liquid from them, but whether there is some other better way or not, I do not know.

THE CHAIRMAN: Did you use gloves, Mr. Norris, when you did this? In regard to the tent caterpillar we had always burned them off, and it was suggested by a professor of the College that we go around in the early stages and take them off with our fingers, pull the nest out readily. Finally we got so we could do it very well, but nevertheless the

arsenate of lead was still better.

MR. PINNEY: In regard to the woolly aphis I would like to suggest that I have heard from the New York Experimental Station that by using Black Leaf-40 and soap and pretty good pressure you can drive the nicotine through that woolly cover. The dilution is one pint to 100 gallons of water, with enough soap to make it as strong as necessary.

MR. KENDALL: I had two years experience in succession using Black Leaf-40 and soap solution as the previous speaker has mentioned, with success, on the woolly aphis.

THE CHAIRMAN: Were these young trees?

MR. KENDALL: Young trees, just set the year before, a year and two years old.

MR. NORRIS: I used nicotine with the soap, but possibly I did not have the pressure right. I used a Knapsack sprayer as I could not run the engine in that field, it was planted, a young orchard on it, and it did not take care of the woolly aphis, although it helped the green lice to a certain extent.

MR. DAVENPORT: I would like to say that when we use the nicotine solution alone we should use soap with it. I did not say anything about using soap with this combination spray as in that case the adding of soap would give us a dangerous mixture, but in using nicotine solution alone for plant lice or for red bug in separate spraying, we always use soap with it.

MR. NORRIS: It is almost impossible to get a good mixture without it.

MR. DAVENPORT: Yes, it does not spread at all, without the soap, nor is it as effective.

MR. ROGERS: You think it advisable to use nicotine for aphis without a very high pressure, for red bug or aphis, simply throwing away materials in other words without a very high pressure apparatus, got to strike them strong or not kill them.

MR. DAVENPORT: The more pressure we have the better work we are going to do in regard to the lice. Of

course we do not expect to kill them by simply hitting them, but must get the material on each one and thus we can do more thorough work with higher pressure.

(At this point the Chairman made further announcements about the inspection trip to be had in the afternoon).

MR. CLARKE: In regard to the lice and aphids it may seem rather a slow one-horse way, but on my young trees it is usually on one or two limbs that they work, not on the rest of them, and I have had good results in taking simply Ivory soap and making a good strong solution and dipping the ends in and it won't take long to go over a block of small trees. Simply a good strong solution of Ivory soap, it won't hurt anything, but does what you want, to get on the body of the insects that will harden there, a greasy substance, and close the breathing pores; that is all it is.

THE CHAIRMAN: One more for Ivory soap.

MR. CLARKE: Any good soap that will form a strong solution. We have our sprayer but I like to go over them with a dish in my hand, do better work, I think.

THE CHAIRMAN: Are there other questions? If not, do not forget at one o'clock sharp.

SEC'Y BROWN: Mr. Annin has a resolution to offer at this time.

MR. ANNIN: The Convention Bureau of the Board of Trade it seems to me has been especially courteous to our organization and to this meeting and I would like to offer a resolution that this Convention extend a vote of thanks to the Convention Bureau of the Board of Trade for all they have done for us in helping to make our meeting a success.

(Motion was seconded and carried unanimously.)

MR. MUNSON: There have been a number of men on our program that have not had any remuneration for their time and trouble and have given us their best efforts, and I think we should extend to each and every one of them a vote of thanks, having the Secretary acknowledge by letter their kind services.

(Motion was seconded and carried unanimously.)

(The meeting adjourned at this point.)

THE MARKET TRIP FRIDAY AFTERNOON

A party of about 50 people started from the Clinton Hall Hotel, and visited Rood and Woodbury's retail market first. Mr. Woodbury was prepared to speak to the people but as we were ahead of schedule we did not see him. We next visited the H. P. Stone Co. wholesale plant on Lyman Street where we asked many question of J. G. Maxfield, and got many good thoughts as to what the consuming public is demanding and better ways for us to cater to the public demand and make more money.

We next visited the H. J. Perkins Co. extensive plant at Market Square. You probably know that this plant is the largest of its kind, has the best facilities for handling fruit and produce in New England. We went throughout the plant studying the methods of curing bananas, roasting peanuts, and storing onions. We saw apples from many different sections of the country in different types of packages, and the party learned the great possibilities which lie before the New England fruit growers in growing more and better fruit for supplying their own local needs.

At the Eastern States Refrigerating Co. plant on Dwight Street, the party saw an extensive cold storage plant that had fruit of all kinds especially carloads of western fruit, eggs, meat, poultry products, ferns and the like. The party broke up at this point all satisfied with the afternoon program and feeling that they had been well repaid for the time and effort put into it.

STRAWBERRIES

Given by Charles W. Mann, Methuen at the Worcester Meeting, Feb. 1916.

Some two weeks ago our worthy Secretary invited me to read a paper on Strawberries and if possible to have it typewritten so that it could be read—easily. I did not write it, or typewrite it and all I can do today is to talk; if you can stand it, I can.

I have an excuse for appearing without a paper and I brought it with me and will now show it to you in the shape of three cartons of apples such as I have been packing from 50 to 100 per day for several weeks. If any of you are handling apples this winter, you know just how happy I am, for I picked 4000 barrels and am having a real good time selling them in the dullest market known for many a year, due partly to the foreign demand being 1,250,000 barrels less than last year, but that perhaps will teach us the lesson that our very best market for apples, as well as other fruit and produce is the **home** market, beginning with the man next door who does not grow his own and spreading out over your own town or city as far as we can conveniently cover with a horse. Then with a motor truck we can take in fifty miles more easily, and lastly, if we must ship by railroad or boat, do this only as a last resort, for good fruit, well ripened, requires better handling than it receives at the hands of the transportation companies.

Now, these little cartons holding about a tenth of a barrel, a little strong of a peck, have proved the means of

increasing my sales quite largely and at the same time increasing the use of fruit, for many a person will buy a neat package of attractive appearance and easily carried home when they would pass by the old dirty bushel box on the floor with its half rotten contents.

Excuse me, please, for talking apples so much, but you see for months I have been in my storage cellar among them till I am full of them and they say if a man keeps full of apples he will not get **full** of anything worse, but we will now tackle the strawberry.

If I had written that paper of course I should have begun with giving the name in a few dead and alive languages, date of discovery, etc., the same as the Professors do, but suffice it to say that it was created in the beginning, as we are told that all things were, and we read that "God might have made a better fruit but he never did." I do not say that this is in the "Good Book," but if you look there for it you may find other good things that will be of benefit. We have always had berries on our farm. The Boston Pine and Hovey's Seedlings being the first varieties that I recall. They were then hulled and packed in tight, round, wooden boxes with a close cover and sometimes sold as high as 40c a box.

When I first grew them, as a boy, I used to pick them so carefully that they needed no looking over, and sold them at the houses in the nearby city getting for the best ones as much as 25c a basket. In those days we had the round Beecher basket and others and used them as many times as we could get them back, turning them out into all sorts of dishes and pans. I planned to have them show as well or a little better when tipped out than they were on top of the baskets and I tried to follow that rule, since, though it is harder to do in a large way. I remember that one of my best customers was a brewer's family, but I never took my pay in trade. I have also followed that rule and find it a good one.

Strawberries will grow most anywhere. Don't go

without them because your land is not fit. Grow some for home use on such land as you have. If growing them extensively select good corn land, well drained and not in a frosty location. Somewhat stony land is no objection except as to extra labor and perhaps all fruit is of better keeping quality and flavor on such land. Newly reclaimed land is of the best even before all the stumps and stones are cleared. Always remember that it must be free from sod to be clear of white grubs as it is useless to set plants where they are plenty. Ground should be well prepared, very deeply plowed, for strawberries have long roots and will hold for a longer season in deep soil.

I seldom use much fertilizer or manure, but choose land that has been well enriched for previous crops.

The last smoothing of the bed I do with a brush harrow made of birch brush. The head pieces of plank, 8 feet long with a narrow one inch piece nailed on back edge of top. Take small birch tops 2 inches in diameter and 12 to 15 feet long, nailing to top of front planks and the inch piece makes it tip up a little so as to be a good leveler. The second cross piece may be a wider plank on top of birch which are nailed on the under side and about 3 feet back. This plank should be 9 feet long causing the back end to spread so as to smooth the ground under small trees without bruising them. Another 10 ft. piece may be nailed on the top 6 feet back. Driver stands on second cross piece and drives across the piece for the last smoothing so that it will mark more plainly for the rows. My berry ground, being generally among trees 20 feet each way, this harrow covers it at two trips between trees. This harrow is very quickly and cheaply made; brush must be renewed each year, and it will beat out the mostly costly tool in the market for good work and saving of time and without damaging trees.

It is very desirable to have rows straight and true as it helps in cultivating close to the plants. I made a marker from an old wheelbarrow frame by fastening three blocks on the wheel at equal distances apart so that it makes a good

mark every 19 inches, the wheel being about 18 inches in diameter. Then run it along straight in lines 4 feet apart and your land is marked for setting each plant just where you want it and so that a wayfaring man etc. cannot go wrong. But you ask how to go straight and it is very easy. Do just as you do to lead a straight life. Have an object ahead, and aim. Have a number of 4 feet sticks and set them in line for your first mark and so you can see from one to another, then keep your eyes on the bottom of the stick and go to it, setting it over for the next line as you pass it. It is very simple and easy after you know how and the same process can be used for other crops.

Holes for the plants are made with one stroke of a grub hoe. Plants are dug with the same tool or a manure fork and should be grown on rather heavy soil so that it will stick to the roots and not leave them bare while handling. They are carried, wheeled or carted in boxes, tubs, baskets, or anything we have handy to the new bed, generally using Florida orange boxes and if carried to any distance using a flour barrirel carrier so that two men can handle two or three boxes easily and quickly. Use great care in separating plants and **placing** in holes. Do not **throw** them or **drop** them two or three feet as that will start the dirt from the roots and lose time in their starting. Pull the dirt round the plants with hands and push it down hard so that they cannot be pulled up easily.

They should be set neither too deep nor too shallow, but just as they grew in the bed. Never cover the crowns. Plants set in this way will hardly stop growing and a quick start means a great advantage, especially in a late or dry season. They can be safely handled on a hot dry day and need little or no filling in or replacing later on. It costs more, perhaps, than the shaking out, dibber or spade process, but the money is well spent, and you are practically sure of a good full bed. If you must buy plants get them near enough, if possible to move them with dirt on. They are worth twice as much. Most plant men will gladly sell

them to you in this way but I have met cranks who insisted on shaking off all the dirt and doing as they always do, saying, "take them that way or you don't get them."

When sending to a distance for new varieties, of course we expect to get them bundled and packed in moss and then there is the clipping of roots and tops, the shaking out and separating roots, and continuous watering that makes a lot of work and expense at a season when time is precious.

Cultivating should begin almost as soon as set so that weeds do not get a start and ground will not dry out so quickly. They may be cultivated carefully two or three times before hoeing, but be sure not to throw dirt on to plants as they smother very easily.

We use six tine hoes, or potato diggers, as they leave the ground more mellow and to a greater depth, giving just the deep mulch that is needed. Remember that all blossoms or buds must be picked off when setting if they show and when hoeing as well, for the plant needs all its strength to make runners and growth without producing fruit the first season.

We usually cut runners at first hoeing and after that place them so they will be separated, so that plants will not be too thick and cause small soft fruit.

Keep beds clear of weeds and ground mellow to a depth of three or four inches through the season. If paths are grown in too much, cut them out before covering, except perhaps enough for next year's setting and they are better grown in plant beds than in fruiting beds.

Cover when ground is frozen enough to bear a team without tracking. If snow has fallen, it will do no harm to spread it on top. Where snow comes early and stays late they will winter without covering, but the danger will be in freezing and thawing after the snow has gone. Also of starting early so as to be caught by a late frost, when in bloom and this should be avoided most carefully.

Pine needles are very nice for cover, if they can be obtained at reasonable cost and in sufficient quantity. Meadow

hay, if cut after seed has fallen will do if coarse, but if fine will likely smother the plants. I find for large beds good clean wheat straw to be all right and when bought by ear load from some well kept, clean farm is not too costly. Ordinary baled oat straw, cheap hay horse manure is so full of foul seed that it often destroys a bed rather than saving it. Just enough light, loose, clean material to put the plants mostly out of sight is what is needed. Do not bury and smother them. If you must put it on heavy anywhere, put it in the path where it will keep the weeds down and the soil moist.

When should covering be taken off? Do not take it off, for when it ceases to be needed as **cover** it is wanted for **mulch**. When it is time in the Spring for plants to start, stir up the covering so they can push their way through and with a little attention to see that the wind does not mix things up, they will be all right till picking time when you will find your berries larger, cleaner, and your season longer than by the method of removing and cultivating as often done. If weeds come through the mulch they can be pulled or lightly hoed.

Now we come to picking time, when we are to obtain our reward according to the care and knowledge and labor that we have expended. First, raise your pickers, is a good rule for the successful strawberry grower. The crop that can be handled by the home gang shows the best net return. With a large crop we must use such help as we can get, usually men, sometimes women, and children, if we must. We pay by the hour as a large number cannot be depended upon to do good work by the piece and will not be satisfied when berries are scarce. We begin work at daylight and stop when too dark to see the berries, from 4 o'clock A. M. to 8 o'clock P. M. Take a long rest at noon if very hot.

If help is plenty all the picking should be done in the morning and no berries be kept over night. If picked in the heat of midday, they should be near market and be used the same day.

We use 8 basket carriers, end pieces of $\frac{3}{4}$ in. board, $5\frac{1}{2}$ in. x $11\frac{1}{2}$ in., bottom of two pieces of California orange box boards 2 in. long, and a piece of lath on the side near the bottom just to keep the basket from slipping; the handles are $\frac{3}{4}$ in. x 2 in. x 2 in. and nailed on middle of top. These are light and handy and can be cross piled when filled.

The pickers **pick** and **pick** only. Other men fill the carriers with empty baskets, take them to the pickers and return to the wagon with the full ones, or pile them in the shade until the team comes to take them to the barn floor 60x12 where they are prepared for market. The barn is not used for cattle, has large doors open at each end and is as cool as any place on the farm in which to handle the fruit. Telephone and electric lights are there and house is near and it is really quite a busy place when 2000 to 5000 baskets a day are going through. The good wife with her helpers sorts and arranges the berries on large tables, placing a label over the middle of each basket. These labels are 1 in. wide, 10 in. long, of white paper with "Mann" printed in blue ink on the middle and the combination of colors, red, white and blue is very popular in this country. This label not only shows whose fruit it is, but also means that I will replace any found unsatisfactory and I often go as far as to help out a dealer who buys too heavily and loses by keeping too long. This is not only good treatment of the trade, but is good business; it pays. A little dab of paste on each end of the label sticks it on each side of basket so that it holds just above the berries.

Berries are packed in lightly built trays holding 20 baskets each, 5 baskets long and 4 wide. They are painted green with a good gloss and as near a foliage shade as possible and always find their place in the center of the show window in the store and fruit stands, attracting the attention of every passer by and outselling the old style crate stock over and over again. Much time is saved in selling in these 20 qt. trays as it is very easy for all sorts of people to figure 20 times any price, while taking a lot of time and

paper and pencil to reckon 32 or 48 or 24 times. With a large amount to handle every minute saved is valuable. In these trays the berries are not crushed as in the old crates by the weight of layers above them. They are made deep enough to allow well filled baskets that do not have to be tipped over and filled up by the retailer. They interlock, something like a sectional bookcase so that they pile safely 10 high, and take less room than crates. Berries can be handled much riper in trays than crates and the riper they are, without being soft, the sweeter and richer flavor they have and the better satisfaction they give. For a distant market they should be picked hard ripe. Now I cannot show you one of these trays filled with strawberries at this time, but I have used small Baldwin apples in place of them and you can see the effect; only **imagine** they **are** strawberries.

I have found the transportation of sun ripened fruit one of the hardest problems that I have met and I have solved it by the use of added springs and decks on wagons and trucks. My wagon that takes the berries from the field to the packing floor has a deck set on several dozen spiral springs and my ton and a half **White** truck has a body built with four sets of springs of varying stiffness between the floors so that there is no jar or shake to the load; it rides like a boat on the water.

Ordinary wagon springs are stiff and hard riding, even at slow speed, unless loaded enough to bring them down, and every bump tends to shake down and bruise the fruit. My truck floor is so delicately, yet strongly supported, that there is no jar or damage whether one tray or eighty are carried; whether the trip is five minutes to the nearest store, or two hours to Boston market; two miles or 30 miles. The people of Boston show the least sense in the management of their street department of any city I ever drove into on wheels. They have the most delightfully smooth, wide and well cared for boulevards for pleasure and light travel, upon which even a light truck going to a "New England Fruit

Show" with prize apples will be held up, but the main line of entrance for the farmer to haul produce **in** over and his supplies **out** over are the abomination of abominations; worse than the **way** of the transgressor, which is said to be especially hard. Rutherford Ave. in its disreputable condition adds many a thousand dollars yearly to the cost of fresh country produce, milk distribution and all other business forced to use it.

Boston gives much to foreign missions along with the rum they ship to the natives, but they would save more profanity and evil thought among their own people by looking more carefully after their own bad **ways**. The high cost of living in that city, and perhaps others, is a great measure due to poor roads. I am glad to see that the **ways** of Worcester are better **ways**.

Please excuse me for this seeming digression, but it is only seeming, for the road to market has much to do with the returns for the farmers' hard work and especially so with the strawberry crop.

I have omitted a discussion of varieties. That is a subject for a half day of itself, and is governed by soil and location so largely that I should hardly care to advise, only I will say that I have grown more "Samples" than any other kind and that there is no better table berry than the "First Quality."

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MASSACHUSETTS
FRUIT GROWERS'
ASSOCIATION, INC.



REPORT OF THE
24th Annual Convention
HELD IN
HORTICULTURAL HALL, WORCESTER
1918

Published by
The Massachusetts Fruit Growers' Assn., Inc.

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Twenty Fourth Annual Convention
OF THE
Massachusetts Fruit Growers' Association, Inc.

Horticultural Hall, Worcester, Massachusetts.

February 26 and 27, 1918.

Morning Session.

Pres. Margeson in the Chair.

THE PRESIDENT: Gentlemen, the hour has arrived to open the meeting of the Massachusetts Fruit Growers' Association. First will be a report from Chairman Stevens of Committee on Memorials.

DEATHS REPORTED SINCE LAST MEETING.

Allen, W. O., Northboro
Bogue, Nelson, Batavia, N. Y.
Brierley, Benjamin, Stratham, N. H.
Butterfield, E. S., Brimfield
Cole, E. E., Boston
Derby, Alden, Leominster
Fuller, Horace C., Leominster
Locke, James E., Belmont
Prescott, Charles W., Concord
Russell, Fred A., Methuen
Sherman, Ellsworth P., Marlboro

It was moved and seconded that the report of the committee on Memorials be accepted. The motion was carried.

THE PRESIDENT: Now we will have a report from our Auditor, H. Ward Moore.

AUDITOR'S REPORT.

Worcester, Mass., Feb. 26, 1918.

I hereby certify that I have examined the accounts of F. Howard Brown, Treasurer of the Massachusetts Fruit Growers' Association, Inc., and find them correct, with the cash and funds properly deposited or accounted for.

(Signed) H. WARD MOORE,

Auditor

It was moved and seconded that the report of the auditor be received. Motion carried.

THE PRESIDENT: Now, we will hear the report of our Treasurer, Mr. Brown.

TREASURER'S REPORT (Condensed) Feb 26, 1918

RECEIPTS.

1917		
Feb. 27	Cash in National Bank	\$550.73
	Permanent Fund in Savings	
	Bank,	802.90
	Interest on Permanent Fund	84.93
	Eastern States Prize	50.00
	Balance on above exhibit	4.04
	Letterheads sold	4.00
	Memberships to Jan. 30, 1918	274.00
		<hr/>
		\$1770.60

(Rec'd memberships since Jan. 30, 1918, \$170.)

EXPENSES.

1918		
Feb. 26	Cash in National Bank	\$269.21
	Cash in Savings Bank	302.90
	Liberty Loan Bond	500.00
	Expenses	698.49
		\$1770.60

Mr. Brown explained various items of the treasurer's report, which was accepted.

SECRETARY'S REPORT

Feb. 26, 1918

The secretary will be as concise as possible as there are many valuable papers to follow. The 1917 Report came very near being among the missing till the middle of the summer. Following the usual custom the speakers corrected the copy of their section and returned it to the Secretary whence it went to the printer, who kept things moving there. Envelopes, already stamped and addressed to those who were paid up for 1917 were sent to the bindery as usual and just as soon as the book was off the press it went to the members. Some copies were sent by express to the Secretary and the balance came by freight and went astray, finally showing up in Marlboro without any bill of lading. However we obtained delivery and some two months later a freight bill showed up and was paid.

We have always issued our reports very promptly and though delayed till after the annual meeting last year we believe we were still ahead of the other fruit associations. We certainly were lucky that all the reports did not go by freight.

The new Association letterhead with fruit design in two colors was sent out with the spray notice on it but apparently every one got so busy spraying that they did not have

time to write letters, for only two orders were filled, with one on the waiting list.

At a meeting at the State House of the Executive Committee of the Massachusetts Fruit Growers' Association with the Orcharding Committee of the Board of Agriculture it was decided to recommend to the Board to issue a circular on "Fruit as Food" to increase the consumption of fruit by calling attention to its uses and giving the Massachusetts season and best canning week. Samples of these circulars were sent to our members and many were distributed with packages of fruit, having been obtained free from the State Board of Agriculture.

The Liberty Loan Committee asked us to write a letter to our membership, urging all to buy bonds and they paid the expense of issuing the letter. Following the advice of the letter the officers bought a \$500 bond for the Permanent Fund, leaving some \$303 still in the Savings Bank.

As one of our Vice Presidents was Superintendent of Fruits at the Eastern States Exposition he obtained sanction to enter our Association in the State Competition, with the result of winning the second prize of \$50 and the banner hanging over yonder. A balance of \$4.04 was also turned in from sales of fruit. Certainly great credit is due Vice President Jenks for his work in rustling up this exhibit. The apples in the exhibit of the State Board of Agriculture were grown by one of our members and of course most of the regular entries were from our members.

The Massachusetts exhibit at the New England Fruit Show at Boston was entirely grown by our members. The exhibits of New England grown fruit rather opened the eyes of some of our western brothers who were attending the sessions of the American Pomological Society.

By vote of the executive committee the January convention was combined with the February annual meeting, but making the latter a two day session. This seemed wise as the State Grange and Board of Agriculture had both already met in Worcester and meetings this year are not usually so

well attended. In fact one of our New England societies will not publish its report this year from lack of funds. The Secretary would urge all members to pay their \$1 promptly and make a special drive for a new member. Remember we have a member who always gets at least one new member every year since he joined. How many have you brought in?

Owing largely to labor conditions no field meetings were held the past season.

The executive committee recommend to remit dues of members in the service for duration of the war. How many barrels of apples of the 1918 crop will you donate to the soldiers overseas f. o. b. your station, or the Secretary would suggest a special committee to develop this, believing the Boston Red Cross or Y. M. C. A. will see to the delivery "over there".

The executive committee recently met with the State Food Administration regarding the sugar situation for preserving fruit this summer and asked for 50 lbs. per family for canning. Apparently the Government looks favorably on this use of sugar and the latest word on the subject will be given this evening. Meanwhile tap your sugar maples.

The Secretary had the pleasure of attending the meeting of the New York State Fruit Growers at Rochester and certainly the scale of their trade exhibits is inspiring though war conditions are affecting matters even here. Tractors and spray guns were the head liners for drawing interest. The fruit exhibit was much smaller than usual as was the attendance at the lectures. These are open only to members and two dollars dues must be paid in before entering. How would our members like that scheme here? All right then, bring along that new member. We need him this year and **NOW**. Of course we cannot expect the peach growers to join this year for all New England and the Hudson Valley are entirely wiped out even to Rochester and down to central New Jersey. So bring in the apple and small fruit men and bring them in strong for we need them to help publish

the report.

The Secretary would recommend the nomination of the State Vice President of the New England Fruit Show as an annual affair. This office has always been held very capably by Professor F. C. Sears. The nomination is confirmed by election at the annual meeting of the New England Fruit Show.

The Secretary would suggest that some means be devised whereby emergency news may be transmitted to members to prevent loss. Last year much spraying was not done to best advantage because insects appeared differently than was expected, while spraying went on as usual. Can we not have warnings from the College via the Farm Bureaus by request?

Respectfully submitted,

F. HOWARD BROWN

Moved and seconded that the report of the Secretary be accepted.

The motion was carried.

VICE PRES. MUNSON: Is it out of place here to take up the matter of emergency news being forwarded to members?

THE PRESIDENT: Yes. That should come under new business. At this time we will be pleased to hear from Mr. R. Edwards Annin, Jr., Apple Grading Inspector, on the "Latest Report of the Massachusetts Apple Grading Law." We will be glad to hear from Mr. Annin, who comes from the State Board of Agriculture and who will have something interesting to say to us at this time.

LATEST REPORT ON THE MASSACHUSETTS APPLE GRADING LAW.

Mr R. Edwards Annin, Jr.

Mr. Chairman and Members of the Fruit Growers' Association: This is the third successive year in which you have

paid the Board of Agriculture the compliment of having some one here to address you on the Massachusetts Apple Grading Law, and for that reason I am not going to detain you long, because it is rather a dry subject and you have much more interesting subjects on your program, and much more interesting speakers.

I think it is fair to assume that by this time the members of this Association are fairly familiar with the provisions of the Massachusetts Apple Grading Law, and it will not be necessary for me to talk about them. I do want to talk to you for a few moments about certain points that have come up this year and about several suggestions and criticisms that we have had about the law, and I would like to get an expression of opinion from this meeting on some of those points.

The growth in popularity of the open Boston bushel box is gradually making the barrel a less and less used package in this part of the state. For that reason, less inspection, on the grading law was required this year in the Boston market than there was last year. The automobile truck, I think, has had a very large effect in making the bushel box more popular, and a great many more apples are coming into Boston in this package every year from as far away as 50 miles.

I had a talk with a member of this Association out in Hudson during the apple picking season—one of the biggest and best apple growers in this state—and he told me he did not have a barrel on his place,—and he was using the bushel box entirely, even for apples that he kept all winter, like the Roxbury Russets.

For that reason the principal part of the inspection work has been in the big apple growing section in this state, up in Franklin County. As you know, that section, as far as shipping goes, extends from about Greenfield to Charlemont on the Fitchburg Road, and we have been surprised to find what a wide distribution over the Northeastern part of the United States those apples had.

You have heard the remark made a great many times, "We do not raise enough apples for our own people here" and I think it is probably true, but still we do export a great many apples.

The following table gives the number of cars and their destination up to about Dec. 15, shipped out of Franklin County. I think this will give you some idea of the wide distribution of this crop.

Shipments of Apples From Franklin County, October, November and December.

Destination	Number of Cars
Hartford	1
Ansonia	1
Mantine, Ill.	1
Bennett, Iowa	2
Baltimore	2
Cleveland	2
North Lonawanda. N. Y.	3
Boston	5
Springfield	5
Holyoke	10
Detroit	11
New Haven	11
Troy	17
Newfane, N. Y.	20
Providence	25
Indianapolis	27
Philadelphia	29
New York City	34
Chicago	47
Ballston Spa., N. Y.	57

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So you see that Chicago, with the exception of Ballston New York—where there is a large storage house—Chicago took about 16% of these apples from Franklin County; and

Boston took less than one per cent of them on direct shipments.

Now, most of the apples in Franklin County are packed by the buyer. In a year like 1917 when the crop in New York State was light, the buyers were very numerous and there was keen competition between them and the grower who sold in the fall got a fairly good price, and I think had reason to be satisfied.

Now, of course, Franklin County is near two state lines, and in enforcing a law which only has jurisdiction over this state, that point is sometimes of importance. There is keen competition between the buyers and sometimes there is keen competition to see that the law is enforced against the other fellow. I remember one of our inspectors telling about walking up the tracks at Shelburne Falls and meeting an apple buyer whom he knew slightly. The apple buyer said, "Now, I want to see you succeed up here and see you do well. This law is all right, but you are not giving satisfaction. You are not strict enough. Now, you had so and so down at Shelburne Falls station and his apples were marked wrong and you let him remark them. Another man up at another station had his apples marked wrong and you let him repack them. Now, I want to tell you that people are not satisfied."

"Well," the inspector said, "I will represent the buyers down at Shelburne Falls by the letters A and B; I will represent the buyers up at the next station as C and D; and those at Colerain, as E and F. Now, A would like to see B safe in jail; B would like to see A in jail; C and D and E and F have the same feeling toward each other, but none would like to see himself in jail.

Now, that just illustrates something we have to look out for occasionally.—that some of these buyers are very anxious to have this law very strictly enforced against the other man.

This year we have had to actually prosecute for violations of the law. We have had only a few cases come to

court,—to be exact, just four. Three of them we have won, and the other, no decision has as yet been rendered on, though it was tried two months ago.

One of the cases might be of interest to you. There is a provision in the law that no mark shall be put on the barrel which is inconsistent with or more conspicuous than the marks required by law. One firm we had to prosecute had a stencil made in which the principal word, the word that struck you most, looking at the barrel, was the word "selected" and down a little further on the barrel in smaller type was "ungraded". Above "selected" was "extra"; so the complete stencil read "extra, selected, ungraded". We claimed the word "selected" and the word "ungraded" are two words that are mutually exclusive in the English language. Apples can be ungraded or selected, but they cannot be both at the same time.

Counsel for the defense had a very interesting argument that there were a number of different kinds of ungraded apples,—poor ungraded, medium graded and this particular brand of ungraded which was called "extra, selected, ungraded."

The Court did not look with favor on the contention, and we won the case.

Now, one very important matter, one rather interesting matter we have had to meet is the relation of the Massachusetts law to the so called Sulzer bill, the Federal apple grading law. That was passed in 1912 before there were any state apple grading laws. The Federal apple grading law is not a compulsory measure. It is simply an optional measure. The most important section of the law says: "Any person who packs apples under this law may so mark them" but nobody has to pack under it.

Now, after some of the packers in certain sections of the state found that the Massachusetts law had teeth in it, they thought they could get around the Massachusetts law by packing the same kind of stuff, but marking them under the Federal law.

Our contention has been this: That if apples were packed in accordance with the Federal law, then they were exempt from the provisions of our law, because, of course, a state statute has got to give way when it conflicts with a Federal statute, but, in order to be exempt from jurisdiction of our laws apples have got to be packed in accordance with the Federal law, not in violation of the Federal law. There is a difference of opinion on that question, and people who had the other opinion thought that they could pack anything under the Federal law. That is, they could pack any kind of apple and pack it under the Federal law and we would not have a right to look at it, even.

Now, who is right we do not yet know. We tried a case on those facts on the 20th of last December, but we have not yet had a decision.

We have found the Apple Grading law is bringing about this result in some instances; namely that buyers are beginning to specify Massachusetts standard grades when they buy apples.

The reason for it is this: They know that if the apples don't come up to the specifications that they can call in the state inspection service as sort of umpire, and it can be decided whether those apples come up to contract or not. I think that is one of the principal advantages that this question of grading is going to have. It makes a grade that is a standard and everybody knows has certain fixed requirements so that buyers and sellers can, when they are buying by written contract, simply state "A-grade apples" and no further description is necessary. In a number of cases we have been called in this year to decide whether apples came up to specification. I think that method of buying will be developed considerably further.

In going over the territory in Bristol County down in South-Eastern Massachusetts this year, we found a section there had a large consuming population. I think the four cities, alone, in Bristol County have a population of over 300,000, but comparatively few Massachusetts apples are sold

there. It is an unimportant apple-producing section, and they get a large proportion of apples from Maine, New Hampshire and New York. A number of the dealers down there have been complaining of the quality of the apples that they have been getting; and we have tried to emphasize this point to them: That if they will buy Massachusetts apples they will be protected, because being in the same state, they can, if they feel they are aggrieved have recourse to the state inspection service. I feel that you fruit growers ought to develop that territory down in Southeastern Massachusetts. I think it needs some good apples and a little selling brains to develop that market. I hope to see more Massachusetts apples sold there next year.

Now, there are three or four minor amendments being made in the law this year. None of those amendments have anything to do with the grades. They are merely small administrative changes in the law. The only change of any importance is one of increasing the fine, which is now \$100. **for a second offense—we haven't yet had a second offense—to \$200**, for the reason that we feel that a fine of \$100 is rather small to deter a big buyer, and a good deal of trouble in enforcing this law comes from the big dealers in shipping out apples not packed up to the standard. On a car of apples containing 200 barrels, a maximum fine of \$100 is only about 50 cents a barrel. Of course, we can only take one barrel as a sample. We cannot bring a whole car into court and we feel that the fine is rather small, that a really more substantial fine should be put there, and the Legislature now has that subject under consideration.

Now, there has been three or four suggestions as to changes in the law. Some of them are from members of this Association. I cannot find, as yet, any overwhelming demand for any particular change in the law. However, I do not know of any better time than now, right here, for the members of the Fruit Growers' Association to state what they think of some of these changes, and there are just three of them that there seems to be considerable demand

for, and I have framed them in the form of questions that I would like to put to you and get an expression of opinion of this body on.

First, shall the term "Ungraded" be changed to "Unclassified"? Now, in Maine, where the law was passed about a year before us, they used the term "Unclassified" instead of "Ungraded". The objection that has been made to the term "Ungraded" is this: That some growers don't grade their apples at all and mark them "Ungraded," so they are really orchard run—some very good apples and some very poor apples in them.

Other growers take out their fancies, take out their A, and perhaps even take out all three grades, then the culls which are left, are marked "Ungraded". Therefore, the man who is packing orchard run comes into competition with the man who is packing culls,—both under the same mark. I think I mentioned this when I spoke on the point last year.

Now, there are two ways to change that. First, perhaps you can change the term "Ungraded" to some other term that will be more satisfactory. Second, another grade might be added, but, that, in my opinion, would be very unfortunate. I think this law should be kept as simple as possible. I feel the addition of another grade would simply make for further complication. Over in New York they have added another grade. They redrafted their law last year and now have "fancy," "A," "B" and "C" and "Ungraded". The "C" grade, however, has not been used to any extent, and I do not believe it will be used to any extent. Personally, I feel very strongly that the addition of another grade would be unfortunate in this law.

Now the second suggestion which has been made is this: That the size for fancy Baldwins, which is now $2\frac{3}{4}$ inches, should be reduced to $2\frac{1}{2}$ inches; and there seems to be a square difference of opinion on that. We have had considerable correspondence with a number of growers and dealers all over the state on it so far, the answers are just about

half in favor of a change and half opposed to it. There has been a feeling that an apple which was strictly fancy as to color, as to shape and as to variety characteristics, but which was only 2½ inches in size—I am speaking of the Baldwin variety—should be admitted to the fancy grade. On the other hand, some people feel that size is an important qualification in the term “fancy” and that there should be no change.

Now, the third amendment suggested is this: That the apples in the A grade and B grade should be hand picked. When the law was first passed in 1915 the words “hand picked” were in the specification on the A and B grade. The following year, 1916, before the law went into effect as a compulsory law, those words were taken out; and they were taken out for reasons that seemed good to the Legislature and the people who advocated taking them out.

Now, the great trouble in this state it seems to me in putting the words “hand picked” into those two grades is this: That with some of our summer and fall varieties,—notably Gravenstein, which is an important variety in the state, the apples are not picked, but they are put under the tree and the apples allowed to drop, they are apples that are going to be consumed by the first or middle of November, and there really seems to me to be no objection to letting them go into the A grade. I feel it would be an injustice to force all such apples into the ungraded class simply because they were not hand picked, and it seems to me that the point is covered in this way, that if they are bruised or materially injured then they cannot go into the A or B grade. I do not see why that does not cover the point.

MR. DAVENPORT: I would like to ask how many of those Gravensteins are put up in barrels or in boxes so they would have to come under the law?

MR. ANNIN: Very few.

MR. DAVENPORT: I was under the impression that there was a large percentage of them put in open boxes and baskets which wouldn't come under the law, anyway. It

appears to me that we really should call our A and B hand picked, and then, if we want to, make an exception in the case of certain apples, like Gravensteins, where hay is used—I know of a case a year ago, where a party bought an orchard of fruit and they were put in storage and the people that picked the apples sent a man in the fall who picked up the best ones from the ground and put them in with the barrels of fruit and they went to storage, and as a result when those apples came out there was a very large percentage of poor apples. They were justified in doing that because the law did not state they had to be hand picked, and it seems to me from the standpoint of the man who owns, who stores the apples, the commission man's standpoint, he ought to have some protection on that point.

MR. ANNIN: In regard to the packing of Gravensteins I would say that from my own experience and knowledge very few Gravensteins that are consumed in the Boston market are packed in barrels, but in ordinary times a good many Gravensteins are exported, and exported in boxes with slatted or closed tops. Of course, this year there has been no exporting.

MR. DAVENPORT: Would they export a Gravenstein apple that is dropped that way?

MR. ANNIN: I think they might; yes, in early September. Now, perhaps we can come back to that point for discussion; but suppose we take the second point of reducing the minimum size for fancy Baldwin varieties from $2\frac{3}{4}$ inches to $2\frac{1}{2}$ inches. This is a matter not fixed in the law. The Secretary of the State Board of Agriculture is empowered to fix regulations for the color and size. And after a hearing about two years ago the sizes were fixed.

Just one other point I want to say about that: It seems to me that unless there is a pretty large sentiment in favor of doing it that it would be rather unfair to people who have made their stencils for this law with the word "ungraded," to compel them now, after the law has been in operation only a couple of years, to change it to "unclassified."

It seems to me if that change is to be made, it had better be made by allowing the people the option of using either "ungraded" or "unclassified" for the first year anyway.

MR. STOCKWELL: I would like to ask what is the difference between "ungraded" and "unclassified," generally speaking.

MR. ANNIN: I personally do not see a great deal of difference.

THE PRESIDENT: As I understand the way Mr. Annin has put it, the members might be given the privilege to use either "ungraded" or "unclassified".

MR. ANNIN: How many are in favor of a gradual change from "ungraded" to "unclassified," say the change taking place over a year?

MR. STOCKWELL: I would like to ask one question before I would be able to vote intelligently. If people in general do not know the difference between "classified" and "graded" what is the use of making any change? How would it protect me any more? How would it protect me to say "classified" any more than it would "graded"?

MR. ANNIN: I wish you would ask that question of somebody who is in favor of making the change. Personally I am not in favor of making the change; but if the apple trade wants to make the change, I think it ought to be made, but not otherwise.

MR. STOCKWELL: Supposing a man has the privilege of putting "classified" on it? Please tell me how it affects me any or how it is an advantage to the consumer? We ought to know so we could vote intelligently.

MR. PALMER: We have had this in New York state both ways. We started it with "unclassified," went to "ungraded," and now gone back to "unclassified."

The answer to this first question is very simple. Last year we packed apples all ungraded. The point is the word did not signify what they were. All the large wormy apples for instance, went down in one grade, and the small wormy apples, according to the size, and three grades of imperfect

apples. In general, the large orchard operations in New York packed by this scheme. They were very carefully graded and marked, however, "Ungraded."

To avoid that point what they want to do is to put in a word which would signify not that they had not been graded, but that they were not one of the primary classes. They weren't classified,—you take your chances on them.

MR. ANNIN: Isn't "classified" about the same as as "graded"?

MR. PALMER: I do not think so. You do not use the word "classifying" apples; you use the word "grading" apples. Grading apples is an operation in itself. The use of the word "ungraded," that means you haven't graded them. You don't class apples.

MR. STOCKWELL: If it doesn't make any difference the less complication the better.

PROFESSOR CHENOWETH: The only objection to the word "ungraded" is the fact that it works a hardship somewhere. There is the man who has 20 barrels of apples and who can't afford to grade them. Another man has 100 barrels of apples and he grades his. What goes into his ungraded are culls, and yet the first man's ungraded barrel is a pretty good class of apples. Yet they both go on the market under the same brand. It seems to me both the consumer and the producer ought to be protected, because if the apples are worth more in one case to the producer the words "ungraded" and "unclassified" ought to be applied, if that be a legitimate protection.

MR. PALMER: Wouldn't it be possible to add on to cover those cases a small stamp saying "orchard run," for instance as is done frequently in New York? "Unclassified" or "ungraded" and then "orchard run." That would cover that point.

THE PRESIDENT: The time has now come where we will have to change the subject and take up the next speaker.

MR. ANNIN: I see ten people in favor of changing "ungraded" to "unclassified". How many are in favor of

leaving the law as it stands on that point? How many are in favor of adding another grade?—three.

I do not want to take up any more of Mr. Selby's time. In conclusion I may say that this question of the grading of the farm products is one that is spreading very rapidly. We now have 16 states in the United States that have an apple grading law and there may be more. The principle is being extended to other products. Only about a month ago the National Onion Growers Association at its meeting in Ohio adopted some grades for onions, which they have submitted to the Federal Bureau of Markets for their approval. The New Jersey Bureau of Markets is doing some work on grading of potatoes. They have not given it legal sanction as yet, but are doing some of the educational work. I feel that the principle is spreading and that the principle is a sound one and that if all growers of the state will continue to give the law the support that they have, and give the inspection service the co-operation that they have, that our apple grading law will be a tremendous benefit to apple growing in this state.

THE PRESIDENT: Is Mr. Selby present?

MARKETING PROBLEMS AND THEIR POSSIBLE SOLUTION

Mr. Howard W. Selby, Springfield.

The previous speaker made a splendid introduction and beginning to this discussion—the question of marketing. The grading is the one fundamental, as we find it, in beginning to attempt any solution in this respect. I am finding that in the states where they are adopting grading laws it is being taken up gradually and with splendid results by those who are following it closely and carefully and taking the real advantage that comes from following carefully and closely the grading laws. Those men are the ones with the active business foresight, who are letting it be known to the public that their apples are not only graded, but they are put up under a brand name and they are taking a cash benefit to themselves by establishing a reputation on their personal brand marks.

Now, there was one remark made by the previous speaker relative to apples in Franklin County which especially attracted and interested me. It was the fact that such a large proportion of those shipments went to Chicago, to Indianapolis, down to Philadelphia and all over the other parts of the United States.

Six percent, if I have the figures correctly—of the apples produced in the United States are raised within the New England states; while 16 or possibly 18 percent of the population of the United States live within the borders of the six New England states. There is, therefore, it would seem a possibility of developing the apple industry in this

section threefold. After we have reached that degree, there is the opportunity of applying such information as Professor Chenoweth will give you this afternoon for developing an increased consumption on the part of the public so that they will know the value of the product which you are placing before them rather than placing your products there without the benefit of information and advertising such things. The people will continue to eat the small amount of the fruit, as they are doing today, but the possibilities for developing that line I note are to be brought out in another talk here this afternoon.

There are plenty of problems confronting the growers here in the East, but no greater than the problems which confronted those who faced the same conditions in the West just a few years back.

In looking over the development, in the study of market conditions and the development of organization work, we find it was only 11 years ago that the California Fruit Growers Exchange was organized. Since that time we have noticed there has been a great increase in the number of orange trees planted, and also in the consumption of oranges in all parts of the United States. When that exchange began operation in California, the business was considered so terribly on the toboggan that it was hopeless. In the 10 years of their existence they have increased the output of oranges by 71 percent, during which period the population of the country increased only 21 percent; but the people who were producing oranges out there 10 years ago were confident of the fact that the people of the country were over supplied with oranges at that time. Nevertheless, they have boomed and boosted their business until today there has been that great development and forward movement.

In only five or six years time in the development of the Florida Citrous Growers' Exchange, there has been a transformation in the planting of orange trees in Florida until today there is more than 100 percent increase, I am told, in

the number of orange trees that are planted out in that state.

We see what is coming in the line of fruit consumption in the next 10 years. People are going to be educated to eat more oranges. They are going to be taught and educated on the line of the medical and food values of oranges.

Now, then, what are we going to do in this section of the country with regard to the development of similar ideas in the minds of the consuming public on the food value and health value of apples? I believe that we have just as great a field, if not a greater one for development for that subject. I believe that a greater number of people will take to apples, making a more general use of apples, than they will of oranges if we will adopt some of the principles and some of the methods which the people in that part of the country have applied to making business out of their production.

There are other questions which come in, and advertising may be considered by you as merely supplemental. I admit that the grading is fundamental,—that we must have the production of the fruit. Some people have said, “How are you going to encourage better marketing facilities or greater organization work here in New England, without an increased production in the line of fruit?” It is true we are far short on the supply, but even with the present supply there are opportunities for the men making far greater savings in the business transactions and the marketing of that fruit than they are doing today.

The men who ship those apples from Franklin County to Chicago possibly receive a greater return on that fruit by shipping it to Chicago, but that should not have been the case. The people of New England should have consumed those apples, because if my figures are correct—and I believe they are—less than six percent, or approximately six percent, of the apples are produced in this area where from 16 to 18 percent of the population dwell.

Is it not logical that all of those apples should have

been consumed right here in New England and the money which went for that excess transportation in carrying them 1,000 to 1,500 miles away from the point of production should have gone into the pockets of the producer back on the farm, instead of being added to that cost which was necessary in selling those apples out on the Chicago market? Now, the question of packing is one that appeals to you and one which Mr. Annin has handled very fully and completely. The packing as it is done in the section where that work is developed has been mighty interesting. We go on to our local market here, and while there is a grading law, and while those laws are being followed carefully, yet there is a difference in the idea and opinion, as was suggested, relative to the color. We do not find the same uniformity and type when it is the individual doing his packing alone.

We find how that was overcome up in the Oregon and Washington section and down in California by their central packing establishments. It has worked successfully so that when a man wants to buy a carload of apples from anyone of those exchanges he knows that they can be bought safely by telegram or telephone. Can that same man on the Boston market or the Springfield market or any other market in New England buy your apples by telephone and buy them safely? There are a few whose apples he can buy safely in that manner, but they are in the minority,—they are in the very small minority.

Men here apply business to their farms as best it can be done by individuals, but we have not yet developed that co-operative spirit, it seems to me, in this part of the country, that is booming agriculture and booming the fruit industry in every other portion of the country.

When it comes to that question of transportation, we had an interesting letter come in this last week from a man in the central part of Connecticut who was interested in growing apples. He said he was interested in the work of developing central exchanges in this part of the country because he had suffered losses about long enough by the

overlapping in transportation.

He cited an instance of a short while back when a carload of apples were shipped from his station up to the central part of Maine, and a carload of the same variety and the same grade of apples came from a nearby point in Maine down to the same shipping station in Connecticut. That may be an unusual incident, but we do know those cars are coming from within a few miles of the source of production in Massachusetts, and we know Massachusetts fruit, instead of being used locally is going to the Central West and down to Philadelphia and to the other sections of the United States.

Now, it is not only unpatriotic, but it is terribly unbusiness like. We are using railroads in a most unbusinesslike manner today for the shipment of the products of your orchards. That needless transportation is taking place while needless transportation is also bringing apples down from Maine. While they are started from Maine they might go on through, but it is not necessary for them to go through if those figures that I want to impress on your mind are correct, and they are Government figures.

When it comes to the production of peaches here, your men have apparently been very greatly discouraged in years that were past because they have contended that their supply of peaches has been a tremendous glut on the market. In figuring the supply of peaches produced in New England, I find that less than one percent of the total production of peaches in the United States are produced in the area of these six states.

I met a pessimist in this hall Friday, when I spoke before the Worcester County Horticultural Society, who said that peaches could not be produced in this part of the country. I have been busying myself looking up statistics since then and the figures that I have show that the production of peaches,—the yield of peaches in the state of Massachusetts is equal to the yield in the state of Connecticut, is greater than the yield in the state of Michigan, and is very

slightly less than the yield, per acre, in the state of New York. Those are all practically in the same latitude with this same section through here.

I know that climatic conditions have something to do with it. Nevertheless, your production is equal, and in some instances greater than it is in other states that are called and prominently known as peach-producing states; just the same as Oregon has gobbled in the national reputation of being an apple-producing state. Yet, you are producing more apples right in this state of Massachusetts than are produced in the state of Oregon. There are more apples produced in the state of Massachusetts than there are in the state of Idaho which is gaining in its popularity and productiveness as an apple raising state; and you come very close to equaling the quantity and volume which is being produced in the state of Washington.

Now, why should those three states in the Northwest be known as the "Great Northwest" and the apple producing section of this nation? Now, you may say that is not true. Probably, in your minds as producers that statement does not seem true. It does not impress you in the same manner that it does the consuming public, but remember, please, that it is the consuming public upon whom you depend for the movement of your crops; and if they believe that the greatest volume of apples is produced in the Northwest, they will simultaneously believe that the best apples are grown in the Northwest, and they will consequently buy the fruit from the Northwest. The people of that part of the country are educating our Easterners here to eat their apples and we are doing it, and we are having to find our markets for our apples produced in New England outside of New England.

Now, isn't that a wonderful arrangement for business? Isn't that a profitable and logical business proposition to follow,—continue shipping your goods to other parts of the country and while your apples are going to Chicago, Oregon apples are coming through to Boston and pass them on the

road, by that overlapping of 1500 miles. Now, those are roughly speaking, some of the problems. Another one is the line of advertising, and one I do not believe I have mentioned to you before. You say, "This advertising proposition is strictly a large, organized movement and must be such," but that isn't the case. I am acquainted with growers who are making good on their personal advertising propositions, who are labeling their fruit honestly and stating the character and contents of the package, and they are getting an increased price by from five to 10 and 20 percent above the average market quotations and movements of the fruit in the big central sections.

How is that done? It is done in a very simple manner; and I might speak very briefly on those points just a few words which you might carry home and apply to your own business. You go on the Philadelphia market or New York market and you will find Horace Roberts' apples or peaches from his farms in Morristown, New Jersey, which are one out of two or three of the largest farming operations in that garden state. They are placed on the market in the ordinary basket, as is practically all the fruit coming from New Jersey to the Philadelphia and New York markets, but distinguished by a simple blue rim. He buys his supply of baskets in advance of the season and has his men painting these baskets blue during off times in the winter.

That blue-rimmed basket has meant more to him than you and I can estimate in dollars and cents. The Hebrew—who is handling the great volume and bulk of the fruits and produce on the market today before it reaches the hands of the ultimate consumer, is too stupid in many instances to remember your name and mine. He comes into the market and sees these blue-rimmed baskets in the wholesale store and immediately that designates or signalizes to his mind an honest farmer, and he says, "That basket gave me satisfaction the last time I bought it." Consequently, he buys that basket of fruit, and is willing to pay five, ten and fifteen cents more for it.

Barton Brothers, a neighbor of Mr. Roberts, put their goods on the market with a red rim on the basket. Herbert Dodge uses a green rim; but I do not believe they have been popularized up this way as yet so that any of you men would be precluded from using various colors.

A firm, or organization, outside of Norfolk, is painting the rim of a barrel of potatoes that it is shipping through and those potatoes are picked out immediately by the people who come there to buy them. It means more even than the labeling and stenciling on top of the barrel, attractive as that may be made by labels and so forth. It visualizes something in the mind of that element, the Jew, on the market, who are quick in their action. It signalizes something of the value there which lies behind the whole proposition.

They know that that package will stand for dumping out on the market, as Mr. Tinkham said in comparison with the farmer on the Providence market a short while ago. The man was irritated somewhat by the prices which Mr. Tinkham was receiving for his cucumbers,—something like 20 or 25 per cent in excess of what the Italian was able to secure, and the Italian was having trouble to move his package, and he asked Mr. Tinkham, rather roughly, why it was.

Mr. Tinkham went over and took up a box of his own cucumbers and dumped them out. Then he said to the Italian, "Now do that with yours." The Italian refused to do it, but simply answered his own question.

You say that is simple,—it is simple, and all the problems before us in the line of practical marketing of farm and garden products are simple, but we fail to follow those simple but fundamental rules.

Now, I have suggested intimate points of personal application—matters that you might apply in your own independent product line; but there is something greater than that which is needed. Mr. Scheuerle is going to talk to you tomorrow morning on the subject of the "New England Fruit Growers Exchange," an exchange which has been proposed and which will be organized on Tuesday of next week

at Springfield. It is a move which will tend to unify all of the horticultural elements in this section, from the standpoint of marketing products, acting pretty largely in the manner of the California Fruit Growers Exchange. But it is not my purpose to go into the details of that plan. I hope you will be able to hear it. It is an attempt toward a solution of the problems here confronting us so that there might be applied in a direct manner by the producer—through an organization in which he has a direct business interest—the grading laws and the packing laws so that standardization may take effect, so that your name, coupled with the organization or exchange name, will go out on to the market and stand for quality and stand for all that goes with integrity and character to the package.

It will further stand for an organization that will tend to develop all the possible markets within the New England limits, instead of trying to market your apples in Boston, Worcester and Springfield, and when those three markets are supplied, say that Massachusetts is glutted. You are in the most wonderful section of the United States from the standpoint of marketing farm and garden and all kinds of perishable produce that is to be found anywhere.

There is no reason why such an organization cannot be developed to the point of selling to the consumer the product that you are growing at home so that it will give courage and encouragement to the producer of those crops and fruits that he might increase his yield and increase his acreage so that he may supply this 16 or 18 percent of the population; and then we will begin the campaign of advertising to increase consumption on the part of the public at large, and we might continue on indefinitely increasing the acreage of those fruits in New England.

I am terribly enthusiastic over the possibilities that there are in Massachusetts. Although I have only been in this section for six or seven months, I am thoroughly converted to the possibilities that there are right here, and especially, in the business in which you men are engaged; a

movement of this sort is one of the kind that should have your heartiest endorsement and I can see in it a solution of many of the problems over which we have been fumbling and about which we have been talking and advocating from the platform for a good long while.

I appreciate every bit of all that education and all that educational work that has gone on ahead. It has led the way. Now, then, the time has come to put co-operation into operation; and I think that is the practical solution for all of our difficulties. I thank you.

THE PRESIDENT: We think as Mr. Selby has given us such a masterful and clean-cut talk that we need not question him as our time is limited and we have another speaker. Is Mr. Van Meter present? We would be glad to hear from him now.

FRUIT EXTENSION WORK IN MASSACHUSETTS.

R. A. Van Meter

Extension Pomologist, Massachusetts Agricultural College.

The last few years have seen a great change in our methods of producing and marketing fruit. We are going through a period of rapid development. New insects and new diseases have appeared. Their depredations threatened, for a time, to put the orchard man out of business. But our knowledge of insect and disease control has increased with each emergency. Scarcely had scale, scarcely had scab appeared, before our experiment stations found ways to attack them effectively during some period of their lives. This performance is being repeated again and again as new pests put in appearance. Our orchard machinery is being improved and new spraying chemicals are being compounded. Experimental work is uncovering better methods of pruning and better methods of soil management. New varieties are appearing. Changing economic conditions are forcing us to adopt better methods of packing and marketing. The whole industry is being transformed.

All this means a wealth of new ideas coming into the business of growing fruit. They center about and emanate from the experiment stations and agricultural colleges. Before the fruit industry can be benefited, some way must be found to collect this information and get it to the man who can use it in his orchard. This is the work of the Extension Service. That is why we have county agents.

The extension service in pomology of the state agricult-

ural college was organized in 1909 to carry to the farmers of this state the principles of practical and profitable orchard management as determined by our most successful growers and as indicated by the results of experimental work carried on by the various experiment stations. The work has grown rapidly. From a very modest beginning in which the work was handled by Professor Sears in addition to his regular duties at the college, it has developed to the point where it takes the entire time of one man and occupies the attention from time to time of every man on the pomological staff of both station and college.

Since the organization of the county farm bureaus, most of the work with individual farmers, including such work as visits to orchards and personal talks with their owners, has been taken over by the county men. In every case the work is done, where possible through the county agent or in closest cooperation with him. He is the extension man in the county.

It was evident from the very start that little impression could be made upon the state as a whole by going from place to place with general talks on the various phases of orchard management. So the work has developed along several clear cut lines and our aim is to make the work in a community as permanent as possible. In the few minutes that are left I shall endeavor to explain, briefly, several of the most important branches of our extension work.

The first of these, and probably the most important from the standpoint of results, is the establishment and care of demonstration orchards under our direct supervision, and others will be planted as we get time and funds to extend the work. The first demonstration orchards were planted in 1910 and their value in pointing out the most successful systems of management is rapidly increasing as the orchards become older and better known. By keeping in close touch with the college, the owner in a few years becomes thoroughly familiar with methods of pruning, spraying, cultivation etc., and is looked upon as an authority

in his neighborhood. He becomes, in effect, a local extension instructor in fruit growing.

The orchards are visited each year by increasing numbers and there is already a marked improvement in orchard practice in the vicinity of several of the orchards. With your permission I will read parts of two letters which came in the other day from owners of démonstration orchards:

“A great interest has been taken in the orchard both by farmers in this vicinity and by people from a distance. Several of them have caught the ‘orchard fever’ by these visits.”

Another:

“Ninety nine people came to the house in 1917 and asked to be shown over the orchard. Many others stopped in passing and went in and looked around of their own accord. These we saw only from a distance and have no record of them, but the ‘ninety and nine’ we looked out for.”

Incidentally we shall soon have some nice figures on the cost of bringing up an orchard in Massachusetts in the way in which it should go.

The pruning and spraying demonstrations center around the démonstration orchards. In the short season in which the work must be done we are able to reach only a few localities in each county. Arrangements can usually be made, however, with the county agent for a démonstration at any time at any place desired.

Extension schools take most of our time during the winter months. These schools are in session for one week and all phases of farm practice are dealt with. For the work in fruit growing we give a series of seven or eight lectures on various subjects connected with orcharding, such as—“The Care of a Young Orchard,” “Pruning,” and “Insects and Diseases and Their Control.” We aim to have at hand a goodly assortment of pruning tools, nozzles, nursery stock

etc., with which to illustrate the lectures. The school is followed by a series of demonstrations by the county agent or by someone from the college if there is a demand or need of such work.

Another kind of extension school is sometimes held in sections where the balance of the interest is in fruit growing. In these schools the entire week is given over to pomological subjects and the problems connected with orchard work are taken up in detail. It has been our experience that a demonstration is of much more importance in clinching an idea than a lecture. So we bring to these schools as many spray pumps, barrels, boxes etc., as can be conveniently transported and demonstrations are given wherever a demonstration is possible.

Another line of work which is now being developed and which ought to be a valuable one, concerns itself with furnishing material to farm bureau publications. These monthly agricultural papers reach the most progressive farmers in the state and seasonal articles on such subjects as "Scab Control," "Value of Cultivation in Young Orchards" or "The Spraying Campaign for 1918" may not only serve as reminders of work that ought to be done, but also serve to disseminate more or less information at a time when it is most useful.

There are other lines of work of less importance which we shall not have time to touch upon. The work is backed up and supplemented by the farm bureau men and various other agencies in the state. We are all working toward the same end—the advancement of the Fruit Industry in the state of Massachusetts.

THE PRESIDENT: I expect you are all pretty hungry. It is past 12 o'clock, but we would like to call to your attention what a fine program we have for the afternoon. Professor Chenoweth is the first speaker, and he speaks on "Fruit and Fruit Products as Food," and no doubt will tell us many ways to use this fruit so that it can be used in the winter and fall and spring.

And then we have Mr. Barelay later. I am sure we will all be glad to hear him. Vice President Munson will preside this afternoon. I hope you will have lunch now and be back here at 1.30.

AFTERNOON SESSION

(Tuesday)

Vice President Munson, Presiding.

THE CHAIRMAN: Since leaving here for lunch this noon, I have heard some very pleasing remarks about the meeting so far. A few have said that they have got considerable out of the talks that had been given this morning, and one man told me, just before I came on to the platform, that he thought we had got down to business at this meeting, and he thought it was one of the most valuable sessions he has attended of the Fruit Growers' Association.

Now, I assure you the talks this morning were very valuable and many lessons could be drawn from them, but this afternoon, as I think you will see, our program will hold to our standard of this morning and give you some more valuable information that you can take home, which will be of service to you during the next year.

I know that Professor Chenoweth has put considerable work into the subject he is to talk about, and that as fast as his lessons, his teachings, are adopted by the fruit growers of the state, that the fruit industry will increase along that line, as well as along the lines we have been talking about this morning, on marketing.

I take pleasure in presenting Professor Chenoweth.
(Applause.)

FRUIT AND FRUIT PRODUCTS AS FOOD.

Professor W. W. Chenoweth, Associate Pomologist, M. A. C.,
Amherst.

PROFESSOR CHENOWETH: Members of the Fruit Growers' Association, I remember very distinctly speaking to the Massachusetts fruit growers from this platform about three years ago on the subject of the Home Manufacture of Fruit Products. As I look back to that meeting now, I can recall that there was some interest and there was a great deal of toleration and there was some open skepticism, and as I left that meeting I have never yet been able to arrive at a definite conclusion as to whether I felt pleased over the result or whether I felt somewhat heartsick about it.

But, nevertheless, when your secretary asked me if I could come down and talk again along the same line, I told him that there was one subject I was always willing and ready and anxious to talk about, morning, noon and night, and that was the subject of fruit or fruit subjects; and so I want to tackle this subject from just a little different standpoint to-day than what I did three years ago. But I want you distinctly to understand that in doing so I am not retreating one step from the position that I took at that time, but on the contrary I am still further advanced and more sanguine about that type of work than three years ago.

We have heard a great deal said about the best methods of popularizing fruits ever since we have been trying to popularize fruit by simply putting fruit before the people and keeping before them the idea of eating more fruit; but we have done little or practically nothing to popularize fruit through its more concentrated forms, and I can see no reason why that is not one of the big avenues through which the fruit grower can popularize fruit and create a greater demand for fruit.

“Eat an apple a day and keep the doctor away” has long been a familiar saying. Just how much medicinal value if any, there is in an apple or in fruits generally no one seems to know. But that there is at least a grain of truth in this old saying seems certain. Apparently all authorities are agreed upon the general proposition that fruits are agreeable, pleasant to the taste, have some food value and are at least healthful if not medicinal.

Fruits contain certain things which the body needs. The most generally emphasized are the acids, the minerals, the more recently discovered substances, vitamins, which are so necessary to complete nutrition and last, but by no means least, the sugars.

During these days of stress we are beginning to appreciate many things heretofore utterly disregarded, or only carelessly noticed. The average person has, in the past, been content to eat his fruit because it tickled his palate and gave him an agreeable comfortable feeling. Little or no thought was given to the possible food value of the fruit. But now, because through force of circumstances, food materials have become objects of general study and discussion every product that contains food value is looked upon in an entirely different light. If this study and discussion is continued fruit will receive the recognition which it deserves and the fruit grower will come into his own.

Fruits, as has been stated, contain considerable sugars and sugars are a source of much energy. Those of us who must work for a living need a great deal of energy. Even the idle rich, who only sit around and look on, must breathe, digest their meals, keep up blood circulation and certain glandular activities so that they too need energy. Now if we can get a part of this energy from fruit and fruit products why would it not be the proper source. As already stated we get more value than just sugar. but for this discussion let us confine ourselves to the sugar values only of a few of our fruits and fruit products.

Chemists and others who during their spare moments

have analyzed fruits and a few fruit products tell us that well matured Baldwin apples will average about 14 percent sugar. Therefore a medium sized specimen, weighing six ounces will contain .84 ounces of sugar. This is equivalent in food value to about four teaspoonfuls of granulated sugar. Hence the saying "Eat an apple and save a biscuit."

When well ripened Baldwins are dried they contain around 60 percent sugar. There are plenty of old folks who tell us that the only real apple pie is made from dried apples. Does any one doubt the relative value of green apple and dried apple pie or have any question as to the relative amount of sugar necessary to make them palatable?

Sweet cider contains about one and a quarter pounds of sugar per gallon. Sweet cider is a delicious drink also, but rather uncertain in its keeping qualities. There are however, many ways of concentrating this rather dilute food so that it may be kept indefinitely.

When sweet cider is concentrated by boiling to the point of jelling we have cider jelly which is a little more than 50 percent sugar. While rather acid in flavor it is eaten as a relish by many who know it and value it. An ordinary eight ounce jelly glass of this cider contains a little more than four and one half ounces of sugars.

Sweet cider may have its apple acids neutralized and when concentrated by boiling will give a beautiful reddish brown syrup with a flavor not unlike the juice that exudes from the baked apple. When this syrup is concentrated to 11 pounds per gallon it will analyze 60 percent sugars. This syrup offers the fruit grower an opportunity to manufacture a portion of his unmarketable fruit, the product to be used in making other fruit products and to be used as a table syrup.

Apple butter is the most delicious, appetizing and nutritious of all apple products. When properly made from sound, ripe apples and clean sweet cider (add cider syrup if you want a real sweet product) it is a dish fit to set before any one. Every pint of such a butter contains the equivalent

of nine ounces of sugar.

The other New England fruits together with their various products also offer additional sources of relatively cheap energy in the form of sugars. Peach, pear, plum and grape butter are among the cheaper products, while properly made jams and preserves of the small fruits need not be expensive and they too should be classed as cheap sources of energy.

Nor must the housewife consider that all these delicious and nutritious fruit products are beyond her means. If she will forget the old and most of the new instructions that are to be found in our books on canning, preserving, etc., and will use her own good common sense she will be able to make most of these products at a cost which the average family can afford.

Now is a splendid time to break away from the old rule of Shylock of a "pound for a pound" and to make our preserves, our butters and our jellies by reducing the amount of sugar we use to one half or less than recommended in the books. And one of the first noteworthy results will be that with sugar double its normal price our pantry shelves may still carry their accustomed load of fruit products at no greater cost for the sugar.

We can go a step further. We can make many of our products by a still greater reduction of sugar, in many instances dispensing with it altogether if we but first pull the teeth of the acid.

This reduction of sugar means that our fruit products will be 40-60 percent sugar with a characteristic fruit flavor instead of the rich sugary pastes colored and very slightly flavored with fruit as always result from the application of that old "pound for pound" rule.

When are fruits in best condition for manufacturing into their products? The answer to this question depends upon the one who is giving the desired information, or as is often the case, the misinformation. There are some who say that in making jellies the fruits must be used before they are ripe. The reason given is that the jelly will be clear and

of a beautiful color. Nothing is said respecting the quality of such jellies.

Analyses of the Delaware grape show that when 60 per cent of the bunch was ripe they contained 13 % sugar and 1.9 % acids. When 100 % of the bunch was ripe the sugar was 25 % and the acids .7%. The necessary interval of ten days more has added 12 % more sugar and has reduced the acid content by 1.2 %. It has done more than this, it has given the fruit what an unripe grape or unripe grape product never did nor ever can possess—**quality**. Baldwin apples in September contained 10.5 % sugar, while in November when ripe the sugar content was 14.5 %. Therefore if one desires highest quality in fruits or fruit products and if at the same time economy in their manufacture is desired, see to it that the fruits are ripe. Oh! but the wise ones say, you can't make jellies from ripe fruits. Try it and see. Your jellies from certain fruits may not be quite as clear nor as light color but they will be wonderfully improved in quality. That is to say, they will have real fruit flavor if you do not mask it with an excess of sugar.

Let us further illustrate the food value of fruits and fruit products using as our unit of measure a pound of granulated sugar. The following amounts of fruits and fruit products contain approximately the food value or energy value found in a pound of sugar:

- 4½ qts. Baldwin apples
- 1 2-3 lbs. dried apples
- 2½ lbs. apple butter
- 2 lbs. cider jelly
- 1.2-3 lbs. cider syrup
- 1 2-3 lbs. grape butter
- 1¾ lbs. dried raspberries
- 2 lbs. raspberry jam
- 2 qts. canned raspberries
- 1 2-3 lbs. plum butter
- 8 qts. peaches
- 3½ lbs. dried peaches

2½ qts. canned peaches

2 lbs. peach butter

It should be remembered that the above fruit products are made according to modern notions, not by the recipes and rules of our grandmothers.

THE CHAIRMAN: Before Professor Chenoweth leaves the platform, one or two questions have come to my mind, and I suppose some of you have thought of some things you would like to ask him; and one of these is, How are we going to get these various methods to the consumer? That has been thought out, I know, in your department, and I would like to have you take a few minutes and explain it.

PROFESSOR CHENOWETH: I have on every possible occasion—and I have made lots of occasions—to give this sort of a harangue on the reduction of the amounts of sugar. It seems to me that the fruit grower himself might very materially increase the knowledge of his customers by having printed some simple recipes for canning and preserving along economic lines, and let one of those leaflets accompany every order that he filled. That would be one way,—that would be the producer himself coming directly in touch with his customer, but there is one thing that ought to be done, and that is, the fruit growers ought to have a uniform set of recipes.

That is one of the hardest things that you have to combat,—the fact that this organization would put out this kind of literature and that other organization puts out something else, and they are diametrically opposed. The poor consumer says, “Where am I? Which one am I going to believe?”

Even after you get your information across to the consumer, you are going to have your difficulties. I will take just a minute to state an illustration. One of my neighbors said, “Professor Chenoweth, I read in one of the Springfield papers some time ago something about your methods of making jelly so I think I will try that method and see how it works.” I met her afterwards and I said, “How did it

work?" She said, "I was very much disappointed. Under ordinary conditions I would have used a quart of sugar. With that quart of juice, according to your suggestion I only used a pint," and she said, "I only got two glasses of jelly." "Well," I said, "how much more were you expecting?" "Well," she said, "if I had used the whole quart of sugar I would have three glasses of jelly." (Laughter.)

Now, that poor woman was mourning over the fact that she hadn't quite as much jelly out of that quart of juice, but she had saved a whole pint and lost one little glass of jelly. Do you get the point? She was putting her whole value on the volume of juice. That was the cheap thing. The fruit juice, the juice itself is always the cheapest thing in your manufacture of concentrated fruit products. I think that by newspaper publicity we might be able to put across a lot of this too but it seems to me that the leaflet from the fruit grower brings the fruit grower himself into touch directly with his consumers and they might believe him more readily than they would believe me, somebody else, some stranger.

THE CHAIRMAN: What are the possibilities of demonstrations?

PROFESSOR CHENOWETH: Any fruit product in making, as a rule, takes considerable time, and about the best demonstration I could think of would be chiefly to manufacture the product and pass it out to folks and let them eat it; but, on the other hand, they might question you how you make it. Your demonstrations should be carried on in small groups, and I doubt whether you could carry on a demonstration with a group of this size except to try and introduce some new product.

Now, if we had four or five gallons of raspberries that had been canned in 20 per cent. syrup and it were passed around to these men and we let them all sample it, I am satisfied that every man would go home saying, "If my wife undertakes to can raspberries in anything stronger than 20 per cent. syrup this year, I am going to put my foot down and stop it, because 20 percent is enough."

MR. PUTNAM: I would like to ask the gentleman, if he was making jam, and so forth, does he use pound for pound? That is to say, taking away one-half the sugar, will it keep unless it is canned?

PROFESSOR CHENOWETH: No, it will not.

MR. PUTNAM: That is what I thought. You did not tell about that.

PROFESSOR CHENOWETH: It must be hermetically sealed, if you reduce your quantity of sugar.

MR. PUTNAM: In my experience in apples, if you go through Worcester County, there isn't a woman who won't tell you that a Gravenstein apple makes the best apple pie that can be made. If you get any apple that has no acid in it—what we call flat—it won't make a pie that anybody wants to eat. They want something to sharpen up the pie, making it taste good. They all think a Gravenstein is the best pie apple raised in Massachusetts. That is my experience, and I have sold a good many.

Supposing we take a Garden Royal. Every man knows that it is a sweet, nice apple, take it just the right time. Is there anyone here that would think that would make a good apple pie? You wouldn't need much sugar in it to get the acid out of it.

PROFESSOR CHENOWETH: If you prefer a tart taste, simply make it by adding apples and cider together until you get the desired consistency, which is rather a thickish substance. If you want it sweet, then you have got to add some sweetening, sugary substance or sugar, and the amount of sugar you will add; you will have to be governed quite a little bit by the taste you desire; but ordinarily, about six pounds of granulated sugar will sweeten a bushel of apples to which two gallons of cider have been added. That will give you about 3 1-2 gallons of apple butter so you will add, really, you see, the equivalent of two pounds of sugar,—approximately two pounds of sugar to one gallon of this apple butter and it gives you a sufficiently sweet product. You could eat it spread on bread.

You can start with those apples, having them peeled and cored and simply wash and cut them in pieces and run them through a colander and separate out the seeds and skins and cores.

A MEMBER: Do you advocate that if the cook should put in a certain amount of soda in that pie, it would thereby take part of the place of the sugar? Would it be feasible?

PROFESSOR CHENOWETH: I do not think she had better put it in the pie. She would probably blow the roof off the pie. She would have to cook the apples. I am not saying that would make as tasty a pie as the man's Gravenstein. But we are going to eat a lot of things between now and the next three years that are not quite as tasty as they were back in 1915, and we might just as well get accustomed to some of these things, and it isn't always a question either whether it is the cheapest thing.

My wife is making quite a number of war breads, and it is costing me a whole lot more to buy materials than to make white bread, but that isn't the question. So, I submit that these pies made with part of the acid neutralized won't be nearly as bad a pie when you have covered up the acid with sugar. But, nevertheless, it will be a pretty good substitute for an apple pie.

MR. HUTCHINS: Why can't you use molasses successfully in making pies? We have tried to encourage some of the women to do that, but they tell us they wouldn't make an apple pie if they had to use molasses.

PROFESSOR CHENOWETH: That is like the old lady who kissed the cow,—according to your taste,—if you can accustom yourself to the flavor of molasses, which the molasses would give to the pie. It isn't a question of sweetening, it is a question of taste.

MR. HUTCHINS: They don't seem to be able to cook successfully with it.

PROFESSOR CHENOWETH: The secret would be there to cook the apple first. Cook it in water and get it tender and then put it into the pie frame and put your molasses

or Karo with it.

MR. HUTCHINS: One other question,—speaking about the Japanese plums ripening before putting them up. You would have trouble in keeping plums on the trees until they get ripe. They fall off and decay.

PROFESSOR CHENOWETH: I didn't mean they were very soft, soft all the way through. But I was in a commercial cannery last summer, I think it was August, and they were canning their plums that had just a faint rosy tint on them. If they had been allowed to ripen, they would be practically red all over. They were very green, very acid,—they never could make as nice plums out of that kind of stuff. If you let those plums ripen up until a large percentage of them are what you would call almost in eating condition, keep them a day or two after you pick them off the tree, if necessary, until they begin to get fairly well ripened, then you can use those plums to a much better advantage than a green plum.

The same thing holds true as it did with those grapes. In ten days they increased 12 per cent. in sugar. Take the Baldwin apple: Analysis shows that in September it is about 10 per cent. sugar. In November, when it is ripe, it is about 14 or 15 per cent. sugar; and so it is with your plums. The more nearly ripe you can get them the better they are for canning or anything else.

MR. PUTNAM: Does that rule apply to making jellies?

PROFESSOR CHENOWETH: It will apply to making jellies with this exception: That you want to be sure that your fruits are not any more than ripe. There is the trouble. If you can go out into your own garden and pick your own fruits to make jellies I certainly would say wait until they are ripe. If you have to buy your fruit from your market man or from your grower, then you may have to buy some before they are fully ripe in order to get them to jell. After a fruit has passed its acme of development, its highest quality, then it loses its jelling quality.

MR. PUTNAM: As fruit growers the most practical use

we can make of this information is to circulate it among our customers so that they may use more apples when sugar is scarce. Now, has the College done any experimenting on it? Have you got out any pamphlet of recipes setting forth this principle?

PROFESSOR CHENOWETH: We put out a small one last year, and I hope, if we can get the time, we will get out a little larger one this year.

MR. PUTNAM: It seems as though the best way for us to do would be to wait until we got that information, and we might even get enough of those pamphlets to circulate among our customers.

PROFESSOR CHENOWETH: For instance, suppose you were dealing in raspberries. You could take out some recipes for raspberries and put those in with your package of raspberries. I am sure you could induce your customers to can those in low per cent. syrup and thereby double your sale of raspberries.

MR. PUTNAM: When are we going to get these recipes?

PROFESSOR CHENOWETH: I don't know. I am here to tell you this much,—I will do everything and anything I can for you.

THE CHAIRMAN: Are there any other questions on this subject?

PROFESSOR CHENOWETH: You do not lose the sweetening power. You decrease it. That is, a fruit sugar isn't as sweet. It has sweetening powers, of course, but it isn't as sweet. I have not been able to find any chemist who would give me the ratio between fruit sugars and cane sugars but that is a general statement, they are not as sweet.

Now, whether it is true 2 to 1, or 3 to 1, or 1 1-2 to 1; I do not know what the ratio is, but fruit sugars are not as sweet as cane sugars. The longer you cook your fruits, the less cane sugar you have.

A MEMBER: How much sugar was put in your gallon of boiled cider?

PROFESSOR CHENOWETH: That will depend somewhat on the degree of concentration, of course.

A MEMBER: Down 7 to 1.

PROFESSOR CHENOWETH: If you boil it 7 to 1 it will be a jelly, and then it is a little more than 50 per cent. sugar.

THE CHAIRMAN: Are there any other questions on this subject? Would anybody in the audience like to express an opinion as to whether it would be advisable for the fruit growers to take any steps to get to the consuming public any of this information on the recipes, that would help to reduce the amount of sugar in their cooking? It seems to me it is a time when we may possibly run into difficulties in getting rid of our fruit, and anything we can do to help it along is what the Fruit Growers' Association is for, and when you come out with any statements that you are able to back up with a membership of 1000 to 1100, it carries some weight.

MR. MORSE: It seems to me that this Association could not do any better work than get these recipes and have them printed and furnished to the members of the Association at cost or a little more than cost, and we can send them out to our customers.

This Association could get them printed. The State Board of Agriculture did something of the sort last year,—furnished leaflets which we could put in our packages of pears and apples and other fruits. We used a good many. It seems to me that the Association could get the recipes from Professor Chenoweth, have them printed somewhere in quantities, and furnish them to us.

THE CHAIRMAN: Will you put that in the form of a motion?

MR. MORSE: I move that the Association do get recipes and furnish them in leaflet form in such quantities as they may think advisable, and notify the members they can have had.

PRESIDENT MARGESON: I am wondering if this would not accomplish more if it came from the State Board

of Agriculture?

THE CHAIRMAN: I expected, Mr. Margeson, after we get this motion through, to look up sources. Of course, we would have to think that up. I was going to question Mr. Annin as to the results of the bulletin which the State Board published last year, and the possibilities of their co-operating and assisting us in this matter.

MR. ANNIN: In regard to this bulletin that has been spoken of last year and which was entitled 'Fruit as Food,' we simply took up the principal fruits that are raised in Massachusetts and tried to emphasize the right time to can and the necessity for canning. Those bulletins were very popular. We distributed them through the members of this Association and also through retailers, sending men out to the principal towns of the state, to the retail stores, and asked them if they wouldn't use them with their customers. It was taken up very well, and over 115,000 copies were distributed, and from returns we have heard, I think the results were good.

In regard to this matter, I want to say that I think I can speak for the State Board of Agriculture that it would be very glad to do something of this kind this year, because we believe that advertising Massachusetts fruit products is one of the functions that the state can properly do, and we should be very glad to co-operate with this Association in something of this kind.

THE CHAIRMAN: You have heard the motion, gentlemen, that recipes be compiled and distributed in whatever manner is best. Are there any other remarks on this question?

MR. DAVENPORT: It seems to me that a committee ought to be provided to carry out an advertising campaign, not only take up these recipes, but any other advertising matter that might well come before the Fruit Growers of the state this coming year.

THE CHAIRMAN: Do you make that as an amendment to the motion?

MR. DAVENPORT: I make that as an amendment.

THE CHAIRMAN: Is there a second to the amendment?

MR. MORSE: That motion did not speak of any committee.

THE CHAIRMAN: I think it would be well to have somebody designated to carry out the motion, because what is everybody's business is nobody's business. Would you include in your motion that there be a committee to carry out this?

MR. MORSE: Isn't there an executive committee of the Association?

THE CHAIRMAN: There is an executive committee, if that would serve your purpose. You have heard the amendment,—that this committee also consider other methods of advertising fruit products of Massachusetts. All those in favor of the amendment signify by raising their hand,—opposed, the same sign. It is unanimously voted that this measure be adopted.

All those in favor of the original motion as stated please signify by raising the right hand; opposed, the same sign. That also is unanimously carried.

If there are no other questions on this subject we will proceed to the next topic on the program, and our next speaker is a man who is recognized in the fruit growing fraternities as one who has gained success through practical experience.

He has 30 acres of orchards and has harvested in some years—with, I understand, a good share of young trees—some 3000 barrels; and because being a practical man and known as such, I am sure we are about to listen to some very practical ideas on the subject which he presents, "Commercial Apple Growing in New Jersey." Whatever he presents as of interest from his section, I am sure will apply somewhat to our section; and I am certainly pleased to be able to present to you Mr. John H. Barclay, of New Jersey. (Applause.)

COMMERCIAL APPLE GROWING IN NEW JERSEY

Mr. John H. Barclay, Cranbury, N. J.

Mr. President and Members of the Massachusetts Fruit Growers' Association: I always hesitate about accepting invitations of this kind for the simple reason I am well aware of the fact that speaking in public is not my calling, which you will readily observe.

With this exception, I am extremely glad to have the opportunity of renewing my acquaintance, having had the pleasure of attending one of your meetings several years ago at Boston. I assure you I appreciate the invitation.

I bring to you greetings from the New Jersey State Horticulture Society. I extended to you a most cordial invitation to visit us in New Jersey and to attend our annual meeting. I regret I cannot tell you the exact date of our next meeting at this time.

I am not here to tell you our methods are absolutely perfect. I propose to give you briefly some of the facts I have learned by experience, and the methods we are actually practicing in our orchards giving the best results. They may not apply to your conditions here in Massachusetts. But I believe in discussing these subjects and exchanging ideas, and if I could say something to help some brother fruit-grower produce better fruit, I would feel amply paid for coming to Worcester.

Commercial apple growing is one of the most inspiring, noblest and most interesting occupations in which a man

can engage, and especially so when rewarded with success.

This great enterprise, like most others, is divided into two classes: the successful and the unsuccessful.

Very few, if any, lines of business will permit so little neglect as apple culture, if the owner of the orchard expects to be rewarded with success.

The keynote of success from beginning to end, is thoroughness, and I have not words at my command that will emphasize this one point strong enough to impress upon you the necessity of it.

Probably procrastination is responsible for more failures than all other things combined. As with most achievements that are worth accomplishing there are some fundamental principles which must be strictly adhered to, and this fact is especially true of apple growing.

One of the very first and probably the most essential factor for the commercial orchardist to consider is the selection of varieties. This, of course, will vary in different States, and quite often in different localities of the same State. Financial success will depend almost entirely upon profitable varieties. Some one may ask: "What is a profitable variety?" I should say, 1st., an annual bearer; 2nd., one that will make barrels; 3rd., one that will command the very highest possible price upon the open market.

The commercial apple orchard should consist of varieties covering the entire season, which will furnish steady employment for the necessary help to harvest and market the crop.

If I were planting a commercial apple orchard at the present time in New Jersey, I should begin with the Yellow Transparent, which is ready to pick early in July and always commands a good price in New York and other large markets. I should follow it with Duchess, Nyaack Pippin and Williams' Early, all of which are desirable for commercial purposes and command top prices when nicely grown and properly packed.

Then we have the 20 oz. Pippin, which is equalled by

very few, if any, varieties as a money maker, provided it is marketed at the proper time, which I think is early in August, when the New York market demands a large green apple. I should follow it with Gravenstein, Wealthy, Fall Pippin and Rhode Island Greening, all of which are productive and desirable for almost any market. No commercial, or even the home orchard, would be complete in my estimation unless it contained the McIntosh, Grimes Golden and Jonathan. These three varieties all rank very high in quality, and are especially calculated for a fancy box trade.

The McIntosh is a particular favorite of mine; in fact I regard it as one of the very finest apples I grow, all things considered. It is not an easy variety to grow by any means, and I think much better of it for that one reason. I certainly would not advise any one to plant McIntosh unless they intended to give it the most careful spraying.

I should follow these fall varieties with two or three winter apples, namely, Rome Beauty, Stayman,—Wine Sap and Delicious.

This one fact must not be overlooked: there is developing in the East an increasing demand for apples of extra high quality, and the man who produces them is absolutely certain to reap his reward.

There are many minor details pertaining to commercial apple growing, especially if one contemplates planting the orchard, which I will discuss only briefly, unless there are some questions later.

Personally, I prefer a well grown two year old tree. I am not an advocate of the extremely low-headed trees. I should say from two and one-half to three feet preferable to either extreme, with the exception of a very few varieties which are upright growers might be headed a trifle lower. The distance of planting should be determined entirely upon varieties chosen. A very serious mistake is sometimes made in New Jersey by planting too close. I believe the practice of planting apple trees as fillers in the commercial orchard is desirable, and it will be the means of securing a much

larger income the first few years. Under no conditions would I be tempted to plant peaches as fillers among apple trees. Very often such crops as potatoes, corn and truck can be successfully grown in the young orchard without injuring the trees.

The greatest of care should be exercised when purchasing young trees to be sure they are free from insects, disease, and true to name. It is quite necessary that some precaution should be taken to prevent injury very often done by mice and rabbits during the winter months.

One of the first topics we should consider is pruning, as it should be completed, if possible, before even the dormant spray is applied. Pruning is a subject that has created considerable discussion and one upon which there are many personal ideas and theories, some of which prove very expensive when practised. Pruning is of vital importance to every commercial orchardist, and is very often sadly neglected at the expense of the crop. I am not an advocate of severe pruning on young apple trees. In fact, I believe it is detrimental. The amount required on older trees will depend largely upon the variety and other surrounding conditions. Any orchard where thorough cultivation is practised certainly requires more pruning than the uncultivated orchard. Every year experience convinces me the quality of our fruit can be greatly improved in most orchards by more careful pruning.

Briefly, my idea of a properly pruned apple tree is, first to keep it compact with a rather open center and so pruned as to allow a perfectly free circulation of air and sunlight to enter every part of the tree. Always avoid cutting off the fruit spurs. Grow the bulk of the crop through the centre of the tree where it is protected from severe winds. The trees will carry twice the quantity of fruit without breaking under these conditions. We find it a great advantage when several men are pruning trees of any size to keep one of the most competent ones on the ground

where he can see just which limbs should be removed to bring about the desired results.

SPRAYING

The next and perhaps the most important problem connected with this great industry is spraying.

Certainly no intelligent orchardist would attempt to grow apples on a commercial scale in this age without having the necessary spraying equipment for proper spraying.

The spray calendar is another topic upon which many orchardists disagree. Certainly, most of us will agree that it is of very great importance to all concerned. The first spraying of the season is the dormant application. Some growers argue that on account of the great scarcity of labor and the increased price of spray materials this spraying can be omitted. I am very frank to admit we are passing through very strenuous times and many of us are obliged to discontinue some of our former practices. But I for one believe an application of Lime Sulphur at winter strength is a paying investment, even if the orchard is practically free of scale. Most of us know the scale increases very rapidly under favorable conditions. We have been many years trying to get it under control and my advice to every fruit grower is, apply the dormant spray if possible.

The first of the summer sprays should unquestionably be applied just when the cluster buds are spread apart and show the pink nicely.

This spraying is **very** important and any orchard thoroughly sprayed at this time with the proper material will certainly produce much better fruit than those where this spraying is omitted. It is the ideal time to control apple scale and other fungus diseases. The application may be applied with a little coarser nozzle and the material a trifle stronger than the later sprayings. In fact, some personal experiments have convinced me two applications before the blossoms open will produce still finer fruit.

The second spraying is, of course, when the blossoms fall, and is the most important time to control the codling moth. Here our time is limited to a very few days, and every precaution should be taken to have the spraying outfit in perfect working order, which will often avoid delays. This application must also be very carefully applied with an extra fine nozzle and just as fine a mist as possible to prevent russeting the fruit. We usually begin spraying when the blossoms are about two-thirds off. Some materials will cause more burning of the foliage and russeting of the fruit than others.

Again, some varieties are much more susceptible to russeting than others. Indeed, almost every variety is a study of itself as far as the material and application is concerned. Experience has taught me there is nothing quite as satisfactory to use on tender varieties after the fruit is formed as self-boiled lime sulphur. In fact, I use it almost exclusively on many varieties and find it puts a beautiful finish on the fruit, and very satisfactory. On large trees we try, if possible, to spray with the wind. We use two leads of hose, one in the tower and one on the ground and from 150 to 200 lbs. pressure.

The third application should be made in ten days or two weeks, and apply it exactly the same as the second one, just as fine a mist as possible. But not too high a pressure; at this stage the young apples are very tender and easily injured.

This is the time when the curculio is very active with us in New Jersey, and unless we keep the fruit well covered with poison it surely will be very badly injured by this insect. I neglected to say we always use 1 3-4 lbs. of powdered arsenate of lead to each 50 gallons in all the summer sprays. Some growers say it is a waste of material, but it kills the insects, and results are what count with me.

The fourth spraying should be made about two weeks later, keeping the fruit and foliage well covered. And the last application about the first of July.

The results from these treatments should be satisfactory as far as scab, codling moth, cureulio and fungus diseases are concerned.

But we also have the aphid to contend with, and many of the growers in the state of New Jersey find it very difficult to control. I believe it does more damage to our apple crop than any one other insect. These insects deposit their eggs on the tender wood of our apple trees in the fall, and they hatch in the following spring when the weather conditions are favorable. The only time they can be controlled is **shortly** after they hatch and before the leaves advance enough to give them protection. Consequently, the time for effectively controlling green and rosy aphid is very limited indeed, and we must be on the alert if we expect to control them.

Very few growers would notice their presence on the trees until the curled condition of the leaves attracted their attention, when it would be too late to control them that year. It seems very unfortunate something cannot be found to destroy the aphid while in the egg state. Lime Sulphur winter strength and Sealecide will reduce the hatch, but not sufficient to control. It is claimed by some professors that aphid can be controlled by combining Black Leaf 40 with the dormant spray, which may be correct in some cases. But some experiments carried on in my orchard by Dr. Headlee, our State Entomologist, proved conclusively the aphid **are not** always hatched at that time. Consequently, if Black Leaf 40 were used when the lice were not present the material would be wasted and the crop of fruit would in all probability be badly damaged unless later treatments were applied.

After considerable experience, some of which has been very costly, I have decided on the following plan of controlling aphid, and it has proven entirely satisfactory the last two seasons. First watch the buds very closely, for there is where the lice will first appear. If the aphid are hatching when you are applying the dormant Lime Sulphur add

Black Leaf 40, 1-500, and it will be effective if the spraying is thoroughly done. If the lice are not present when the dormant spray is applied, watch the buds closely, just as soon as they begin to appear spray at once with Black Leaf 40 at the rate of 1-500, plus two pounds of whale oil soap to each 50 gallons, using about three hundred pounds pressure. If the trees are thoroughly covered it will kill 100 percent, giving a perfect control. This is about all the spraying necessary except in occasional instances when we have an infestation of Rose bugs and Leaf Hopper, both of which are easily controlled.

Cultivation is another very important factor in the commercial apple orchard. Personally, I do not think there is anything that will take its place. Neither do I believe as high a quality of apples can be produced when it is not practiced.

The cultivation should be started early in the spring. It will increase the size of the fruit considerably. The trees appear in a more healthy condition. The fruit will hang on the trees from ten days to two weeks longer when thorough cultivation is practiced. Our orchards are ploughed very light along in April and cultivated at least once each week and often twice if the weather is dry until the first or middle of July, when they are seeded with kind of a cover crop, preferably clover, to be turned under the following spring. We use the Forkner light draft harrow and find it very satisfactory. No doubt there are many apple orchards located where the conditions are not favorable for cultivation; but as I am a very strong believer in cultivation I would not care to own an orchard where it could not be practiced.

Fertilization is also a necessity and adds greatly to the attractiveness, and I think I can safely say, to the quality of the fruit.

No apple orchard can possibly produce annual crops of fruit unless it is well supplied with some kind of fertilizer each year.

The shortage of potash makes this question a difficult one for us to solve. Potash is almost indispensable and the scarcity of it is very unfortunate for the fruit growers.

Lime is also very beneficial in most apple orchards, and a liberal application of it should be applied at least every three or four years. Stable manure may also be used to a very good advantage.

The orchards in which a liberal supply of potash had been used while it was plentiful have a considerable advantage over those where it was used sparingly or not all, prior to the shortage of it.

As long as we were able to get potash we used acid phosphate, bone meal and muriate of potash equal parts, applied at the rate of one half ton per acre, on old trees. When we were unable to get our supply of potash, Dr. Lipman, Director of our Experiment Station, suggested to me that I use 200 pounds of agricultural salt per acre, mixed with the acid phosphate and bone meal, which has worked out very nicely for me so far. My orchards having had considerable potash, it was thought there was still a surplus there and the object of using all the salt was to make it available.

The apple orchard does not require a fertilizer that acts too quickly; on the other hand, it should have one which acts rather slowly, and especially toward the close of the season when the fruit is ripening.

The fertilizer is sowed broadcast as soon as the ground is worked up nicely, and we are reasonably certain of a crop of fruit probably about the 10th or 15th of May. In addition to the fertilizer we use all the wood ashes we can get from the saw mills located in our neighborhood.

THINNING

The thinning of apples is an absolute necessity if the owner of the orchard expects annual crops of large, fine fruit such as commands a premium in the large markets of the East.

I know of no better investment in the line of fruit growing than the thinning of apples. I am sorry to say it is not practiced extensively in New Jersey at the present time. It seems to me it should require only a very little consideration to see this is one of the most reasonable things in the whole orchard proposition.

Apple trees, like most other things, have a limit to their productiveness, and it is very much better from several points of view to grow from five to six barrels of strictly fancy fruit per tree than it is to produce twice that quantity of small, inferior and undesirable apples for which there is no market except at a very low figure.

Apples should be thinned from at least eight to ten inches apart, according to the variety.

It should be done early in the season if expected to benefit the developing of fruit buds for the next year's crop.

Many growers have the idea that thinning apples is a very tedious and expensive business. It is just the opposite. Any intelligent person will very soon get the idea and the work can be done much faster than expected. Some care must be exercised to get the men to take enough of the fruit off, especially those of little experience. This is the greatest trouble I have ever had, but it is usually remedied after seeing the results of the first. Small shears should be used in doing the work. It can be done much faster and with less danger of loosening the stems of the remaining apples than if picked by hand, especially if the apples are in clusters, as they often are.

Where thinning is practiced the fruit can be picked much quicker and packed faster, and we find it more satisfactory from every standpoint.

We are living in an age of improvement and we must expect to adopt new methods in fruit growing as well as in other lines of business.

It is a large percentage of strictly fancy apples that is desired and will return the largest profit to the grower,

and they cannot be successfully grown unless thinning is practiced.

There may be times when some of these apples that are thinned can be sold to advantage and bring enough to pay for the thinning. I have practiced the thinning of apples for several years in my own orchards, and I repeat I know of no better investment I could make of the money actually spent for this purpose.

When the crop is once grown we have another problem of vital importance: the harvesting and marketing end of it.

Every fruit grower must realize the importance of handling his fruit carefully if he expects to dispose of it at the best advantage. The time of picking will vary and every person owing an apple orchard must determine this point for himself.

Very often certain varieties of apples will command much higher prices in our large markets early in the season when they are green than they will if we let them ripen. I believe in watching the market and disposing of them whenever they will command the highest possible price regardless of the ripened condition. Most varieties should be picked over at least twice in order to get them nicely colored and at their best. This is especially true of the red varieties.

There is no time when an apple improves so rapidly as the last few days it is allowed to remain on the tree. Some care should be exercised and the pickers cautioned about breaking off the fruit buds which, if allowed to any considerable extent, might reduce the next year's crop. We find the handle basket holding about a half bushel the most desirable and satisfactory kind to pick in. We sometimes line them with burlap when picking very tender varieties.

Every fruit grower must again realize the necessity of growing a fancy grade of apples before he can pack and market them in any considerable quantity. New Jersey, I am very glad to say, is growing some beautiful fruit, but

we are not growing a large enough percentage of this kind of fruit the state over. In fact I am inclined to think this is true of most of the Eastern States. There has never been a time to my recollection when there has been such a marked distinction made between the fancy and poorer grades of apples, and this condition is going to increase every year. There is an **unlimited** demand for apples of extra high quality a time to my recollection when there has been such a marked distinction. If we expect to continue in the fruit business from a financial standpoint, we are simply compelled to grow apples of a high standard.

And when we produce them in sufficient quantities to supply the large markets, we will then be in a position to attract some attention and our Eastern grown fruit will very soon establish a record for itself and be preferred to most of that grown in the far West.

It makes very little difference what kind of a package we use to market our fruit in. In New Jersey the most of the early apples are sold in hampers. Personally, I prefer to use the loose bottom hamper. They can be packed much easier and faster and are more attractive when packed than the other style of hamper. Later in the season many of our growers prefer to use the barrel, I do myself, especially for the winter varieties. The one important thing for us to do is to pack honestly and try to stimulate a demand for our products.

The box is a very attractive package but not used very extensively at the present time. Personally I have had more inquiries for boxed apples the last year than ever before. The demand for fancy boxed apples is increasing rapidly and I consider it a very desirable package. But when we pack apples in boxes we must consider very carefully our varieties and use only those of especially high quality. An attractive label should be placed on every package, giving the name and address of the grower.

One of the greatest difficulties and most serious objections found in using the box extensively at the present

time, is the securing of competent and experienced packers, which are a necessity if this package is used to any great extent. It occurs to me here is a great opportunity. If box packing were taught from a practical standpoint at all of our State Colleges and Experiment Stations, at least some competent packers should be available when desired. Considering the existing conditions, which are likely to grow worse, it is **very important** that we have all our necessary supplies on hand, such as spray materials, packages, etc. for the coming season. If we have not already ordered them, it will be greatly to our advantage to do so at once. You see I am a believer in preparedness in every sense of the word.

I believe the outlook is quite promising in the future for fruit growers, especially those producing a high grade of fruit. The increased cost of production will cause many growers to neglect their orchards, which is certain to have its effect.

The question of marketing is quite a serious problem in these days when the railroads are so tied up. Some of the largest growers in New Jersey use the truck for transporting their fruit to market and find it more satisfactory than freight.

Some few growers are using the graders and claim they are quite satisfactory. We do not use one yet, therefore, I am not in a position to tell you much about them.

Our early apples are shipped to New York and sold in the open market. A great many of the fall and winter varieties are sold direct to private trade. We find this a **very** satisfactory way to dispose of them. Our customers come back to us year after year from every section of the State,—several of the best stores taking from ten to fifteen barrels a week giving their orders either by telephone or mail. We also have a great many private families who depend entirely upon us for their supply of winter apples. Each of these having their friends, sends us new customers each year, who are only too glad to pay us a premium for a

high grade of apples. The poorer varieties and cheaper grades are sold to hucksters, who come from New Brunswick and elsewhere in wagons and trucks late in the season, carting them in their own open-head barrels.

There is no better way to increase the consumption of apples than to advertise and exhibit them in the cities, where the people can see just what we are growing.

Public exhibitions each year of both boxes and barrels of such fruit as we are now growing in the East will do more toward stimulating a demand for our apples than any other one thing we can possibly do.

That is just what created such a demand for the Western grown fruit here in our Eastern markets, and this condition will continue until we show the consumer that the Eastern grower can supply them with apples of a much higher quality than those they are now eating which come from the great apple regions of the West.

Commercial apple growers should be thoroughly organized; they should control their own cold storage plants. They would then be in a position to secure the very highest prices for their fruit.

Most of the storage room in New York City and elsewhere is controlled by speculators or commission men, who buy up large quantities of apples early in the season and usually make more out of them than the grower.

I notice the most successful growers in the State of New Jersey are those who keep in close touch with our experiment station. As a matter of fact, we greatly appreciate the assistance we get from that department and are proud of our staff of Professors, at least three of whom come from the State of Massachusetts. I think the fruit grower in general should keep in close touch and co-operate as much as possible with the various departments of experiment station work in every State, and they will be greatly benefitted by so doing.

In conclusion, I regret to say the American farmer and fruit grower is confronted with the most difficult problems

we have ever faced.

Where are we to secure competent help to gather our crops?

A question that is beyond the ordinary human being under the existing conditions.

We are urged from every quarter to increase our production, and, needless to say, we are doing our utmost to respond to the appeals. But if there is any one place where experienced help is required in order to do efficient work at the present time, it is on the farm.

We are expected to feed the world; therefore, it is quite evident, food is the most essential factor. The whole world is depending upon the farms for food.

It must be supplied, or famine will be the result.

And these United States will pay dearly for the inexcusable and intolerable mistake of taking the experienced help from the farmers, and setting the prices on our products, regardless of the cost of production.

THE CHAIRMAN: Mr. Barclay, I am sure, will be pleased to answer any questions which you may have had brought to your attention during his discussion.

MR. HUTCHINS: In the use of the hamper basket, do you face the top and put a cover on it, or heap the top and leave it off?

MR. BARCLAY: We face the top with one layer.

MR. HUTCHINS: In other words, you put in the small bottom the last thing and put the cover on the basket, do you?

MR. BARCLAY: We put the cover on first, face and fill, then nail the bottom in.

MR. HUTCHINS: Does that come under the marking laws as a closed package in New Jersey?

MR. BARCLAY: We do not sell them in New Jersey. We ship them to New York.

MR. HUTCHINS: How is it in New York?

MR. BARCLAY: We haven't had any trouble. We mark with our own individual marks.

MR. HUTCHINS: May I ask Mr. Annin if that is supposed to be a closed package?

MR. ANNIN: We call that a closed package. New Jersey has no apple grading law.

MR. BARCLAY: New York has an apple grading law applying to apples in barrels but we have never had to pay any attention to it with the hamper.

MR. ANNIN: The New York law refers to apples packed in the State of New York. We are referring to apples which, in his case, are shipped into New York.

MR. BARCLAY: We have to pack under it when we ship to New York in barrels.

MR. ANNIN: I do not believe you have to.

MR. BARCLAY: We always have. The commission men told us that was the best plan.

MR. ANNIN: But you do not have to, because the apples are packed in New Jersey, and shipped into New York and don't come under that law. The only apples which come under our law here are apples packed in this state. Apples packed in New Hampshire and Connecticut do not come under our law.

MR. HUTCHINS: In working against the aphids, where you combine lime-sulfur with the black-leaf-40, do you put in the soap, then?

MR. BARCLAY: No.

MR. HUTCHINS: You do not need it, or does it hurt the mixture?

MR. BARCLAY: I imagine it would. Dr. Headle doesn't advise using soap with lime-sulfur and arsenate of lead.

MR. STOCKWELL: I would like to ask the speaker if he doesn't think it advisable in controlling the aphids to wait until the buds are just ready to open and then by adding the Black-leaf-40 it kills the parent aphid.

MR. BARCLAY: I don't think that is advisable under all conditions. Where would you be if you got a week of stormy weather?

MR. STOCKWELL: That is what I have been doing the last two years and made quite a success of it.

MR. BARCLAY: It might be done if you had a small orchard and you felt like waiting, but it is pretty risky. We just go ahead and spray when we get ready, and as soon as the aphids begin to hatch we put in the Black-leaf. If you were to get a few rainy days, you are up against it.

A MEMBER: How do you ship?

MR. BARCLAY: Mostly by freight, except boxes, they go by express.

A MEMBER: How does the consumer get that on the other end? He has to pay the freight and cost of delivery. It is sold at our station. If it is sent by express, the consumer pays express.

A MEMBER: Does the express company carry that in a decent fashion?

MR. BARCLAY: They always have until this year, and this year we have had considerable trouble.

A MEMBER: Now, in selling for the retail trade how do you establish the fact that the customers you are getting, have good credit?

MR. BARCLAY: We have never lost a barrel of apples until this year, but have lost a few this year, or very likely to lose them.

A MEMBER: Do they pay by check when they get the fruit?

MR. BARCLAY: By check, or by money order.

A MEMBER: Sent you with the order?

MR. BARCLAY: Once in a while a man will send his check with the order, but as a rule they do not; I never demand that. I never had any trouble until this year, it has been very cold, and some few packages have been frozen, making a little trouble.

A MEMBER: Do you let them take their time in paying you, paying any time in the next 30 days after they get the fruit?

MR. BARCLAY: We never force them. They usually

pay as soon as the fruit is delivered,—in almost every instance. Once in a great while one might wait a little while. Most of our early apples are sold through the commission men,—practically all of them, up to the time the Jonathan and McIntosh begin to come.

MR. STOCKWELL: I would like to ask the speaker if he wants us to cultivate our orchards when one of the leading men in the State of Massachusetts raises the nicest apples without cultivation?

MR. BARCLAY: None at all, if your conditions do not require it. But I prefer to cultivate. Our practice is to cultivate. I have as yet to see as nice fruit grown on the uncultivated orchard as can be grown in the cultivated orchard.

MR. HUTCHINS: What do you consider the cost of thinning a 15-year-old tree?

MR. BARCLAY: It would depend on conditions.

MR. HUTCHINS: What is the average charge in your own orchard?

MR. BARCLAY: Again that would depend on what you had to pay the man, whether you could get him at all or not. A man that had some experience, probably, would thin 15 or 20 trees—12 or 15-year-old. He might not do that on some varieties. On other varieties he would do that and more. Take the McIntosh, if it was very full, probably might not thin over a dozen.

PRESIDENT MARGESON: I would like to say in regard to growing under cultivation, I do not think the full story was given when Mr. Marshall's orchard was referred to. Mr. Marshall grows his apples in a different way than men who grow them uncultivated. He keeps an open space of about six feet with no sod growing around the trees. That is not the same proposition as where the grass grows up around the trees.

MR. BARCLAY: No doubt there are conditions where you cannot practice cultivation.

THE CHAIRMAN: Are there any other matters to

come before the Association?

MR. DAVENPORT: There is one other matter, I think, we ought to consider as fruit growers. It appears to me every fruit grower ought to keep at least one hive of bees.

There are three reasons why we ought to keep bees. Last year, you remember, a great many fruit trees blossomed fully and apparently a lot of the fruit set. A little later we noticed a large percentage dropped off and most people said we had a very heavy June drop, when, in reality, if we investigated very much we would have found that comparatively few of those apples that dropped had any seed formation showing that the fruit was not properly formed. Therefore, for that one reason, if for no other, we ought to keep bees on our fruit farm for the work of polinating the blossom, so we might get a better set.

In the second place, last year there was a shortage of sugar. A hive of bees well taken care of ought to supply from 30 to 100 pounds of honey, which would help a great deal with the supply of sugar for the family.

In the third case I wonder how many of us realize the value of honey as a substitute for sugar. I think to-day if you go to the bakers or to the candy makers you will realize how much they appreciate honey and how many tons and tons they have used of it in the last year making cake, doughnuts, cookies and all kinds of chocolates, and they claim that the use of honey makes a far better doughnut or cake.

Now, there are other ways of using honey. If you investigate or have seen the canneries you will find you can put up berries in honey that will give a better product than putting them up with sugar. So, it appears to me, since there are tons and tons of honey, or nectar that really goes to waste in Massachusetts every year, that every fruit grower at least ought to have one or more hives of bees this coming year.

MR. PARKER: I would like to ask the speaker how old the trees are that he cultivates.

MR. BARCLAY: We have had some that are 30 years old,—some 12 years old and some 18 years old.

MR. PARKER: You cultivate them all?

MR. BARCLAY: Yes, sir.

MR. PARKER: The reason I asked was that I noticed the other day that the experiment station in Missouri had advocated, after a series of experiments, that when a tree gets to be 12 years old, it better be kept in sod.

In regard to our own orchards which are here in Worcester County, we have got three large orchards—one orchard has not been cultivated to my knowledge for years. Our fruit is fine, and I would not think of touching that orchard with a plow under any conditions. Three years ago we read so much about cultivating that we thought we would break up the sod in another orchard which we have on the same range of hills. It was the sorriest thing we ever did. Our next crop of apples was without any color, and we were thoroughly disgusted. This year that orchard has got back into sod, and those trees, which are about 25 years old, were one of the most beautiful sights ever seen. We will never touch it again with the plow, as long as we hold

I think this matter of cultivation is largely one of the location of the orchard itself, not that anyone can sit down and say that because this man cultivates everybody should cultivate; the soil itself and the actual conditions have all to be taken into account.

We have some 3500 trees in our young orchards. These we cultivate every year, up to the middle of July, and then put in a cover crop, but judging by our old orchard, after these trees get to be 10 or 12 years old, they are going down to sod. We shall put in orchard grass which, of course, will give a loose sod. Don't put in timothy. Our orchards are in orchard grass.

A MEMBER: What do you do with the grass?

MR. PARKER: It is cut and left right under the trees. Don't take the grass out of the orchard,—leave it right

there.

MR. SMITH of Wellesley Hills: It seems to me that the last speaker disproved his own contention. He said he plowed up his own orchard and that year did not get so good a crop. Of course, the roots were near the surface and he cut them all off. The roots formed all over the surface, and the year after he had a better crop than ever.

THE CHAIRMAN: How was the crop before you plowed, Mr. Parker?

MR. PARKER: Oh, it was like the crop we had this year.

THE CHAIRMAN: Is there any other gentleman in the audience who has a view on this subject?

MR. WHITCOMB: Isn't it a fact that the uncultivated orchard requires more fertilizer than the cultivated orchard?

THE CHAIRMAN: I am sure I can't answer that question, Mr. Whitcomb. I do not know whether there is anybody here than can give you any light on it or not.

MR. STOCKWELL: I think that is where people make a sad mistake. When their orchards are in grass they don't fertilize it enough, and there is where the failure comes. If you fertilize an orchard sufficiently in sod, it is much better, in my estimation, than it is under cultivation, but if you are not going to fertilize it sufficiently, perhaps, you better cultivate, but you have got to feed it enough to get your crop.

THE CHAIRMAN: Have you any view on that matter of fertilization, Mr. Parker?

MR. PARKER: We have never used any great amount of fertilization in our orchards. The grass has been cut and allowed to lie under the trees. The soil in those orchards is red schist. It is full of this schist and you can take the stones up and break them in your hands. I think that soil, itself, has quite an amount of fertilization in it. We use a little nitrogen, perhaps, two handfuls to a tree, but we do not every year.

In our young orchards we use nitrogen every year. But,

of course, we want those trees to come forward rapidly, for the sooner we get them into bearing, the sooner we will get an income out of them.

THE CHAIRMAN: I might state a little experience I had with a 25-year-old orchard that might be of interest right along this line. It was a combination of cultivation and sod method. We started in to renovate them. They hadn't grown as rapidly as they should have. The first year we plowed the orchard right up to the trunks of the trees and then gradually let up on the plowing until we had sod under the trees out as far as the branches extended, and between the rows where the sun came in we used a spring tooth harrow. That seemed to give us the best results on that particular soil. The apples remained about uniform for a series of years after that treatment was given them. They gave good crops right along.

MR. C. B. PRATT of New York: For a good many years I have been especially interested in this matter because I have some 9000 trees, and especially for my young orchard I have been watching the effects of alfalfa, and at the present time I am experimenting with about 23 acres with trees that are five and six years of age. I found that with the alfalfa those trees seem to be growing just as healthfully and vigorously as trees where cultivated.

I have a friend up near Rochester who has carried on an experiment for a number of years in clean cultivation with a cover crop, one in timothy, and another in alfalfa. The difference between the clean cultivation and cover crop is that the trees are about two years older in the other orchards than in the timothy and alfalfa, but the alfalfa trees are catching up with the clean cultivation.

I think there is no difference, but the trees in timothy are very much stunted, but he is keeping this as an experiment.

I think the whole question of cover cultivation depends a great deal upon the nature of the soil. Mr. Barclay's orchards are in a light soil, and I think there the cultivation

and feeding is necessary. That is the reason he gets good results from it. I used to be a clean culture crank, but I am drifting away from it.

I remember in Mr. Collingwood's orchard last year he was pointing out a lot of trees. He had some Baldwin trees there bearing every year for, I think, four or five years that never had any cultivation since he has had the place.

There was another very interesting article I saw in "Better Fruit" two or three years ago with a comparison of two orchards,—one clean culture and cover crop and the other in alfalfa, in the far West. The report for the previous six years was that the average production of trees under the clean culture was 10 and a fraction boxes per tree, and under, alfalfa, 19 and a fraction per tree.

MR. GEER: I have an experience with cultivating McIntosh trees. Some 10 years ago we had about 50 or 60 barrels of McIntosh on young trees, probably 12 years old. The McIntosh did not get good color. Potatoes, corn and various other crops had been planted and we were disgusted with the trees and wished we had not set out a single McIntosh.

I made up my mind that I was going to seed down those trees. Before this I could not keep McIntosh. They wouldn't keep until the middle of November. They would all soften up and had no color. The result was that within a very few years after the land was seeded down, we got a good colored McIntosh, and they kept until April right in our cellar; and I wouldn't any more think of plowing up the land where those McIntosh trees are now than to think of cutting them down,—not a bit. It has been a great benefit to seed down that land, it added so much to the color and keeping quality of the fruit. So, for our land, I wouldn't think of cultivating.

MR. BARCLAY: In orchards where cultivation is practiced and you pick them at the same time, you may not get as good color, but if you will let them hang on the trees 10 days or two weeks you will get just as good color. That is my experience. I heard the talk "Not to Plow Your Or-

chards." I plowed half of my orchard and the other half left in sod. Where I plowed the orchard, I had more apples than where I did not plow. Ever since that I have practiced cultivation, and I expect to continue.

THE CHAIRMAN: It seems to come down to the proposition of each man knowing his own conditions and working them out. Some are getting results one way and some in another. It is about that way with any kind of a farm proposition. It seems to me the man that is running his own farm knows it best and knows the best treatment to give it and he has to work those things out according to his local conditions.

I have seen on the same farm one orchard under cultivation that was on very light soil, what we call "asparagus soil," and on another location on the same farm, heavier soil, that we would not dare cultivate at all.

MR. PARKER: There is one question I would like to ask and that is in regard to the sooty fungus. Our Northern Spy apples in 1915 were so covered with sooty fungus they were good for nothing. They were very large apples and they were just ruined by the sooty fungus. This year we had the handsomest crop of Northern Spies you ever saw and there wasn't any sign of sooty fungus.

I would like to know if someone has had the same experience.

THE CHAIRMAN: Did you give any different treatment in the two years?

MR. PARKER: No, we did not. We used the same formula both years.

THE CHAIRMAN: And sprayed at the same time both years?

MR. PARKER: At the same time, too.

THE CHAIRMAN: Mr. Davenport, can you give us anything on the subject?

MR. DAVENPORT: We had the same experience as Mr. Parker. The same year, the same conditions, the same spraying. We laid it to climatic conditions. As you all re-

member, a year ago last fall, we not only had sooty fungus, but the Brooks spot. How many had Brooks spot this last year?—comparatively few. The year before a great many of us were blessed with Brooks spot, in addition to sooty fungus.

Without any different spraying on anyone's part, there was very little Brooks spot this last year. I think if you study the weather you will find that it was this that made the condition. You know that the Brooks spot, and also the sooty fungus, start during the summer, and at that period, if we get a large amount of rainfall or get quite a number of cloudy days you will find the sooty fungus and the Brooks spot spores are spread and develop very rapidly, and after they get a good start, no matter how much spraying we do or what the weather conditions are, we are bound to get a bad case of it, but if we do get, at the time the sooty fungus propagates some good clear weather, you will find, as a general practice, that you get little trouble from this disease.

THE CHAIRMAN: Do you advocate spraying every year, whether you see any indications of these diseases or not?

MR. DAVENPORT: Why, yes, as a general practice I do. I believe we ought to spray at least three or four times. The times of spraying that I advocate, of course, would not be the same as Mr. Barclay because we are in a different section of the country. But nevertheless, I believe we ought to carry on from three to four sprayings, and at least one of those ought to come at a time to check the Brooks spot and sooty fungus or any other disease.

THE CHAIRMAN: What time do you advocate for that?

MR. DAVENPORT: The way that I keep in mind the different sprayings that we have for this section of the country is like this: We have one spray which comes about the middle of May, which is just before the blossoms open. Now, that varies somewhat in the season, but comes usually about the middle of May. The next one comes usually about Me-

morial Day, or a little before. That is, after the petals have dropped. Then we try to get one in about the last of June.

Some seasons we may find that we are about to have sooty fungus to spray. Now we vary that somewhat, according to the weather conditions. It may be between the last of June and the first of July. Then we try to give another one the third or fourth week of July. We find that those usually hold down any fungous disease we may have.

A MEMBER: We have lost eight colonies of bees, although we used a great deal of arsenics,—probably about two tons and a half. The colonies were very strong.

MR. DAVENPORT: Just one other case might come up. You know the bees gather what we call “honey dew,” the honey dew given off by lice and by the pear psylla. Here is another insect we have got to be on the lookout for. The pear psylla in Massachusetts is doing a great deal of damage and no one has seemed to be able to stop it. The trees that are sprayed heavily result in there being more or less lead on the honey dew, and the bees gather that honey dew which also contains some lead. You may get some killing of bees, under those conditions.

MR. HUTCHINS: Have three or four sprays a year had any effect on killing bees?

MR. DAVENPORT: In my own case, in the orchard we keep usually from two to ten hives of bees. We have never lost a hive, and I have not seen any indications of what you might call poisoning of the bees.

I am afraid that in many cases where we have lost swarms of bees, a great many of the bees have died and we have laid it to poisoning, when, in reality, if we looked further, we would find something else wrong. Probably most of you know that there are two diseases which are extremely bad in regard to bees,—both American and European foul brood, that in many cases have been the real cause of the killing of a hive of bees, rather than spraying.

MR. STOCKWELL: In 1915 when there was so much trouble, I had been troubled considerably with the Northern

Spy not giving satisfaction, and I proposed to try an experiment. So, when the Northern Spy was a little larger than an egg, I went over the trees with some Bordeaux, and that was the year when the Northern Spy was so bad, but I had the nicest Spys I ever had, but I had a row of Ganos right beside it, which I also sprayed with the Bordeaux and ruined the crop.

THE CHAIRMAN: Certain varieties of apples will stand the Bordeaux and others won't.

A MEMBER: I would like to inquire how much it costs an acre for cultivating Mr. Barclay's orchard?

MR. BARCLAY: I do not know as I can answer that, exactly. That varies a whole lot.

THE CHAIRMAN: On an average, per year?

MR. BARCLAY: Generally it costs \$10 or \$12 an acre to cultivate and do it thoroughly.

THE CHAIRMAN: Per year?

MR. BARCLAY: Yes; and make \$50 worth of fruit.

A MEMBER: I would like to inquire if Mr. Barclay keeps a strict system of accounts?

MR. BARCLAY: No, I do not. I think, however, I know whether I come out ahead or behind.

MR. WHARTON: Wouldn't it be possible to have some information given here regarding the effect of Bordeaux on different varieties?

THE CHAIRMAN: Do you know anything about that, Mr. Van Meter?

MR. VAN METER: The only experiments that I am familiar with in that line were made in Ohio. There they found that the Gano type were the worst ones affected. They would burn before anything else. It was also found that in practically almost every case, lime-sulfur gave a cleaner and brighter looking apple than the Bordeaux mixture. We found where it did not burn the apple enough to show a russet spot, it was just burning the finish enough to take the polish off of the apple.

THE CHAIRMAN: Did they find that lime-sulfur

would not control scab on some varieties?

MR. VAN METER: No, they used Bordeaux mixture for their pre-blossom spray, but after the fruit set, they only used lime-sulfur. They had much better results that way than using Bordeaux mixture straight through. Bordeaux mixture is probably a little stronger fungicide than lime-sulfur,—a commercial lime-sulfur, about 1 1-4 gallon to the barrel.

MR. PARKER: Has anyone had experience with the orchard gun for spraying? The Hayes Pump Company have a booklet out telling about their orchard gun. Also the Hardie Manufacturing Company.

MR. HACKETT: In regard to the spray gun, I am afraid to tell you anything about it, because I think so much of it that you will think I am trying to jolly you. But the actual fact is that the spray gun as used by us last year enabled us to spray, when, through weather and labor conditions we could not possibly have covered the ground. Now, that is the first consideration. The next one is we believe that with the spray gun, we covered more ground with one man on a team and with less material than we ever were able to do with two men spraying with long poles.

THE CHAIRMAN: And a better job?

MR. HACKETT: I think so. The result on the fruit, I think, shows that.

MR. PARKER: What spray gun?

MR. HACKETT. That is the Friend.

MR. STOCKWELL: I will hold up my hand on what he says.

MR. WHARTON: I would like to inquire regarding the height of trees that can be successfully sprayed with the dust outfit.

MR. HACKETT: In our experience we have trees that we are very much ashamed of on account of their small size, and others so large we are ashamed of them. For the small trees, it is splendid. I think the old pole is a little more economical, and for trees more than three years, go as far as you

like, but there is nothing in our experience that will compare with the gun. The limit of height is nothing. We never think of a tower. The man walks along and has an awfully good time, and does a good job.

I think that what I have said might be a little misleading if I did not supplement it by stating that the Friend gun,—and as far as I know any other of the same system—is not a real efficient tool unless you have sufficient power back of it in your outfit. In other words, if you cannot maintain a pressure of from 250 to 300 pounds you will not get as fine a division of your material with the gun as I think you would get with the ordinary nozzle and the smaller opening.

THE CHAIRMAN: That seems to point to the fact that some investigation should be given the matter before purchasing a certain kind of outfit for the kind of work you have to do.

Mr. Davenport, can you give us any more information on the pear psylla, which is interesting, I know, to our President and one or two others here that have considerable trouble with it?

MR. DAVENPORT: Before I say anything on the pear psylla, I might say that the Red Astrachan is also injured very much by using Bordeaux mixture. There is one variety of apple, however, which is benefited by it, and that is the Roxbury Russet. Now, you might think that a little peculiar, but I know in one particular case they had a good deal of trouble getting a russet color on the Roxbury Russet, and Bordeaux was the solution.

THE CHAIRMAN: Does that remedy go back on them?

MR. DAVENPORT: No, it gives them a good russet color and absolutely keeps them free from scab.

Now, in regard to the pear psylla. I do not know as you would want to take up at this time very much about the pear psylla, but I think if you look back over your trees or if you think back over the condition of your pear trees, you will remember that last year and the year before you noticed a little sooty fungus on the leaves and also on some of the pears late

in the fall, and in the mornings a little glisten of dew on the edge of the leaves, and if you looked at them closely, you would find it to be honey dew.

The pear psylla is a very small insect. The only insect that I can compare it with and with which perhaps you are all acquainted is the cicada. The pear psylla is like the cicada in shape and appearance, only it is about possibly 1-200 part as large. It is very small.

It stays during the winter on our trees in the adult stage, usually hiding underneath the bark. If you examine the trees closely on a sunny day on the south side and lift up some of the bark, you will find it very active,—moving very quickly. For that reason we find that during the month of November we can partly control the pear psylla by spraying with lime-sulfur during those days when the thermometer runs to about 40, because the pear psylla usually moves out from underneath the bark of the trees to sun itself, and you can get a fairly good percentage of them at that time.

The trouble is that there does not seem to be any time when we can get a large enough percentage of the insects to control it.

Then, in the spring, just as the blossom buds—the cluster—separates, the pear psylla begins laying its eggs, and those may be destroyed or partially controlled, but it is almost impossible to control them all, because they are usually placed underneath the bud scales and are not all exposed.

Then later on in the season when we spray before the blossoms open and after the petals have fallen off, if we use Black-leaf-40 in those two conditions we will usually get some more of them. But even with those three or four applications and trying the best we can, I haven't found anyone yet that has been able to keep them entirely under control, so before fall again, you have got a bad infestation of pear psylla. I think it is a subject we ought to investigate more thoroughly, and if we are going to grow any pears in this state at all, we ought to try and find some solution for it.

THE CHAIRMAN: If there are no other comments to

be made, President Margeson, I believe, has one or two other things on his mind which he would like to bring before you.

PRESIDENT MARGESON: Mr. Hardy reported fungous diseases noticeably absent, while gypsy moth caterpillars and rosebugs were plenty.

There are a few things I should like to speak about as President of the Association. All present are more or less interested in fruit growing. We are all growing it more or less and we might, in a general way, review some of the experiences of 1917.

I think we were all especially hopeful in the early season of 1917. We had a large apple bloom and many of the other fruits bloomed very profusely, especially cherries, but we found later on that our high hopes were somewhat disappointed. I know especially in my own case in regard to cherries we found we had a very large set, but more than three-quarters of those dropped off, and we scarcely got any sweet cherries, and I think this condition must have been very general. The sour cherries came through but not in as large numbers, but very good fruit.

We also had a very heavy apple crop. You know, we were expecting a bumper crop of apples throughout the United States, and when we came to harvesting the crop, we found we had a very small one, especially in New York State, where there were some four or five million barrels short of a normal crop.

Then we all know some of the experiences we had regarding help in 1917. Something has already been said in our meeting this afternoon about the help outlook. We found it very hard last year to get help that was qualified to take care of the orchard and our various fruit trees, etc. Then we found it very difficult to obtain help for picking the fruit. In the small fruit line, I do not think I ever had as much trouble in getting boys and girls to do the work. It seemed as though when you paid the boys twice the normal wage, they were not satisfied.

But on the whole, I believe those of us who were able to

produce a crop of fruit received better prices for that which was produced in the year 1917 than we have for quite a number of years. There seemed to be a ready market and people were desirous of getting all the fruit they could, either canning it or drying it.

And right along that line, I think we are up against a proposition this coming season. We are going to discuss this evening for a short time our sugar problem. The sugar proposition is a real problem, and we are not sure we will get it in sufficient quantities to take care of the fruit. I believe we have got to look to some other way to take care of our fruit. We have got to resort to drying, perhaps, and this will have to be carried on in some larger way than the individual home drying.

We should have in various sections of the state drying plants properly conducted where the people could be educated in the art of drying fruits. I think we all found, especially those near small towns, that the municipal markets were a great help to us in selling our fruit, those who do a retail business were able to get rid of their fruits with much less help, and less expense, than if they had to take it to the home of the consumer. I believe the consumer enjoyed it as well, and was glad to get out and meet the grower and procure their fruit fresh at a reasonable price.

And I think right along this line, if we have these markets another year, we should be careful not to put prohibitive prices on our fruit, in order that the consumer will come and buy our products and feel satisfied. We should consider it an advantage to have the consumer come to the market and get our fruit.

We had trouble in regard to the selling of the late fruits, the late peaches and quinces, etc. It seemed hard to sell them when the sugar famine came on.

I would like to speak in regard to the Fruit bulletin that was gotten out. This was worked out through your Association. Some of you may not know it, but we had this little bulletin prepared. Some of your officers gave quite a little

attention to it in concert with the State Board of Agriculture, which was glad to co-operate and put up the money to publish it. As Mr. Annin told us this morning, there were 115,000 copies of this distributed throughout the state.

Most of you have seen it, but it was headed "Fruits as a Food." We had some illustrations in it, and took it up from this standpoint: "East fruit, why eat it, how eat it, and when, why fruit is palatable. It adds flavor and zest to meal. Fruit is nutritious. It furnishes heat and energy at low cost and it should be eaten in combination with tissue forming foods, like bread, milk, eggs, meat and beans."

"Fruit assists digestion of other foods. A daily diet of fruit is the best laxative that can be bought. Fruit contains certain acids which are indispensable to the human system. Fruit is healthful. It improves the complexion and purifies the blood. Fruit is a necessity, not a luxury."

How are we going to eat it? "Fruit may be used in many ways. Eat fruit raw—before breakfast, after lunch, after dinner, before retiring, between meals.

"Eat fruit cooked—stewed, baked in cakes, pies and puddings and tarts. Eat fruit preserves—canned fruit, fruit jams, fruit jellies, fruit marmalades, fruit conserves, fruit sauce.

Drink sweet fruit juices—cider, raspberry vinegar, blackberry wine, grape juice. Eat fruit dried and evaporated—drying and evaporating can be done at home—dried and evaporated fruit is one of the cheapest foods.

"For methods of preservation of fruit, send for the following publications: United States Department of Agriculture—Farmers' Bulletins Nos. 293 and 841; and State House, Boston, Room 136, for Circular No. 55."

We are laying a few of these bulletins on the table. We do not want you to carry them off. There is only one of each kind, but perhaps you would enjoy looking at them; and also looking at some of Mr. Barelay's apples which he grows in cultivated soil. They are on the table, too. We had this bulletin sent out under the State Board of Agriculture, feel-

ing it would carry much more weight than if sent out by the Massachusetts Fruit Growers' Association. The consumer and the grower benefit from it.

“When? Eat fruit in season. Fruit in season is always reasonable. Fruit in season is always fresh. Fruit out of season is expensive and stale because it is hauled long distances.” Of course, this applied more to the small fruit grower than to the apple.

“Fruit in season comes from nearby points.”

This was an especially good point,—“Watch the market for times of low prices and then can, preserve and evaporate in large quantities.” We all know that there have been certain seasons when there was a glut in the markets of small fruits—and if the consumer knew something about this, then he or she would go on the market at that time and purchase our fruits for putting up.

“This will use up fruit that would otherwise be wasted and will furnish desserts for the winter—delicious and nutritious.”

I wanted to bring this to your attention because by a distribution of 100,000 of those bulletins an extra demand was created for fruit. I know personally I used something like two or three thousand of them, and people were glad to get them and seemed to respond.

There is a number of drying apparatus on the market. There is one that could be purchased for five or six dollars, or could last year. It is a home one, but I think we should have something on a larger scale.

Now we should look ahead a little to the season which is before us. We are facing hard problems,—we are facing expensive conditions for fertilizer, and the spray material is high, we should not neglect our orchards or fruit plantations and we should spray them as thoroughly as we can. If we neglect them this season, they may get where it is going to take a long while to get them back where they are at the present time. I believe those who are at the head of the food department, especially the sugar department, will rea-

lize that canning is a good way to conserve sugar in the fruit, and I think a certain amount will be liberated. We should give careful attention to our growing this year. I believe we are going to sell what we grow. Let our aim be to grow the best we can. We have heard a lot said to-day about help in regard to boys and girls and women gathering the fruit. I am not so sure but we can gather it quite as well with the help of the girls and women as we have been able to with some of the men.

This has been a hard year and one in which there was very little your Association could do, or your officers could do, but we have had the interests of the growers upon our minds and tried to do, in a quiet way, what we could to encourage an outlet for the fruit.

This evening, if you are present, we will read you the communications which we have had with the Food Administration. We have taken it up with the State House at Boston. Mr. Wheeler has taken it up with Mr. Hoover in Washington. We have quite a lot of correspondence here, and it looks encouraging in regard to sugar.

I believe we are confronted by a serious condition in regard to the pear psylla, and unless we are able to control it we will be losing our pear trees soon. I know in the orchards where there are only a few trees in the back yards in our section, it is getting beyond them. I do not believe we can control it as well with lime-sulfur as with oil. I think if the oil is used in the fall and again in the spring, that we can check it, but the lime-sulfur doesn't seem to penetrate under the bark and control the pear psylla.

THE CHAIRMAN: I would like to bring a little matter to your attention. I do not believe the Association should overlook this matter of extending a vote of thanks to the people who co-operated with the Association in getting out this information last summer, when it seemed to be desirable; and also a vote of thanks for their offer to assist next season in getting out information. As Professor Chenoweth left the hall, he told me that his department at the college

would be more than glad to assist in whatever way they could in getting out whatever things would help the selling of our fruit. I believe a vote of thanks is due to these people, and I move you that such be given them.

Motion seconded and carried.

PRESIDENT MARGESON: I am sure we are all very glad to hear Mr. Munson's suggestion that we move a vote of thanks to those who helped in getting out this information,—the State Board of Agriculture and the Agricultural College.

If there is nothing further to come before us at the present time, we will stand adjourned until 7:30.

EVENING SESSION.

President Margeson, Presiding.

THE PRESIDENT: The meeting will now come to order. Those in the rear of the hall will please come forward and take seats. The first item on the program for this evening is "The Latest Report of the Food Administrator on Sugar for Preserving Fruit." Your Association has had some communication with the sugar people and I will be glad to give you, in a brief way, our communication and their reports to us.

A committee met the head of the State Sugar Division at the State House and were cordially received. The side of the grower was presented and assurance was given that sugar for preserving was considered part of the conservation program and the growers would be justified in planning for a full supply of sugar to take care of the canning season.

Word is also brought directly from Mr. Hoover by Sec. Wilfrid Wheeler, who has just seen him in Washington, assuring the food administration's appreciation of the value of preserved fruit.

The next subject on the program this evening will be handled by Mrs. Burnham, of Waltham, on "Evaporation of Fruit." I understand that she will be engaged by the United States Government right along in this line during the coming season. I am sure she has something good for us, and we will be glad to hear from Mrs. Burnham now.

EVAPORATION OF FRUITS AND VEGETABLES

Mrs. Irene Burnham, Waltham.

Mr. President and members of the Association, I was charmed this afternoon to hear your president say that he thought that there should be more commercial evaporating done in the state this year. It helped me out greatly for when the need of any thing is apparent you can begin at once by telling people how to do it.

I would like to tell you a little about what the German housewives have been doing along this line of evaporation for many years. They have had teams go through the market places each night to take from them any products which were in danger of not keeping until morning and these products have been taken to a community drying plant and saved for future use. They have also had itinerant drying equipment on automobile and wagon bodies and have gone over the farms after the harvest, picking up everything that has been dropped and drying it so that no kernel of corn or grain of any food value has gone to waste, and we are told that the government inspects the housewife's store room from time to time to see that she has a good supply of dried products on hand, the understanding being that she should have vegetables and fruit on hand to last a year if her supply were cut off.

The Germans are now having vegetable soup made from a combination of dried vegetables which gives them 200 calories per portion. Let us learn some of these lessons of thrift now and then let us not forget them when our time of real need is past.

We have been able to feed ourselves well, to export all that we wanted to and to waste a great deal but that time is over for us for the present at least and I believe we will

never go back to the days when we depend entirely on the grocer for everything, but out of this terrible conflict we will come a more thrifty and economical people.

Drying is Nature's own method of preservation as we see in the drying of grains like wheat, corn and many others. And it is a century old method although you will hear many people say "This drying of vegetables is something new isn't it?" Nearly all that we have learned about it has been gleaned from French and German books in our libraries, and from that we are going on experimenting and learning all the time and I feel sure the more we find out about it the more eager will we be to do more of it.

There are three names in general use for this process of preservation and in the final analysis they all mean the same thing so you may call it by the old name of drying or you may say "evaporating" or even "dehydrating" so long as you do some of it we will not quarrel about names.

There are three methods of drying: Sun drying—drying by artificial heat—and drying by moving air. And really a combination of heat and circulation are essential. Sun drying is a method entirely dependent upon climatic conditions. In Southern California sun drying is practiced almost entirely, as they are free from rain or excessive moisture for the entire season, but in our New England climate it is rather an uncertain method as we are never sure of our weather and rarely do we have enough warm, dry days in succession to entirely finish a product, but we may begin drying in the sun and finish by artificial heat, always remembering that a good circulation of air is just as essential as the heat, without the products will mould or sour rather than dry. Sun drying is usually so slow a process that a darkened product results and possibly not so good a flavor as though dried more rapidly with the aid of artificial heat.

The method of drying with the aid of moving air which usually means the use of an electric fan has its disadvantages in this climate unless you can heat and dry the air you blow over the products as, obviously, there would be no

advantage in blowing over your vegetables air which is already saturated with moisture, but if you have an arrangement for heating the air you may dry very rapidly in that way. There are a number of ingenious contrivances which will suggest themselves to the housewife who has electricity in her home. Drying by artificial heat opens up many uses for equipment which every home has without the expenditure of any money at all. Your range or gas oven may be utilized to very good advantage for this work always leaving the door open for the escape moisture. Remember the oven is made for cooking and that is what you do when you close the door, but if you leave the door open you will have a circulation and dry very nicely. The one thing to be very careful about in oven drying is not to have too high a temperature. The temperature should never go over 160 degrees and it is best to begin the drying as low as 120. I believe the only way to be absolutely sure of your temperature is with a thermometer. I have heard people say they could tell the temperature of the oven with their hands, but I am sure it is not a very sure test and I should hesitate to depend upon it. However if you have a thermometer or care to invest in one you may do a great deal of satisfactory drying in your home ovens when the fire is low or by turning your gas or oil flame very low, and you can see you are using very little fuel by doing this. Another way in which you may use the artificial heat which is escaping from your stove is by arranging a tray or series of trays on the back of the stove or hanging them over the stove, if these trays are made of wire such as is used for cellar windows the air will circulate through them very nicely and drying may be done quite rapidly.

For commercial evaporating there are many types which would need to be studied and the kind best fitted for the locality used. The large Stahl dryer has a capacity of quite a number of bushels at a time and may be filled several times a day and for community work should be very satis-

factory.

I hope the surplus of fruits and vegetables which we hear such weird tales about once in awhile, being told of a surplus so great that it does not pay to market it, or of things being thrown into the harbors for one reason or another, will be taken care of this year, and if it is too much of an undertaking for the community centres which I am sure every town and city will have, then I should like to see it done on a commercial scale. It will take but a very short time to create a market for the dried products once they are well known, and it should be perfectly possible for it to become a paying proposition financially as well as a much needed line of conservation work this year for a drying plant to be established in connection with our large markets and also on a smaller scale for each farmer and fruit grower to have some arrangement for evaporating the products of which he has a surplus.

The Fruit Growers' Association could do some definite work along this line by arranging for some demonstration of evaporated products in a large market near the fruit orchards. And I believe these demonstrations to be really as convincing as they should be must show some of the evaporated product again brought back to its original state and ready to be served.

In preparing vegetables for drying it is better in most cases to give them some preliminary cooking, in the case of root vegetables so that the skins may be easily removed, and in the case of nearly all vegetables the color will be better and the time required for drying quite considerably lessened by pre-cooking. The amount of pre-cooking to be given is a matter of personal preference, they may be entirely cooked, but this is not necessary, and of course in the commercial evaporating plants very little preliminary cooking is done. In fact the potato evaporators of Canada are sending many potatoes over seas and they are simply washed and crushed with the skins on and then dried, but in the home I think you will be better pleased with your product

not to do that. After partially cooking the root vegetables slice them and put them on the drier, the more thinly you slice them, of course, the more quickly will they dry, but I think sometimes it is better to sacrifice a little in the drying time and have thicker slices when serving, for instance carrots. The exception I would make in pre-cooking vegetables is onions. They are much nicer to slice them raw onto the dryer, as the cooking and then drying seems to toughen them. You may not care to dry many onions if you have a suitable storage for them, but they make an a valuable addition to soup vegetables. Greens may be previously cooked or not. I have had perfectly satisfactory results in drying greens with no cooking, but the French authorities tell us they lose much in flavor and color. A few weeks ago I gave a demonstration luncheon to the Faculty of Wellesley college; some of the girls of the different dormitories were asked to be present and test the products and say if they were willing to have those products served to them the coming winter. They were much pleased with most of the things but the spinach and kale which I served were so strong of mineral salts that they did not like them. That seemed to me proof that they had not lost much of their flavor. I cooked them in the same water I had soaked them in and they were somewhat bitter. If I had poured the water off once they would have been better.

In the drying of fruits no preliminary cooking is necessary but a much better product will result if the skins are removed. Fruits like peaches and quinces may be dried as apples are and stored until such time as you care to use a little sugar in cooking them. Berries are dried whole or mashed and dried in sheets into what is known to the French as "fruit leather." This is very nice to use as a confection or in sauce and ice creams, and is much appreciated just now if sent to the boys over seas. It is also very nice to make little cakes of peach and apple butter and dry them to the consistency of figs. If you have a friend "over there" he will be delighted with some home made sauce of

that sort and in many cases you will find that he has eaten it all as a confection because he could not wait to soak it back to a sauce.

How to know when the products are sufficiently dry is a matter which troubles some. Generally speaking there is no great danger of getting vegetables over dried, the greatest danger being of having too high a temperature and cooking them, but with care about this you will soon learn when they are sufficiently dry. A simple test which may be tried until you have had experience enough to know when the products are dry is to put a little of the product in a glass preserving jar with a dry cracker on top of them and seal the jar for over night. If the cracker is dry in the morning the product is all right; if not you will need to return it to the dryer for a little while. Nearly all vegetables will dry under good conditions of dry and moving air in about three hours, but of course conditions vary so much that no stated time can be given.

The test for fruits is that you should not be able to get any pulp from them and that they should not stain your fingers when crushed. It is possible to dry fruits so much that it will take them a very long time to soak out again as it takes fruits always longer to absorb water after being dried than it does vegetables. Prunes, figs and raisins are a good example of dried fruits. You know they are not so dry that they are brittle and break, but no pulp comes from them and they do not stain your fingers. All fruit butters if dried to the consistency of figs will keep indefinitely.

In storing dried products two things are necessary to remember. First to store them where they will be free from moisture, and second to be sure that they are secure from mice. They are fairly aromatic and will attract mice if they are where they can reach them. Paper bags are good containers if twisted together at the top and tied firmly, and several bags may be put into lard pails or coffee cans. Any number of containers may be found in any home without the expenditure of any money and a supply of vege-

tables sufficient to supply an ordinary family for a long time may be stored in very little space. The shrinkage in bulk and weight of most things is quite surprising—for instance—six pounds of cabbage when dried weighs about four ounces; a bushel of potatoes (60 pounds) weighs when dried 10 pounds; two quarts of string beans will easily be contained in a pint paper container. It is undoubtedly one of the best ways of shipping foods because of the economy in space and weight, and it is also a good way for apartment dwellers who have no good storage space to keep their supplies.

The time of soaking out these products depends somewhat on the time they take to evaporate but I think it is better to give nearly everything plenty of time to absorb the water slowly and then in cooking they may be treated just as fresh fruit or vegetables would be. If you can keep your products in a cool place I would prefer to soak everything over night, although many bulletins will tell you that three hours is sufficient.

The best bulletin about drying that I know of is "Bulletin 841" which may be secured by writing to the Dept. of Agriculture at Washington.

If I have not covered the ground thoroughly I should be glad to answer any questions that I can.

CHAIRMAN: Is there any one who would like to ask Mrs. Burnham any questions?

MR. DOTEN: I would like to ask if you use bleaching.

MRS. BURNHAM: I have never used sulphur or any chemical bleach. In the commercial evaporators I believe they use a sulphur bleach to preserve the color. The only thing that I have done is to drop apples into slightly salted water after they were sliced until ready to put them onto the dryer.

MR. DOTEN: How about the selling price of these products?

MRS. BURNHAM: I don't know that the price is as

yet created but all who have seen the finished products have been greatly interested and many have asked me where they could be procured. so there should be no trouble in making a market.

THE CHAIRMAN: I would like to ask how long it takes to soak out the dried product.

MRS. BURNHAM: Generally speaking it takes about as long to put the water in as it took to take it out. Sweet corn, for instance, will evaporate in about three hours. Usually, I soak my sweet corn three hours. You can soak it over night, if you care to, but if you do so, you should keep it in a cool place. There is such a large percent of sugar in it, that it is apt to sour.

Root vegetables, generally speaking, I would cook pretty thoroughly before I evaporate them. Beets, for instance would want to be sliced before they were evaporated. Of course, you wouldn't want to slice them and cook them. They would lose their color, so I cook my beets and slice them.

In the large evaporating plants where they are drying potatoes they simply wash them and then mash them to a pulp, and dry them to a sort of starch compound.

THE CHAIRMAN: But the fruits, you wouldn't cook?

MRS. BURNHAM: No, unless you wanted a dryer butter.

MR. PUTNAM: Is that the only kind of vegetable cooked before being dried?

MRS. BURNHAM: The root vegetables.

MR. PUTNAM: When I was in the army, we had all kinds of vegetables. such as potatoes, cabbage and turnips. They were partially cooked and dried and pressed into a block and called concentrated vegetables.

MRS. BURNHAM: Were they good?

MR. PUTNAM: They were good. They were put into soup. We had scurvy very bad in the army and had to use something of that description. You could not get potatoes, so the folks at home got up this vegetable matter and

had it dried and pressed into blocks and we used to get it. It would come out just the same as a block of dates or something like that. Then we would put it into the kettle and make soup.

MRS. BURNHAM: I have a friend who has charge of an old ladies' home and she told me she stewed her tomatoes with different flavorings until they were stewed down quite thick and then dried thin and put them into a candy box, and a teaspoonful of them would serve 20 old ladies with soup. However, I do not know whether I wanted to be one of the old ladies or not.

MR. WHITCOMB: I would like to inquire if there are any figures available as to the cost of this drying. For instance, two bushels of potatoes reduced to 20 pounds, what would be the cost of getting rid of that 100 pounds of water?

MRS. BURNHAM: In our kitchen where we did it, as I say, we used the Granger Evaporator. Once your water is heated under that evaporator, it takes a very short time. The pilot burner will keep it going, and I evaporated those potatoes in about three hours with the pilot burner, so the cost for gas was very slight. The electricity was probably five cents; possibly 15 cents would fully cover the cost of evaporating two bushels of potatoes. if you don't count the labor. There was some work to cooking them and peeling them, though.

MR. WHITCOMB: The sun drying would cost nothing, of course, for fuel. We might be willing to sacrifice the price of the materials for the sake of the sun drying.

MRS. BURNHAM: That might be, if you live in a part of the country where you are at all sure of the weather. In Waltham we are too near to the ocean to be sure of more than three hours of dry atmosphere at a time. On our hottest, sunniest days—there are very humid days and very bad for drying.

I think it is always well, if you have a good sunny day, to start your evaporators down in the sun, but always

finish them over artificial heat, to kill any insects or anything of that sort. Of course, in Colorado and Arizona, where they never see a cloud for months at a time and the air is very dry, sun drying is used very largely.

MR. WHITCOMB: I would like to inquire if you have had any success in drying tomatoes and celery?

MRS. BURNHAM: Celery and tomatoes all are in that box. They are often contained in the soup stock. The tomatoes that are in that box I dried this way: I cut them in halves and with powdered sugar, dried them to the thickness of figs and sliced them, and you may stew them until they are quite thick,—I wouldn't try tomatoes. They are perfectly good, but there is such a large content of water from them that you lose more or less juice, and I think I would use my glass jars for tomatoes in preference to almost anything else, and dry some of the drier vegetables. I would always dry from preference for the best flavoring in them. I would always dry corn, peas and string beans. Those beans, which look so much like little worms, are delicious. They are very much better than anything I have ever seen.

THE CHAIRMAN: Are there any further questions,—now is your opportunity to find out about drying.

A MEMBER: I would like to inquire if there is a reasonably priced evaporator on the market which the farmers could afford to buy without paying too much?

MRS. BURNHAM: There are a great many. Granger Evaporator, if you have steam pipes at all, is a good one. You can get hold of a bulletin that I have here, "The evaporation of fruits and vegetables by J. B. Caldwood, of the State College of Washington." It is the most complete thing I have seen at all. There is a Government bulletin on home drying, but this takes in both home evaporation and commercial, and also for the farmers' use, and tells you every type of evaporator used, so far as I know. It is bulletin No. 148. I think you will find it very valuable, and I am sure they will be glad to send it to you. It is the State

College of Washington, at Pullman, Washington.

THE CHAIRMAN: Are there any further questions? I am sure we have enjoyed Mrs. Burnham's talk very much, and we all appreciate the peaches. (Applause.)

MR. DAVENPORT: It might be interesting to you to know that in Westfield, this last year, there was a plant that did quite a little evaporating. If any of you are in Westfield or near Westfield, if you will look up Mr. Fowler,—I do not know whether he is doing any this year or not. He may have decided after one year's experience not to do any more, but they did quite a little bit of evaporating last year there in Westfield.

THE PRESIDENT: Mr. Collingwood is our next speaker. I do not think he needs any introduction to the Massachusetts Fruit Growers' Association. I am sure he will have something very special for us tonight, and I now have the pleasure of presenting Editor H. W. Collingwood of the Rural New Yorker who will speak to us on "How War Conditions Will Be Met on Hope Farm This Year."

HOW WAR CONDITIONS WILL BE MET ON HOPE FARM THIS YEAR.

Editor H. W. Collingwood, Rural New Yorker, N. Y. City

This war situation is changing the life of every man and woman in America. Men of my age can never expect to see this old world settle down once more into normal conditions, and the future of this world will depend very largely upon the way we older people view life during the next few years. I do not need to come to New England and tell your people what war means, or what preparation for war means to those who stay at home. For the New England people, from the time of King Philip's war, down to this day, have at intervals gone through a period of home preparation and war change. The problem is what shall we do; with our boys and our workmen taken away from us to keep our farms and do our share at fruit production.

During the Civil War a Pennsylvania farmer came in from his work one day and drove his axe into a log. Then he walked into the house and said to his wife, "Mother! I am going to volunteer! I must get into this war!" He had brooded over the subject out in the fields day by day until it had come to be a part of his life, and he had to volunteer. The wife told him to go, and that she and the children would get along in some way. When that man went, a boy of about fifteen years became the head of the family. He went to his mother one day and said, "What shall we do with this farm?" The mother put her hand on his shoulder, looked off across the fields for a moment, and said, "There are just two things for you to do. **Trust in God! And plow up close to your fence rows!**"

That was the soundest advice I ever heard, and it tells

the whole story. It is what we, whose privilege it is to remain on our farms, must follow out during this war. We must have confidence and trust, and this gives us the double power of manhood. We must "plow up close to the fence rows." That means utilizing waste products, and doing things we have never thought of before, or changing our methods in order to economize labor if we can find the right thing to do.

This is no time for a grouch or a growl. We have got to come across, or the Kaiser will, and the better spirit we show in going at our job, the finer our job will be. We have a little girl at our house who has given us a fine example in this line. She is a little thing, hardly two feet long, but she has a very large person as bed fellow. During one of the coldest nights of winter, that little thing got into the big bed, kicked around a little, and then called out—"Come on, now, I have got the bed all warmed up as far as I go." In these war times men of our age cannot stand back and frighten ourselves in considering how cold that bed must be. We have simply got to warm it as far down as we go and the rest of it will be provided for.

Last fall I thought I saw how this thing was coming. My boys volunteered, as I wanted them to do. A munition plant took away most of the rest of our workers, and I knew that we must change our methods; so last August I seeded every foot of ground I could in a cover crop. It went into the corn, into the orchards, wherever it was possible to put the seed in time. Part of it was rye alone, part of it was rye and vetch. Thus the entire farm is now covered with a good thick coat of grain, which has come on since the regular crops were harvested.

Now I figure that the price for most of the things we raise this year will probably be above the average. Perhaps not for potatoes, but for most of our other crops. If we are able to obtain help, the cover crops plowed under will make our land all the stronger. If we cannot get this help, we can obtain an income from our cover crops without expen-

sive labor. We can let them go to grain and straw, seeding clover in the spring so as to have them in hay for another year, or we can feed these crops down with pigs. Our peach crop this year will be a failure. The buds and many of the trees have evidently been killed by the hard winter. With our cover crops we can substitute pigs for peaches, and obtain a fair income through the substitution.

My experience last summer convinced me that we have never given the pig a fair run for his money. We have mistaken his nature, and he has made us pay for the mistake. Many of us were brought up to believe that the only way to keep a pig is to build a small pen, perhaps 8 feet square and six feet deep in mud; and turn the poor thing in, feeding him on swill and table scraps. Or we think the only thing a pig is good for is working over the manure pile and living a lazy, shiftless life in a small pen. The fact of it is that the pig is a grazing animal, just as much so as the sheep or cow, if you will only give him a start. I found that out last summer, and the knowledge has proved a good asset for us. I can put a portable fence around a part of the vetch and rye, turn my pigs in, put in a self-feeder with ground oats, tankage or any cheaper grain, give them plenty of wood ashes and charcoal, plenty of water, and an oiler for them to rub against, and let them alone. They will do the rest. They will harvest the rye and vetch, and then move on to another field. They will keep clean, healthy, and grow into pork while you wait. Many people make the mistake of turning a drove of hogs into an old orchard, where there never was any feed, and expect the pig to play the part of a clover plant and get nitrogen, and everything else, out of the air. That is a good way to raise runts, but no way to make pork. I have found that the green pasture crop will just about furnish a living, and a little growth on the pig, but you must feed grain to some extent in order to get full growth. I believe that we shall find that this substitution of pigs for peaches in a season like this, will give a profitable investment. A crop of oats and peas, or of rape, can be seeded in

the spring, but the most profitable way is to seed to a cover crop in the fall after cultivation is done, and have the pigs ready to turn on the following spring.

Why do we not advocate keeping larger flocks of poultry? The present high prices of grain, and the fear of a restrictive legislation, do not give poultry keeping a good outlook at present, unless you are in a position to produce most of your grain. If a fruit grower can produce fair crops of wheat, barley and corn, it will certainly pay him to stay in the chicken business. I do not think he will make any money this year, but as sure as fate there will come a time when the swing will be back into poultry. Prices of feed will drop sometime in the future, and then there will be a great shortage of birds. There will be a rush to get back into the chicken business, just as there has been a stampede to buy sheep. Then those men who have stuck to the proposition, and have kept up the quality of their flocks, will have far more business than they can attend to in supplying the people who want to get back into the chicken business. A young man or a boy, can hardly do better at this time than to cull and select a small but choice breeding flock of almost any breed that suits him. My advice would be to enter pullets from this stock at one of the Egg Laying Contests, and stay by them year after year. In the course of time there will come a good record, and when prices of grain fall, as they must in the future, the reward will come when people must have good birds to start up their flocks anew. I have had no experience in growing Spring Wheat in this part of the country, and personally I doubt if that crop will pay. If there are localities where it will get through, I think both Spring Wheat and Winter Wheat, the latter as a cover crop, will pay in place of rye.

In former years, when labor was to be obtained, I have grown considerable crops of potatoes, tomatoes and smaller garden stuff. This year it will depend largely upon the labor supply. It would be, I think, folly to start such crops on a fruit farm, unless we were entirely sure of labor enough

to take care of the crop. This is our bearing year for apples, and it seems to me better to spend our time and labor in the orchard and give it as good care as possible, rather than to give half care and put the rest on to hoed crops. My orchard is on a steep hillside, and is at present in sod, very largely a combination of Sweet and Alsike clover. Our plan for handling it this year is about as follows:—

In April we shall go into that orchard and plow seven or eight furrows on each side of a row of trees, throwing the furrows to the trees. Then about 600 pounds of lime to the acre will be put on this plowed ground and worked in with a Disk. This ground will be harrowed at intervals of about two weeks up to the latter part of June. Later after our early crops are planted, we shall plow the middles on what is left of the sod between the rows, put on more lime, and harrow down in the same way. Then two rows of corn will be planted at the center of these middles. That is all we care to plant between them now, as they are about 16 years old, and will give a good crop.

These trees have received about 15 to 20 pounds of chicken manure each, or that equivalent in good stable manure. This was scattered on the sod around and under the trees. During May we expect to put eight pounds or a little more of phosphate around each tree, and thoroughly harrow it in. We used slaked lime in this orchard instead of ground lime stone, as the slaked lime is quicker in its action, and the haul of the top of the hill means considerable to us.

A corn fertilizer is used in the hill for the corn, and good culture is given up to early July, when a combination of buckwheat and Sweet and Alsike clover mixed together is seeded over the whole orchard and harrowed in. This clover will stand for two years. We usually plan to cut at least twice during the season, and let it lie on top of the ground under the trees. The third year the sod is plowed again, and the same work I have mentioned gone through with. Thus we plow every third year, at which time we usually get enough corn to pay the cost of plowing and cultivation. If

it is a wet season, we can take out the buckwheat grain and leave the straw on the ground. If it is a dry season, the growth is not so good, and we usually let the whole thing mat down on the ground. I have been told that this is a lazy method of handling an orchard, but it has given us good results thus far. Personally, I do not think the New England people have ever given anything like a fair chance to Sweet clover. Judging from my experience, and what I have seen of it elsewhere, I think this Sweet clover can be made remarkably useful in our fruit growing, and it ought to be taken up and tested elsewhere. The great problem with us has been how to spray to best advantage for the coddling worm and scab. The liquid sprays for the scale can be put on over a range of several months, but the coddling worm must be fought at just exactly the right time or he will win out. I do not expect to have the labor for careful liquid spraying this year. My water supply is far removed from the orchard, and usually the winds are very high just at the time that the spraying will be done. We intend, therefore, to break away from the old habits, and use dust this year. I have bought a Power Duster, and we intend to use the dry sulphur, lime and arsenate of lead at least three times during the season. I have not believed that this would take the place of the liquid until this past season, when the results of experiments in several orchards in the Hudson Valley have certainly proved convincing. I do not for a moment believe that the dust will have much effect against the scale. Where that insect is present we shall be obliged to use the liquid, but for the worm and the scab I feel sure enough of the dust to give it a fair trial.

Another thing which I think will pay well this year is the production of good seed corn. There has never been a time in the country when the seed corn situation was worse than it is today. The early frost cleaned up vast quantities of corn which was intended for seed, and careful testing is now showing that much of the corn which farmers are depending on is more than half dead, that is less than half

will germinate strongly. The result is that very much inferior corn will be used for seed, and this will mean a poor yield and low quality of grain. Another year there will be a rush to get back into standard varieties by obtaining high class seed, and this as I see it gives a chance for the New England fruit grower to plant some of the choicer varieties of Flint corn and give it extra care. For the next few years I believe that many people who have formerly used Dent corn entirely, will be hunting for good seed of Flint, as there is a general belief that the Flints are earlier and more likely to get through without being killed by frost. Thus a man who is careful about his variety and culture can take one of these extra strains of Flints and develop it so that it will pay him better than Sweet corn, without being obliged to pick and market it during the summer. At home we have a variety of Flint which seems well adapted to orchard culture, as it matures quickly and makes a low stocky plant. I have been surprised to see what a demand there has been for this kind of corn, and our plan this year is to plant this corn in the orchard, give it the best culture we can and save the seed as well as we know. I think that for the next few years there will be a fine opportunity for many a bright young man on a New England farm to develop a good strain of Flint and put it on the market as seed.

The labor question will bother many of us this year, perhaps more than ever before. I think we should all be very careful not to try and plant too much of an acreage, so that we cannot give it good care during the summer. It seems to me far better to put our land into oats and peas, or some other broadcast crop, rather than to plow and plant a lot of stuff which we never can handle properly. In many parts of the Hudson Valley the women and girls have given good satisfaction in light work such as picking and packing. Of course these women are not able, as a rule, to do the heavier and rougher work of the farm, but men who have employed them say that as pickers and packers, or at work

with a hoe, they have given better satisfaction than the average of men. They generally come in units, living at some central place by themselves, and go and come to their work in groups. I believe that this kind of labor will prove of real service to us in the lighter work of picking, packing and hoeing. Our hardest job will come in finding labor to spread manure, plow and do the heavier work of spring. We have tried school boys and young college students to some extent, but they have not proved entirely satisfactory, and my judgment is that up to the limit of their strength the older women of ambition and character will be more satisfactory than this boy or student labor.

The fertilizer question will bother us greatly this year. I find it harder than ever to buy stable manure, and harder yet to depend on having it hauled over the railroad. The price too has gone up so as to make it almost prohibitive. I have been able to buy considerable quantities of chicken manure. A number of large chicken men in my neighborhood became discouraged over the various poultry rulings, and have about decided to give up their business. They will sell off their stock, and as they have only a limited amount of land they are willing to sell the manure. I buy this chiefly for its nitrogen and potash, and probably at the price we pay for it it is the cheapest source of potash we can get this year. The manure comes to us dry, and without much litter. We spread it around our fruit trees during spring and early summer, and plan to add a fair amount of phosphate along with it. We are trying several kinds of phosphate this year, in the hope of learning how to economize with this fertilizer. There seems to be no question that acid phosphate is the most desirable form, especially for fruit growing and gardening, but this season it is almost impossible to obtain this phosphate at a living price. I shall experiment to some extent with the Barium phosphate, which is produced in the Northern part of New York. I am not sure yet that this will prove any more satisfactory than raw phosphate rock but I believe it is one of those things

that we should try thoroughly. We need a supply of phosphates produced closer to New England than Florida or Tennessee, and if this Barium phosphate will really give us fair results, it will prove an advantage to New England. In a time like this I cannot advise much experiment with new things. It is better to stick to those things we are sure of, but in this case I believe it will pay to make a trial of different phosphates in various combinations.

In almost every country home very much more wood has been burned for fuel this winter than ever before. Many families like ours at home, have used chunks of apple or other hard wood with the coal in running the furnace, thus there is more potash than ever in the coal ashes, and I think it would pay us to use them, especially if they have been well sifted. There may not be much plant food value in them, but they will lighten up a heavy soil, and are very good for using as a mulch around fruit trees. Of course every ounce of wood ashes should be used on corn or garden crops. In many cases the pile of coal ashes has been used as a place for dumping the waste from the house. This is a good practice, as the coal ashes absorb and hold the ammonia in this waste, and when they are spread this plant food goes along with the ashes. Every bit of waste should be scraped up and used this year, and especially every bit of trash, weeds, coarse hay or even brush should be saved for piling around fruit trees to form a mulch.

We all realize that we have our work cut out for us this year, and we must think and economize in time and labor as never before. This war is making changes so great that few of us realize what they will mean to us. Life can never be the same to us again, and in every farm community great changes are to be made in methods and in crops. That being so, the success of the future depends not so much upon muscular effort, because that would be hardest to obtain, but rather upon the ability of the farmer to use his brains, think out new plans and methods, and adapt his work carefully to his conditions. (Applause)

THE PRESIDENT: I am sure we have all enjoyed Mr. Collingwood's very able address and we stand adjourned till 9 o'clock tomorrow morning.

WEDNESDAY (Morning Session) 9 o'clock a. m.

Vice President Jenks in the Chair.

THE CHAIRMAN: The meeting will please come to order. I understand that most of the committee reports have been rendered or will come later in the day. The matter of co-operative fruit exchanges has come to the foreground rapidly in the last few years. There are several in the state that have been under way for several years now, and the experiences which they have gone through and the results they have attained are very satisfactory. The Marlboro Exchange has been very highly advertised and is well known throughout the state. We are especially fortunate this morning in having with us Mr. Gage, who will discuss the "Highland Co-operative Fruit Exchange of Marlboro, and some of their Marketing Problems,"—Mr. Gage (Applause.)

“MARKETING PROBLEMS OF HIGHLAND CO-OPERATIVE FRUIT EXCHANGE, MARLBORO, MASS.

Mr. Sumner C. Gage, Manager.

Ladies and Gentlemen, your applause comes from anticipation. There may not be any after the realization, I assure you of that. I understand that I am to speak this morning upon some of the problems of the Highland Co-operative Fruit Exchange. I notice that in the audience we have two of those problems,—as two of our members are here. It is possibly assuming quite a little for a small exchange like ours to come here and attempt to tell you of our common experiences, when undoubtedly there are men in the audience who grow and sell more than the combined farms of our exchange every year.

But the problems of co-operation and the difficulties of getting men to co-operate are probably as great in the small exchange as in a larger one, and surely in the small exchange we find the embryonic conditions which must be decided in the larger exchanges before they can be made a success. It is an easy matter to read of co-operation and how successful it is, and how they conduct it, but rules that apply abroad will not apply at home. I believe that each exchange has its own problems to solve.

In the fall of 1916 Highland Co-operative Fruit Exchange made its first attempt at co-operative marketing. Several members signed an agreement to sell through the Exchange, this to include a commission of 5 percent to the Exchange and the grading of the apples by a disinterested party. The manager, Mr. Ralph Barnes, interested several buyers in the fruit, secured their bids and submitted the same to the directors of the Exchange. The directors finally

sold the apples to a Chicago firm, and I (as grader) received orders to go ahead and prepare the apples for shipment.

Problems immediately commenced to assert themselves. It is not an easy matter to grade another man's apples with the owner watching the process, as he naturally wishes to realize as large a sum as possible from the fruit and is liable to resent the throwing out of a large percentage of the apples into the ungraded class. The majority of the men had very poor apples, the fruit being so seriously infected with aphids that about 33 1-3 percent were discarded as unfit for market. This was a severe blow to the growers, but they stood it manfully and did not take issue with my decision in the matter. Nevertheless, it was easy to see that it was not increasing the popularity of co-operative marketing. In order to keep his agreement with the exchange one of the members was obliged to sell his excellent fruit (second to none in the State) in closed packages and for much less than would have been the case if he had been allowed to sell it independently in open packages as fancy fruit.

It soon became apparent that the members of the Exchange were losing money by marketing co-operatively; the careless grower through having large quantities of fruit discarded which he would undoubtedly have included if marketing independently; and the careful grower through the necessity of selling his superior product in conjunction with the inferior fruit from his neighbors' orchards. It was apparent that this system could not hope to have the permanent support of the growers.

In December 1916, Mr. Barnes resigned as manager and the position with its varied troubles and problems was conferred upon me.

It seemed advisable that the 1917 marketing should commence at once. Accordingly the Exchange members were treated to a lecture which was instructive, illuminating but not flattering. They were frankly informed that as a whole, their 1916 crop was extremely poor in appearance and quality and that much more attention must be given to

the trees if the Exchange hoped to establish a reputation for excellent apples. The men took the advice seriously and immediately ordered large quantities of nicotine sulphate, arsenate of lead and lime sulfur.

During the spring and summer of 1917 they applied the chemicals painstakingly so that September found our orchards with fruit which was absolutely free from aphids and of a much higher grade than the fruit of preceding years. But it was very evident that the men who raised fruit as a "side-line" had apples which were very inferior to those of the men who raised fruit for a living. The latter gentlemen were not inclined to sell at a loss again, simply for the sake of helping out a co-operative marketing scheme. Briefly the problems which confronted the manager were:

1. How to get the members to market the fruit through the Exchange.
2. How to induce those whose fruit was still below the desired standard to put forth the necessary effort to improve its quality.
3. How to secure the best prices for the fruit.

Early in August I communicated with several buyers informing them that we had 2000 barrels of apples which would be ready to dispose of in a few weeks and that we would be glad to take their representatives through the orchards and to list their bids on the apples. They replied immediately and during the month of September they sent their representatives to Marlboro. In two instances members of the firms appeared in person. They asked many questions about the exchange and appeared delighted to think that they could transact the business for a dozen farms through one man.

They were given to understand that they were to submit a separate set of bids for each orchard and that the individual growers could accept the bids through the manager of the Exchange whenever they were satisfied that they had secured the best price possible. Naturally the various growers asked what their neighbors were offered. When a

man with inferior fruit discovered that he was being offered 25 cents less per box than his careful neighbor it set him to thinking harder than any lecture the manager might have given. "Money talks." Competition also ran high among the buyers. One gentleman offered \$3 per barrel for A's and \$2.50 for B's, but when he observed that the price did not interest me he suspected that the other buyers were offering more and immediately advanced his bid to \$4 for A's and \$3 for B's.

In this manner the men received the best prices obtainable for their fruit without any effort on their part. They were impressed with the important part played by the Exchange in securing these prices, and secretly resolved to improve their orchards until they secured as high grade fruit and prices as their neighbors.

We have found that co-operative marketing is most promising. Large quantities of fruit command more attention from buyers than small ones. It allows each grower more time to attend to harvesting his fruit as he does not have to bother with, or worry about the selling of his product. It stimulates competition among the men to produce better fruit. It demands and receives the money before the apples are shipped, which is something that the small grower is unable to do. In fact it demonstrates that—"In union there is strength."

MR. GAGE: I would be pleased to answer any questions that I can.

MR. WHARTON: I wanted to ask Mr. Gage how these apples were graded. I understand they were graded by the Association.

MR. GAGE: Yes sir.

MR. WHARTON: By the Exchange?

MR. GAGE: I had the grading. We do it by machines. We use grading machines, and we grade very strictly. I am glad you mentioned that, because that is another one of our problems for next year.

We find that where we are near the market, we can do

far better selling in the open package than we can by grading and selling in the closed package. as we have to reject a great many apples that otherwise could go in the B grade. We sold some of our aples this year, orchard run, down to 2 1-4 for \$1.35 a box in the orchard. They came with trucks and took them away.—no sorting or grading of any kind.

MR. WHARTON: Mr. Gage, as manager of this exchange, you, of course, do not give your whole time to it except at certain seasons?

MR. GAGE: I could not, no sir, I am a business man. I am interested in economies. It may possibly give you gentlemen an idea of some of the difficulties of starting cooperative exchanges. They will naturally be small, and you will be unable to pay much money, and somebody will have to do it practically gratuitously.

I have been interested for a long time in economic problems,—ever since I left college. My income last year from the Exchange was \$32 and some cents. (Laughter.) The time I put into it, had I put it into my business, would have netted me somewhere around \$350 to \$400 for the same time. It is simply a question that you have got to find men who are willing to do something for their country in times of peace, as well as those who are willing to serve in times of war. You have got to consider other people, you have got to help and try and assist others to progress. Otherwise some of the problems of each generation will remain unsolved, and you will be of no aid. I hope, myself, to have been something besides a mere earner of money. That is why I am doing this work. (Applause.)

A MEMBER: If there is plenty of time, I would like to inquire about the grading. How much grading is required? Does a machine only grade for size, and then you have to grade for color and wormy apples and defects?

MR. GAGE: Yes. We grade in strict accordance with the state law, and have an understanding with the buyer as to how small he wishes to have the apples in the A grade. Our minimum size on A grade thus far has been 2 1-2 inches.

On the B grade, 2 1-4. Of course with the Baldwins, you are required to give 35 percent color, and practically free from defects, with a range of 10 percent in the A grade. The color isn't considered in the B grade, but we have not placed any apples infected with aphid or any other blatantly bad defects. We have made a very good B grade.

This year, we were able to sell our ungraded apples. Last year, 1916, there wasn't such a demand for apples as this year, and we did not attempt to sell ungraded in the outside markets. They were sold in Marlboro.

To show you about the home market, we had a little fair and an exhibit in Marlboro. The townspeople came in and were very much interested in the apples, and they wanted to know what they could be purchased for. The men in the Exchange quoted them the wholesale prices.

The people demurred, and said it was too much. I said "Here, we do not care to sell you these apples, we are merely doing it out of interest in our home place, because we can receive the same price for these apples on the farm. If we sell them to you, we have to go to the bother of a house to house delivery, which takes time. If you do not want them, gentlemen, please don't place your orders." We received orders for four barrels of apples.

A MEMBER: Do you grade them as they come from the machine, or do they have to be handled again?

MR. GAGE: They have to be handled again. The machine merely sizes. You have to be very careful. Mr. Dodd, who is present in the room, is probably just as good a man as there is in the Exchange on handling early fruit, which bruises much more easily than the harder apples. He took the machine and padded it up very carefully and was extremely successful in grading his apples that way, receiving practically unheard of prices for his fruit.

MR. WHARTON: I would like to ask Mr. Gage what sizer is used.

MR. GAGE: I guess Mr. Brown is more competent to answer that than I am.

SECRETARY BROWN: We have been using the Pease Grader.

MR. PUTNAM: On the ungraded apples, was the size taken into consideration? You can put large ones or medium ones together if they were ungraded?

MR. GAGE: I believe that according to law, you do not need to put the sizes on.

MR. PUTNAM: That is what I understand.

MR. GAGE: If you put on the minimum size, 2 1-4, and people are sure you haven't any apples in there the size of a walnut, you are more likely to get a ready sale of apples. The small apples we send to the cider, mill, anyway.

We have dreams. We hope some day to have an evaporating plant and so forth and so on. The only way co-operation can succeed, gentlemen, is for a number of these exchanges to start and then amalgamate into a state exchange which will do our buying and do it the way you are doing through the Worcester County Farm Bureau at the present time. If we get organized in that way, we are going to have a tremendous purchasing power. If you could get an organization of agriculturists together under one head and start to buy three or four million dollars worth of material they are going to receive much more reasonable rates than any local exchange. We have had that demonstrated with Mr. Austin and other men from Maine. They paid their own way up here and spoke to us twice last year, hoping that we would organize a statewide organization. They have a purchasing power down there now of over \$3,000,000, buy over \$1,000,000 worth of grain a year.

I am drifting off my subject a little, but they have a subsidiary company,—the Farmers' Union Grain and Supply Company, in which the unions of the state of Maine have stock. They buy the grain direct from the jobbers in the West and charge one percent for doing business. Those cars are sidetracked at a certain point in New York and are made up in mixed cars if desired and shipped to the state of Maine. Now, in that one percent they paid the manager,

they maintained an elevator in Waterville, Me., they paid all their clerks and all expenses, and declared a dividend of 30 percent beside. That is, on the one percent profit.

A MEMBER: How many cars would they handle?

MR. GAGE: I think last year they handled in the vicinity of 2,000 cars.

MR. WHARTON: Is it the purpose of your organization to enter into co-operative buying or selling.

MR. GAGE: Yes. We buy grain.

MR. WHARTON: Your organization is regularly organized and incorporated under the incorporation law of Massachusetts.

MR. GAGE: Yes sir.

MR. WHARTON: With stockholders?

MR. GAGE: At \$5 a share. We paid two dividends last year.

MR. WHARTON: Have you actually bought supplies of grain and so forth?

MR. GAGE: We have, yes sir.

MR. WHARTON: With success?

MR. GAGE: Professor Damon told me last Tuesday at the State House that we had the largest percentage of saving of any exchange in the state. We had a business of some \$3200 and saved our members \$341 and had \$75 additional in the treasury, and declared two five percent dividends.

MR. WHARTON: You have no central warehouse, as yet?

MR. GAGE: No sir; we hope to eventually. That all takes time. We have all these minor problems to solve. We have got to teach our men that in union there is strength and that they must pull together. They are doing very well.

THE CHAIRMAN: I think, gentlemen, we will have to end this discussion at this time. I think it is very gratifying to note the intense interest in co-operative work at present. Three or four years ago we talked about the possi-

bility and desirability of co-operating. Now, we can talk,—we can get together and talk over what we have done along these lines. There are several co-operative exchanges in the state, doing excellent work.

The next speaker is to discuss a larger subject,—one of co-operative buying and selling on a New England basis, which is just along the line that the last speaker has suggested was desirable. It gives me especial pleasure to introduce Mr. Scheurerle, who has been my chief, with whom I have been a co-worker for several years. Mr. Scheuerle was very instrumental this past season in putting across the New England Peach Growers' Association, which you have all heard about. He is now undertaking a much larger endeavor. I am sure we are going to listen with a lot of pleasure to a discussion of this problem.

**OUTLINE OF NEW ENGLAND FRUIT GROWERS' EX-
CHANGE FOR CO-OPERATIVE BUYING
AND SELLING**

Mr. John A. Scheuerle

To give you a concrete point of view and acquaintance with this whole situation, I will tell you how the idea of the exchange started. Your presiding officer was working in Hampden County for about four years getting people to spray and prune and raise more fruit. Out in Wilbraham and Hampden we got a lot to plant more peaches. About three years ago we came up against the real problem,—the problem of marketing. Our Wilbraham and Hampden peaches were being sold in Springfield and along came Connecticut peaches and other peaches all dumped into Springfield.

There was such a glut at Springfield that farmers barely got enough to make it worth while for them to pick their peaches. I presume some did not pick all they had.

Mr. J. L. Brooks, President of the Eastern States Exposition, started out early in the morning and got the prices of peaches. The farmers received 35 to 40 cents a basket in Springfield. He went up to Maine to Boothbay, the same day. On his way up he stopped at Portland; here peaches were selling for \$2.25 to \$2.50 a basket. At Boothbay he secured a basket of poor quality peaches for which he had to pay \$2.75.

What was the trouble with the peach business in New England? No organization. No systematic distribution. A glut here and a scarcity there.

Last spring, the peach growers of New England felt

they were going to have a bumper crop again, so Mr. Jenks and I started, at the behest of the Eastern States Field Department, to interview some of the prominent peach growers.

We started down in Connecticut and met such men as Mr. J. Norris Barnes, Mr. A. T. Henry, Mr. Charles Lyman, Mr. Stancliff Hale, and others of that character.

All those men were discouraged,—a big crop coming on,—expecting gluts, difficulty in securing labor and high cost of everything, railroad congestion, etc., peach growers in other states in a similar state of mind. We finally succeeded, with the co-operation of the Pomological Society of Connecticut and other states to get some of these growers together.

We met at Hartford, had probably 30 or 40 of the most representative peach growers from every part of New England there. It was the bluest meeting I ever attended. It was almost the unanimous opinion that the peach industry was on the toboggan in New England. Other peaches were shipped in from New Jersey and Eastern New York, in large quantities, this together with the difficulties of getting them marketed, the gluts, etc., had been so discouraging in past years that people thought rather of cutting down the orchards than the planting of new ones to increase their peach business.

However, that meeting appointed a committee to look into the matter still further, to get an estimate of the crops, to see what could be done, and to devise plans. To make a long story short, they had a later meeting with this committee reporting, and then they appointed committees on publicity, on marketing, on transportation, on finance and on permanent organization.

With the aid of the public safety committees, a widespread campaign of publicity was inaugurated. Thirty-six articles were sent to 250 daily and weekly papers in New England. These articles contained recipes for peaches, the uses of peaches, methods of preserving peaches, when the peaches were coming on, and what varieties were used for.

The Connecticut State Council of Defense also distributed a poster, about two or three thousand copies to the principal growers and produce dealers. We had planned through the Market Service Committee to have peach weeks, and the machinery was organized in Springfield, Worcester, Boston, Providence, New Haven and Hartford, so as to take care of the glut when it came. But this publicity campaign created such a demand for the peaches that prominent peach growers wrote to headquarters saying "Do not send any more requests for peaches to our places." New markets opened up. People came in auto trucks to get the peaches.

The crop, by the way, did not materialize to such an extent as had been anticipated. They had expected about a million baskets, but only had about 500,000 baskets.

The Market Committee established a reporting service and the United States Department of Agriculture, Bureau of Markets, gave us a man. The Connecticut Council of State Defense furnished the office and requirements there. Thus the members of the peach growers association had every morning on their desk or in their home, the prices peaches were bringing in all the different centres, not only in New England, but also in the larger centres throughout the country. This service the principal growers tell us was of very great importance to them in helping them to market their crops satisfactorily.

The Committee on Transportation found almost insurmountable obstacles. In the first place, because of the railway congestions the Railway Commission at Washington said, "No more flats." That meant that peaches must be packed into cars holding from 600 to 800 baskets packed full. The flat contains 250 baskets, or a little over. That one ruling meant eliminating a large number of small markets and shipping the peaches only to large centres where congestions would have resulted. Through the efforts of the committee, the Railway Commission rescinded their action, and the railroads allowed flats to be used.

Another difficulty in the transportation was this: that

the railroad companies had issued an order that all peach baskets must be covered with wooden tops. Think what that meant! The peach growers had all bought all their baskets with the cloth covering. They did not intend to use wooden tops,—had no wooden tops, and it was impossible to ship peaches under those conditions. The committee induced the railroad companies to do away with that ruling, but we have to look out the coming year regarding the ruling. Another thing was this: We had a ruling from Washington that in ordering cars we must, at the same time, designate its destination, working absolute chaos with the peach business. No peach grower can tell where his car is to go before it is packed and it is sold, and it may be that someone will want one kind of peach, and somebody will want another. How does he know where he is going to sell it before he orders the car?

One obstacle after another, through this organized effort, was overcome. Through the efforts of the Committee on Transportation, 75 cars were shelved by the New Haven Railroad, and thus enabled us to help move the peach crop.

The peach growers of New England have organized a permanent organization committee with the idea of studying what the effort might amount to. This was not fundamental, as you recognize. It wasn't a consignment of crops, it isn't a general uniform standardization of the peach business. It was simply taking care of very outstanding difficulties and hindrances. The peach growers, so far as we have been able to learn, say that they have never had such a satisfactory year of marketing their crops; and never in the history of the industry, no matter how small the crop, was there a time but what they had gluts, but this year they say there were no gluts.

So satisfactory was the outcome of this, that you might call, in a way, a superficial effort, that the permanent organization committee made further investigations of the peach growers who said almost to a man, "Why not include apples and other fruit in this organized effort, and why not

organize the fruit business of New England on as fundamental lines as the citrus business was organized in California, and as the Skookum apple growers were organized in Oregon?"

Here is just a sample of the kind of letters we received from our members: "I think the apple growers would be largely benefited by our organization, and including them would broaden and strengthen the body and lessen the expense for all. It came to my notice last fall that several cars of apples were shipped from Maine and New Hampshire down here to Meriden and New Britain, and at the same time that the same kind of apples were being shipped from here to Boston, a manifest waste of labor that might be avoided by such an exchange." This is true in a large way. Do you realize that there are carloads upon carloads of Skookum apples shipped all the way from the Far West on to Chicago, past Buffalo, past Albany on to Worcester, Springfield, Boston, Bangor, and Portland markets, while apples that are raised here, to find a proper outlet, go way on to Chicago? Think of the manifest waste and chaos.

What can organization accomplish? You listened to a very instructive illustration this morning. What the gentleman said is absolutely true. It is only as you federate these individual exchanges and their efforts into a large, far-reaching exchange that can take care of the purchase and of the sales on a businesslike basis, that great results can be obtained and great savings effected. Those local exchanges are almost helpless. What would the Hampden County Exchange amount to in peaches, when other peaches from other sections in New England were brought in there to cut the throat of that business and that enterprise there? Absolutely nothing.

New England is right up against this. The fruit growers of the West are organized. They are taking the markets away from us though they have to pay transportation clear across the continent. The New England fruit industry is in a condition similar to Russia. Russia is unorganized.

and Germany, with one little army, can go out there and defeat a great multitude of people with tremendous resources back of them, simply because they are not organized. We have resources in apples far beyond those of the West, and when we organize, we will be ready to hold our own,—not only here in New England, but throughout the world, because we have the best apples in the world.

I want to give you just a few illustrations of savings effected. We have been in touch with Mr. Powell and the men back of Mr. Powell in studying out this New England fruit exchange. He said that last year that co-operative buying had saved the California fruit growers in boxes alone, \$2,500,000. Think of, just on boxes.

The California Peach Growers Association within two years increased the price they obtained for dried and evaporated peaches from three to eight cents a pound without any material increase in cost to the consumer.

When they first started the California Fruit Growers Exchange they found that the buyers were packing the oranges and lemons and that it cost them from 60 to 70 cents a box for oranges and a dollar for lemons. Co-operatively the fruit growers are packing oranges to-day at a cost of 33 cents a box, and lemons, at a cost of 60 cents a box.

While the population of the country increased 21 per cent., the increase in consumption of oranges in this country was 71 per cent. Talk about a market! If we put on a big advertising campaign in New England for fruit, we would have to multiply our crop ten-fold, and then we could not meet our own demands. The peach growers realize this.

We are going to organize, through the initiative of the Peach Growers Association and the co-operation of the Pomological Societies and Fruit Growers Associations and the Eastern States Agricultural and Industrial Leagues. You know how New England people have been in the past in regard to co-operation, but the pomological societies and fruit growers associations and others have jumped into the harness and they have put this thing across, and to-day, instead

of pessimism, there is optimism and certainty ahead. So much so that the Permanent Organization Committee investigated thoroughly and worked out a plan and a program for the organization of a New England fruit growers exchange. I will leave this subject right here for a minute to go back a step.

The Eastern States Agricultural and Industrial Exposition was the outgrowth of the Hampden County Improvement League, and that was developed from the realization that one county by itself is lost or one group of exchanges by themselves can't get there,—that it requires a large movement such as a New England movement, a specific section of the United States with common interests must get together. The exposition was founded upon that idea, the idea to bind together and reinforce the agricultural interests and agencies here in New England and the East.

The exposition created a Field Department and that field department in studying the situation felt that the colleges, the extension service, the county agents, the breeders, fruit and vegetable associations all needed a practical reinforcement, a reinforcement by agencies that could buy and sell and transact business, and that not until there were great sales and advertising agencies in the farming industry, such as other industries have could New England come back to its own in agriculture or maintain herself.

So they put in a lot of time and got some of the best farmers and some of the best business men—such as Theodore N. Vail—and farmers like H. W. Tinkham—who have had experience in organizing business on a world scale, together with the best attorneys who worked out the organization of a New England and Eastern States Farmers Exchange. We were in touch with the Department of Agriculture at Washington and got their advice and co-operation, and we have under a Massachusetts law incorporated a non-stock and non-profit association which must operate absolutely at cost, so that the anti-trust laws will not interfere with it in doing interstate business.

The special committee of the New England Peach Growers Association took the Eastern States Farmers Exchange as a basis upon which to build up a New England fruit growers exchange. A constitution and organization plan worked out by the United States Bureau of Markets was also carefully studied and made use of. These plans have been worked out thoroughly and carefully and there is a proposed constitution and by-laws to be presented at an organization meeting, so that when you come to this organization meeting you will have as the basis for discussion a plan concretely and specifically worked out, and adjusted to New England conditions in harmony with the federal and state laws,—a plan which will be based upon local exchanges and upon local groups of efforts, that will bind together the purchasing, sales and advertising power of New England and the East.

We are calling a meeting to be held at Springfield, March 5th. in the Mahogany room of the Municipal Building at 11 o'clock in the morning for the purpose of considering the organization and incorporation of the New England Fruit Growers Exchange. This exchange will avail itself of the facilities of the Eastern States Farmers Exchange.

The Eastern States Farmers' Exchange is aiming to bring together the purchasing power not only of the fruit interests but of the dairy interests and of all other agricultural interests, so that when fertilizers are bought, they are bought on an enormous scale, and when grains are bought, and everything else, you have the tremendous advantage of great purchasing power. But that exchange also is built upon local exchanges and will deal primarily with the local exchanges. The exchange is a service institution operating at cost and bringing all the benefits that can be obtained to the local exchanges and their members.

THE CHAIRMAN: You see, Springfield men are getting down to brass tacks and going at this market problem in a broad way. I wonder if you don't want to ask Mr. Scheuerle some questions. The thing is being worked out

on such a large scale that it has probably dazed some of us.

MR. WHITCOMB, Littleton: I do not know as I ought to take much of your time, but I am on my feet because I could not sit down. I am now enthusiastically interested. Now, you say, "Why, getting interested in this co-operative movement doesn't mean much," but out home I am considered a pretty conservative New Englander, and you probably all know what that means.

I think the Marlboro Exchange has got the idea, and that it is going to make it possible to organize these exchanges all over the state, all over New England, and thereby organize the New England Fruit Growers Exchange and the Eastern States Exchange. We have tried a little co-operating there in my town and it did not work, and I think it was the way we went at it; but I think this idea in Marlboro of selling the individual orchards to the buyer is something that the growers can all get together on. We know in the West, of course, they bring their fruit together and grade it in one grading station and grade it the same. There they have hundreds of thousands of cases of probably the same soil, under the same conditions, but we know with our New England apples that there are no two orchards that can be graded alike and be graded fair to the producer of those apples; and I think this Marlboro idea is an idea of bringing the buyer into those orchards and selling the individual orchards and then packing them to a standard, the same standard, but you can't make certain apples come up to certain other orchards even with the same brand. So all over New England and I think if this idea can be brought in there will be no trouble in organizing the fruit growers all over New England.

MR. SCHEUERLE: That idea was brought in. That was the very thing that Mr. Powell brought out in our conversation with him. We told Mr. Powell of these conditions. "Why," he said, "my dear man, the variation in the oranges of California was vastly greater than the variation of apples in New England." That is one of the matters that we dis-

cussed there, in connection with standardization and packing. We are going to have a standard label and trade mark, a mark that will go the world over.

MR. R. H. WHITCOMB, of Amherst: Don't you anticipate some organized opposition on the part of the grain dealers and fertilizer dealers whose business you are going to cut out to a great extent?

MR. SCHEUERLE: We expect opposition from the shortsighted grain dealer, and perhaps some of the fertilizer men. The question that comes up there is this: Is the whole community to suffer for the sake of a few individuals who are not rendering necessary service? If a man is rendering necessary service, and is rendering it economically, he need not worry at all. The many should not be sacrificed for the few. It may mean readjustment, it will mean readjustment, but let me tell you how it worked out in Hampden County.

When we started our farmers exchange there, the hardware men's association of our county started to buck us. They said, "Here, you are going to sell spray material at wholesale. What is going to become of our business?" Westfield is a place where a lot of country towns centre in. We met opposition there as elsewhere. I tried to convince these hardware men that through this effort a good deal more spraying would be done, that though those farmers would buy spray materials at wholesale, in car lots, and perhaps some of their spraying implements at wholesale, they would have to supplement it, as their full barrels or wholesale quantities would not always complete their entire needs and that they would make more money and would improve their homes, their barns, buy automobiles, improve their property, etc., but they could not see it.

Two years later, though, we were dealing wholesale with the farmers, shipping many articles out there in large quantities, our hardware merchant told me, "I am selling about 50 per cent. more of the very articles that you people are wholesaling out here." Why? When the Hampden County League started, a few people were spraying, and

to-day they have been multiplied, I presume, pretty nearly a thousand per cent. Many are enlarging farming operations. Do you mean to say that general business will suffer when you increase business one thousand per cent. even if most of it is absorbed by wholesale orders? Do you mean that a dying industry that is committing suicide is going to bring prosperity to even the very men that we are going to more or less touch so that they will have to readjust themselves?

Out in Rockingham County where they buy grain co-operatively they found that the dealers bought of the co-operative association because they could get better prices than they could from the jobbers. They bought it because men wanted to supplement their requirements, and they could sell cheaper at retail as the result of buying from this co-operative association and the farmers needed retail to supplement their wholesale lots.

I say the shortsighted dealer in fertilizers and all these different things will run up against it, but the bright, keen fellow who is rendering a real economic service don't need to worry. He will have to readjust. If he is not rendering an economical service, he should get into something where he can render an economical service in this day when it is so essential to do our bit.

MR. WHARTON: I should like to ask Mr. Scheuerle if he does not think it is perhaps part of wisdom for these exchanges to sell to farmers practically at retail prices and then make up the difference in dividends at the end of the year rather than cut prices in that way and arouse the antagonism of the vested interests.

MR. SCHEUERLE: Of course, that is a matter that has to be worked out by the local exchanges. I look upon the raw material, which means these spray materials and fertilizers, seeds, and things of that kind, as a manufacturer looks upon his raw material. It must be gotten at wholesale. The manufacturer, for instance,—take the rubber companies. They do not buy little dabs of rubber here and there and

everywhere. They go right out into Africa and get rubber at the source at wholesale and bring it to their manufacturing plant. They don't charge a retail price on that, at all.

Farming is a great manufacturing plant, and its raw material should be gotten to the farm at wholesale. As far as the Eastern States Farmers' Exchange is concerned we will deal with wholesale prices through the local exchanges. Then it is up to them to work out that matter of selling it to their own members. We are a non-profit, non-stock company. We are doing an interstate business, and doing an interstate business we have to be on a non-stock, non-profit basis. We will try to bring to these local exchanges the raw materials at wholesale by going back to the very sources of production.

MR. WHARTON: My suggestion was in relation to local exchanges.

MR. SCHEUERLE: Yes, that is a matter for the local exchange to work out. I haven't thought into that enough to give any opinion. In Hampden County we simply offer it to the farmer at the prices that they can get it.

THE CHAIRMAN: Cost, plus a certain expense, enough to cover doing business.

MR. SCHEUERLE: We do not put on the retail price and give a rebate on the price there, at all. That is a matter for people who are better versed in local economics, than I am, to handle. As far as the overhead organization is concerned in which I am particularly interested, that will deal with wholesale prices to the local exchange. I presume it would be a good idea for the local exchange leaders to get together. Perhaps that would be one thing for the Eastern States Farmers' Exchange to do,—bring them together and discuss that very item.

MR. MUNSON: I should like to ask how this exchange is being financed, Mr. Scheuerle.

MR. SCHEUERLE: The Eastern States Farmers' Exchange will be financed entirely on the percentage basis, say one per cent. That is simply operating at cost.

As far as the Fruit Growers' Exchange is concerned, the plan is this: That every farmer pay 25 cents per acre per orchard as an initiation fee, and 10 cents per acre of orchard after that as an annual due.

Then, in the sales and purchase end, such commission will be charged as will be necessary to supplement those funds to operate at cost. It will have to operate at cost according to the law under which it is incorporated.

MR. MUNSON: It seems an awfully small figure.

MR. SCHEUERLE: The idea being, Mr. Munson, that the Fruit Growers' Exchange should take care of itself on a percentage basis for the business transacted, so a man who sells his fruit or buys the raw material through the exchange will pay his pro rata percentage for that business transaction.

MR. MUNSON: But the publicity is what I was getting at. It will be more or less necessary to carry on a publicity campaign. I can hardly see where your figures cover that.

MR. SCHEUERLE: That will, of course, be decided by the management. You might charge half of one per cent. for publicity on the total gross business.

Mr. Jenks has suggested that I tell you what the peach advertising campaign cost. That was done at a time which you cannot always duplicate. The papers were anxious to get our material because of the idea of food conservation. We got, free of charge, many thousands of dollars worth of publicity, and the very best kind of publicity, because it came through the news columns. The public safety committees co-operated with the idea of conserving the food,—the peaches, rather than allowing them to rot when food was scarce. The total operating expense of the New England Peach Growers' Association including publicity and all other work directly chargeable to it, but simply to the peach growers themselves was about \$370. But what Mr. Munson has in mind is absolutely sound.

I was told by the man who organized the Skookum ap-

ples, that they set aside at the beginning of the season \$80,000 right off the bat and added as much more to it as the season goes on to advertise their apples. This money is raised on a percentage basis.

MR. MUNSON: Has your organization thought of the fact that as soon as we go ahead advertising fruit, other fruit is going to be increased, that is the consumption of fruit, if the Western grower keeps on packing and put his fruit here in better shape than we do, you are advertising for him?

MR. SCHEURLE: Yes; the organization contemplates having a strict system of inspection. An absolute consignment of the crops, and the local exchanges will have their own packing and inspection or packing under exchange supervision, so when No. 1 brand goes on a barrel or box of apples or No. 2, that it is just that. The farmer himself will be held to it, because his number will indicate his pack or his name, and because he will be asked to sign a non-interest bearing note of a dollar an acre of his orchard, and no less than \$30, which is to be used as a guaranty for liquidating damages, or if a man isn't meeting the requirements and if after all the inspection you trace back the deception, you have got the man. In other words, you will have to be as strict as our competitors out West or quit. In other words, it comes down, as you say, Mr. Munson, that unless we produce as good a fruit as the Western apple and as standard a pack, why we are simply playing into their hands and we are not going to do that.

THE CHAIRMAN: We will have to leave this subject here as we have other subjects on the program, so I think we will stop at this time here. Thank you Mr. Scheuerle.

THE CHAIRMAN: The matter of spraying is very essential to our having good fruit to market properly through an exchange or individual. The matter of dusting has come forward the last year or two very rapidly, and we are glad to have with us a man from Bolton, Mr. Haekett,

who is in the Bolton Fruit Company, to discuss the matter of dusting. He has had considerable experience, and we will hear from Mr. Hackett at this time on "Dust Spraying for Peaches."

“DUST PROTECTION FOR PEACHES.”

E. A Hackett, Bolton Fruit Co., Bolton, Mass.

It seems rather academic to talk about dusting peaches this season, when it is questionable whether we are to have any, and especially when we have to consider such live themes as co-operation and marketing, but you are very welcome to the result of our experience in the use of dust on peaches last year.

You are welcome to the result of our dusting of peaches at Bolton last year, but in applying it the coming season, as far as this region is concerned, it will be a good plan to “first catch your peaches.” Whether or not we are to catch a crop this year, what we did in 1917 may be of interest to those of you who are engaged in the precarious peach raising business, and who therefore must have faith in the saying that the “birds will sing again.”

You probably all know of the experiments with dust to protect apples from fungus and insect, using materials usually applied as a liquid spray. Bulletins are available, giving complete information on this subject. These reports show that dusting gives equal results as to quality of fruit, with no very great difference in cost. But the greater speed with which dust can be applied makes it possible to accomplish the work at more nearly the right time, particularly on large areas, and thus affords better insurance against adverse weather conditions.

So far as I know, there are no complete official reports on dusting peaches, and possibly in this line the grower was ahead of the experiment station. We first heard of dust being tested on peaches in 1916 by a prominent Western New York grower, who had bought a dust equipment for apple work. He told us his results with peaches were satisfactory

as to protection from fungus and insect troubles, observed a decided heightening of color on the fruit, and much better shipping qualities in dusted fruit compared with fruit from the same block of trees that had been summer sprayed, with liquids. And he dwelt expressly on the speed of the dusting process.

Any time-saving factor in the protection of peaches is a natural attraction to the grower handling a large area. It is more essential to protect peaches at the right time, because it is a more delicate fruit than the apples, although delay in protecting either fruit is generally costly. The greater number of peach trees to the acre requires a comparatively larger quantity of liquid spray, which in turn raises the question of water supply and facilities for cooking summer spray. If you have a large area of peaches to spray with self-boiled lime sulfur, whether the weather conditions be favorable or otherwise, with either a scanty or distant water supply, you will jump at any suggestion that promises a substantial saving of time for that distasteful job.

It was because of our unfavorable conditions in these respects that we tried the dust system last season. We had heard lots of adverse comment on dusting, how disagreeable a job it was for men and horses, and so we equipped ourselves with goggles and bottles of milk to restore sight when our eyes should fill up with sulfur dust. If the war had not cleared the market, we probably would have bought gas masks, too. We had a lot of trouble finding the proper adjustment for our machine, and our first efforts wasted a lot of expensive material. After the first half day of dusting, anyone happening along our way might perhaps have picked up a bargain in a dusting outfit. But we stuck to our task, discovered the secrets of proper engine speed and discharge pipe manipulation, and after the second day the men who did the work would have been insulted if we had told them to go back to the self-boiled way. We soon discarded goggles and other fancy impediments, and found that it was an easy job to cover a very much greater area of bearing trees

in a shorter time than we could possibly do with liquid spray. Our team moved quicker and more steadily—no more stops for adjustment than usual with the spray rigs—stops to fill the hopper with dust were no more frequent than for filling the tank. But for filling up there was the very essential difference that dusting material for half a day's work was carried on the wagon on which the dusting machine was mounted, which eliminated for us the waste of a long haul empty to the water supply and the equally long heavy haul of the filled tank back to the orchard. This difference accounts for a large part of time saved in dusting, and this saving of time means much better protection for the fruit, because the fungicide and insecticide is really applied at the time it should be, with the consequent large proportion of quality fruit for the market.

The comparative cost of dusting and spraying will naturally suggest itself to you at this point. It would require the combined efforts of a proper Philadelphia lawyer and a group of chartered accountants to determine the real difference in actual cost of dusting and spraying operation. And when such figures were obtained as to one orchard, then would come the hitch of applying them to others with vastly different local conditions. So our views as to the cost of dusting must be understood to apply to our own orchards, where conditions as to distant water supply, grades, isolation of blocks of trees of the same variety, spring, summer and autumn mud, and other local variants, possibly make our costs greater than they would be under better conditions. We found under our conditions that we effected a saving in dollars and cents by using the dusting method—a saving in the cost of what we may call the mechanical phase of the work—embracing first cost of material, hauling, labor in preparation, team time used in actual work, and team and man time used in refilling. It is a close thing, this question of cost of dusting versus spraying, and the factor which turns the scale with us in the favor of the higher priced dusting material is the saving in teaming and man labor in

the field.

The difference in the cost of the mechanical phases of the two systems is of minor importance, in our experience, because of the substantial saving we have attained in the fruit itself—maturing a very much larger proportion of marketable fruit, of better quality, than we had ever been able to secure with the liquid spray. And another very important matter is the holding down or prevention of the spread, of such a disease as brown rot. This disease is our worst enemy—this year some of you will want to give Jack Frost the first place—the rot was gaining on us year by year, causing serious and growing losses in marketable fruit, and making the fruit less reliable as to keeping qualities after packing and sale. We feel that we started a reversal of these ills by using the dust last year, and are hopeful that future results will confirm this opinion.

Perhaps you may be interested in specific results on different varieties, and the checks we had on them. White fleshed early peaches are notoriously subject to brown rot. The past season, particularly the early part of it, was favorable for the development of brown rot. It did not seem a practicable proposition to leave rows of undusted trees as a check, as the clouds of dust spread over a wider area than is intended, and we had isolated trees of these varieties, that furnished a better check. Greensboro with us is susceptible to brown rot and very much subject to peach scab. We brought through a clean crop of this variety with only one application of dust. We intended to dust twice, but the trees were heavily laden and we could not get through the rows the second time. Carman and Hiley are also subject to rot; on them our loss was negligible where we dusted, while eight or ten of these trees, neither sprayed nor dusted, showed a loss of all of the fruit by brown rot. The despised Mayflower, which really meets public approval when sold ripe and in small packages, is very susceptible to rot with us—as much, if not more so, than Champion; it came through with only a small fraction of the usual loss, and the fruit stood

up well. In 1916 we lost our whole crop of Mayflower from rot, even with summer spray, and in 1917 half a dozen isolated Mayflower trees, not dusted, lost nearly all of the fruit through rot. On Carman we found the higher color, attributed to powdered arsenate of lead by our New York friend. One Carman tree in a block of Champion was dusted twice, and every peach it bore—a full crop—was sound and of much richer color than fruit from the blocks of Carman trees, dusted once. Champion, of which we have only a small number of bearing trees, is as bad a variety for brown rot as Mayflower and we had equally satisfactory results with the dust on Champion.

We did not spray or dust Alberta. It resists rot better than any variety we grow, and the cureulio is not bad enough in our orchards yet to justify spraying or dusting for this pest alone. We had no appreciable loss from brown rot on a crop of about 9000 baskets of Elberta.

To sum up, our experience with dust on peaches in 1917 gave us better results than we ever obtained with liquid spray, and at practically equal cost, considering all phases of the mechanical side of both methods. The dusting is no more disagreeable, when properly done, than liquid spraying, and dusting certainly permits of the work being done more nearly when it should be done.

It would be a rash statement to say that dusting established its superiority over liquid summer spraying for peaches after only one season's experience. It is a fair statement that the results obtained in dusting in 1917 indicates strongly the advisability of using dust for summer work on peaches, and I hope we may have opportunity the coming season to carry on this work to a point where we can tell you definitely which of the two methods—dust or spray—has proven itself the better for our conditions. (Applause)

MR. FULLER: I would like to know when you dust.

MR. HACKETT: At exactly the same time you would apply the summer liquid spray—when the peaches are formed and begin to shed the shuck, you should spray or dust

them as soon as you can in order to get the best protection, particularly with the white fleshed peaches. This is the first application; others are made according to the judgment of the individual grower.

MR. FULLER: You wouldn't do much good in windy weather, would you?

MR. HACKETT: We had a very large area to cover, so wind doesn't matter much with us—we have to keep going in order to get the work done. We don't spray or dust in the rain, but in any other weather we try to keep on the job until it is finished.

A MEMBER: Does the dusting material show on the fruit?

MR. HACKETT: We had no more trouble from that than we usually have with liquid spray. Sometimes things will go wrong with the duster, as they do with spray rigs, and if an open nozzle or the duster outlet is held still too long, you may have a tree on which the fruit will show the spray or dusting material. If you are using arsenate of lead, this may alarm you, as the grower naturally doesn't want to poison the community. I have eaten half a dozen peaches at a time on which the dust still showed when they were ripe, with no bad effect whatever.

MR. HUTCHINS: Mr. Hackett has given us a very interesting talk. I would like to offer that as a suggestion this year Mr. Hackett should use a liquid spray on a block of trees as a check on the results obtained by the dust process.

MR. HACKETT: It would be difficult to get comparative tests as to results in the same block of trees, because the dust permeates the trees so thoroughly that you could not keep a single row, or several rows, free of it. We had checks on our own farm as to the protection we secured last year by dusting, but only with undusted and unsprayed trees of the same variety. If you mean comparative results as to speed and cost, combined with the protection secured, we believe that the dusting method for our large area gives us better results than we could obtain with spray rigs, even if we had

sufficient equipment of spray rigs to do the work in the same time. Of course it would not be practical to own and operate a sufficient number of spray rigs to equal the capacity of a dusting outfit.

Now, in the nature of the check the gentleman has suggested, I naturally obtained from growers in our neighborhood who used the self-boiled liquid spray, reports on the protection they obtained with liquid spraying on blocks of the same varieties of trees that we protected with the dusting applications. One of the best growers in this section sprayed a nice crop of Carman twice with self-boiled lime sulfur, and lost about 25 % of the fruit from brown rot. The Carman that we protected with the dust came through with negligible loss from brown rot. This does not mean that the liquid spraying was not well done, or the material used was bad—there might be a dozen factors that would contribute to that result, even including the weather, and they cannot be positively determined. What I know is that our crop of Carman protected with the dusting materials, came through practically 100 %, and the other grower, spending approximately the same money for protection with liquid spray, only brought forth 75 % of his fruit to market. That margin of 25 % is very attractive, to say nothing of the advantage of holding such a pest as brown rot down to a minimum.

MR. HUTCHINS: Do you think there was really some chemical advantage in the use of arsenate of lead in the dusting materials, as evidenced by the texture or finish of your fruit?

MR. HACKETT: You mean as to color?

MR. HUTCHINS: As to color, yes.

MR. HACKETT: It would be a broad statement to make, after only one season's experience, that the use of the arsenate of lead in the dust form does improve color decidedly. I think it does, but you will notice in the paper I read the statement is made only mildly. One isolated tree, which had two applications of dust, certainly seemed to show much better colored fruit than the same variety dusted only once.

That may be because the eye of the grower makes the peach red, or perhaps the actual color was there. I think it was.

MR. GILMORE: I would like to ask Mr. Hackett as to the saving in time in dusting compared with spraying—that is, one dusting outfit compared, with one spraying outfit both having the same equipment of horses and men.

MR. HACKETT: On a two horse spray rig, with two hose leads, you use three men. On a two horse dusting outfit you use a driver and one man, so you cut your labor a third. But on the dust rig you can easily carry enough material to operate half a day, while with the liquid spray rig your equipment must travel to the water supply every time the tank is emptied, and then back to the field where you left off. But it is the greater mechanical speed of the duster that gives it the advantage of getting the work done on time, and makes the cost work out about the same for the whole operation, notwithstanding the higher money first cost of the materials. You will understand how important a factor time is in protecting a large area.

MR. GILMORE: What do you figure you could do with the dusting outfit—how many acres?

MR. HACKETT: I think it is a fair statement that the dusting outfit can cover about 30 acres a day, and this would allow a little time for the interruptions for adjustment that we always have to make on any machinery that we send afield. I think, all things considered, we should be lucky if we could do a third of that area with a liquid spray outfit. But please understand that these statements are only of our own particular conditions. In comparing liquid spraying with the dusting you must remember that in the first case you must haul a tank of 150 gallons of mixture, after it has been made, from the mixing point to the orchards, and that is a pretty good load for a team on soft ground. Then you may have mud when you begin your summer spraying, and you must show consideration for your horses by cutting down the load or resting them frequently, with the consequent loss of valuable time. The spray rig is a heavy piece of machinery, us-

ually. The dusting outfit consists of a hopper to hold about 100 pounds of material, a light centrifugal pump and a motor. We use one of the gas engines from our spray rigs.

MR. GILMORE: As to the original cost—I understand the the dust outfit is cheaper, is it not?

MR. HACKETT: The machine itself, the duster, is very much cheaper. You can use it with any gas engine of suitable power. The cost of material for dusting is much greater than for spraying. The economy of the system is figured on the whole operation.

A MEMBER: Did you try the dust on apples?

MR. HACKETT: We did not. That has been done thoroughly by the experiment stations, and there are official bulletins available for anyone sufficiently interested to send for them.

A MEMBER: What make of duster do you use?

MR. HACKETT: The Niagara. There are two makes. The other one I know nothing about.

MR. DOTEN: What is the minimum power required?

MR. HACKETT: That depends on the size of the dusting machine. The size you buy would be gauged by the acreage you have to cover in a given time.

MR. DOTEN: I understand your results were from one application of the dust,

MR. HACKETT: Most of them. On one or two blocks we made a second application. The grower should have enough material on hand to make as many as three applications on the tender varieties, and whether he makes more must depend on his judgment and the conditions.

MR. VAN METER: As I understand it, the idea to prevent the development of brown rot on peaches in transit is to dust them thoroughly just a few days before picking. Have you tried that? Does the dust show on the picked fruit?

MR. HACKETT: Occasionally you will see some dust on the ripe fruit, as I stated in reply to a previous question. Perhaps a brief statement of the whole dusting operation

may make the matter more clear. A bag of dusting material is placed in the hopper—about 100 pounds. The motor is started with the dust outlet closed. The team enters the row, and the outlet pipe, about four inches in diameter, is opened. The man stands on a platform at the rear of the wagon, and as the team moves along, he sweeps the outlet pipe toward the tree, creating a big cloud of dust, that enters the foliage, and rises above the tree, finally settling down through the foliage. If it is properly done it must cover everything. Then he turns to the other side of the row, and sweeps the outlet pipe to cover the trees on that side, the team moving along all the time, its speed gauged to the time required for covering the trees on both sides, and the time varying with the size of the trees. As to the protection from brown rot developing in transit, I think that will depend largely on how the crop has been protected in the growing stage and the weather the peaches are subject to in transit. We all know how big a factor the weather is in encouraging or retarding brown rot, all through the season. I do not attempt to state it as a positive fact, but I think it is true that peaches that have been protected by dust applications through the growing season will stand up better in transit. Our own fruit last year stood up better than it ever did when we used liquid summer spray. We have the statement of one of the large growers in New York that the dusting makes the fruit travel better to distant markets. If the dust has been applied in the growing season so as to prevent the development of brown rot, I would not think a special application necessary just before picking in order to protect the fruit in transit.

MR. VAN METER: Do you think, one year with another, you can always depend on controlling such a disease as brown rot?

MR. HACKETT: You mean eradicating the disease? No, because I do not think brown rot can ever be wiped out. What you can do is to hold it in control in your own orchards. The better you control brown rot, one season with

another, the more likely are you to have less of it the ensuing season. But as I said before, the weather is practically the determining factor as to whether brown rot shall be light or heavy, local or widespread. Perhaps you will understand my policy better if I state the proportions of varieties, or classes, of peaches, that we grow. About 30 % of our trees are Elberta. Elberta in many sections is very subject to brown rot—that is, if brown rot is bad in a section, it will probably do a lot of damage to an Elberta crop. On the other hand, if brown rot is not extensively prevalent, Elberta may not need protection from it. Now my theory is that if I can hold brown rot down close enough on the white varieties comprising the other 70 % of our trees,—the white varieties being more susceptible to brown rot than the yellow Elberta—I may be spared the expense of protecting Elberta by dusting or spraying for some years to come.

MR. VAN METER: From the evidence we now have on the subject, I should think a man shipping peaches to distant points would certainly be justified in dusting before picking.

MR. HACKETT: I do not think a final dusting application, say about ten days before picking, would do any harm, although it might not be absolutely necessary.

The CHAIRMAN: Mr. Barclay, I wonder if you can tell us what is being done in New Jersey in the way of dusting?

MR. BARCLAY: I really know nothing about dusting on peaches personally, but I think some growers in the state have tried it out and it is quite satisfactory on peaches, more so than it is on apples.

THE CHAIRMAN: Mr. Frost, have you had any experience with dusting, or heard of people in this state or elsewhere that have had experience in dusting?

MR. FROST: No, but I am convinced that dusting is all right on peach or apple trees. It must not be overlooked that it is necessary to have two outfits. You must have an outfit for liquid spray for the dormant application. If an orchard is large enough to stand two outfits, I think it is a good thing to get into the dusting.

MR. FOSTER: I would like to ask if the mixture was bought ready made, or the materials bought and mixed at home?

MR. HACKETT: Last year we bought our material mixed, a combination consisting of 80 % sulphur, 10 % arsenate of lead and 10 % filler, lime, I think. At present I believe it is better to buy the mixture already made, because at this early stage there is not enough knowledge amongst manufacturers on this subject to justify the grower in buying the powdered sulphur competitively, the lead in another direction, and the lime in another, and then attempting to get a smooth, even mixture by home methods. Ultimately, if the use of dusting materials increases, as now seems likely, there will undoubtedly be some live manufacturers that will undertake to supply the prime materials for dusting, and thus enable the grower, by mixing these materials at home, to use his judgment as to the combination of fungicide and insecticide his own orchards may need.

THE CHAIRMAN: Mr. Miles, I understand considerable dusting has been done in Connecticut. I wonder if you can tell us some of the experiences of the growers in Connecticut.

MR. MILES: I was just thinking about that. So far the results are not very satisfactory.

MR. HACKETT: So far as I know, there has been no test on a commercial scale in using dust for the dormant application. Some manufacturers talk of it, but it doesn't appeal to my judgment to attempt to apply dust for the dormant work.

THE CHAIRMAN: I take it most of us will continue using liquid spray for several years to come. This year's program is somewhat up in the air—we do not know just what we have ahead of us. We have a shortage of labor, there may be a possible shortage of sugar, and we do not know what the crop in the country is likely to be. Amongst other things, we may possibly have a shortage of spray materials and high prices. Therefore, the question of what we

can do with our liquid spraying this year is tremendously important. I do not believe the officers of the Association could have made a better choice of a man to handle this subject than Dr. Felt. Dr. Felt, of Albany, N. Y., will now discuss

"A WAR SPRAYING PROGRAM"

Dr. E. Porter Felt, State Entomologist, Albany, N. Y.

There is no time when spraying should be given more careful consideration than this season. We cannot afford to waste valuable time or material under the present conditions and it is equally unwise to imperil profits simply because a few precautions are not adopted. Have we cancelled our fire insurance and surrendered our life policies? Not under present conditions and what is true of these matters applies in a general way to the spraying program. It is a poor time to insure in a weak company and likewise we cannot recommend questionable short cuts or substitutes in a spraying program. No protection may be better than that depending upon an indifferent application or a material of doubtful efficiency. It is a poor time to try experiments. There never was a greater need of hitting the mark. Spraying is a particular operation and should be performed to secure certain benefits. The application made on general principles, while doubtless of value, may give comparatively small returns. The individual grower should know enough of his own conditions to realize his more important problems and direct his energies toward mastering them, rather than rely too much on general practices which may be ill adapted to his needs.

In the first place it is necessary to have the spraying outfit ready when needed and the requisite materials on hand, and as matters now stand it may be difficult to meet one or both of these conditions.

There is a great deal of common sense in the following message just received from a prominent firm dealing in insecticides: "Replying to your letter 20th, there is a fair probability that we shall be able to meet the needs of our

trade, provided orders are placed sufficiently early. Farmers and dealers should order now, goods to be shipped as soon as wheather conditions will permit. Official ekemption of insecticides from embargoes does not insure rapid transportation." This reads very much as though it might have been dictated by a shipping agent who had been rather busy the last few months.

It is safe to assume that we agree as to the great desirability of making a dormant or delayed dormant application of lime sulfur wash, sometimes with other materials added, and the well known calyx or codling moth spray. These two treatments are by far the most important the apple grower can make and usually the latter is of greater value than the former, because the codling moth is not only a general but very injurious pest.

We further admit that dormant applications of lime sulfur wash at winter strength or some other equally effective insecticide is the most satisfactory method ow controlling San Jose scale. It is well known by some at least that this pest infests Kieffer pear, sour cherries and quinces to such a slight extent that spraying of these trees to control scale is not as a rule necessary and may therefore, under present conditions be omitted. Experience in the Hudson Valley has shown it to be moderately safe to omit the dormant spray for a year or two, at least in orchards where scale has not been abundant the last two or three seasons, though this should not be construed as guaranteeing immunity from injury if there is no dormant spraying. It has worked out fairly satisfactorily in a number of cases and the probabilities are that equally good results would follow in many New England orchards, since parasites are apparently very effective in checking this pest in many localities.

The delayed dormant spray, where conditions permit and justify its employment, is more valuable than the earlier dormant application, since if arsenate of lead or other poison be added and the treatment be delayed until the young leaves are about half an inch long or even until the pink

shows in the bud, as is the practice of certain growers, we have not only an efficient check upon scale but a most valuable remedy for early leaf feeders such as bud moth, case bearers and the more conspicuous though usually less injurious apple tent caterpillars. And if in addition we add to this delayed dormant spray a tobacco extract, 40 per cent. nicotine, we have in this application a very effective check on aphid or plant lice and the early hatching red bug, at least in some seasons. The difficulty with this treatment, especially when given late, is the limited time during which the material can be applied with safety and the danger of bad weather preventing treatment altogether. In sections where scale has not been troublesome in recent years, where aphid and red bug are generally not important and where fungus is rarely troublesome, it is possible to omit this dormant or delayed dormant spraying without great danger of serious loss. Some other insects deserve notice in passing, namely aphids and red bugs. The former, especially in view of the remarks by an earlier speaker, are more important than many fruit growers realize. The extended investigations by Professor P. J. Parrott of the New York State Agricultural Experiment State have satisfied him that serious damage to fruit may be caused soon after blossoming and therefore later spraying for the control of these pests is frequently unsatisfactory. His work in the western part of the state has amply demonstrated the beneficial results following early thorough bud spraying with a contact insecticide for the destruction of the aphids shortly after they have hatched from the black, over-wintering eggs so frequently numerous upon the twigs. The best time for this treatment is just after the buds have separated, though excellent results may be secured if the spraying is delayed until the leaves are about half an inch long. The main object is to destroy these pests before they have had an opportunity of curling the leaves and thus protecting themselves to a considerable extent from contact insecticides. The addition of nicotine to the delayed dormant spray is one of the cheapest and most effective ways of con-

trolling aphids.

Red bugs are becoming increasingly abundant in New York State and the same is probably true of New England. We have known of instances where half of the crops has been seriously injured and a number of reports last summer indicated a damage to twenty-five per cent. of the yield. The work of these pests is most easily recognized by the reddish spots—suggesting dusting with red pepper—on the young leaves at the tips of the branches. The spots, as the leaves develop, turn brown and in midsummer we may have the center of the affected areas dropping out and in any event the characteristic spots and crumpling persist throughout the season even to the dropping of the foliage, consequently this leaf damage affords one of the easiest methods of detecting red bug in an orchard. The earliest evidence of injury to the small apple is an exudation accompanied by local discoloration and hardening. The young fruit is frequently pierced to the core and as growth continues depressions with pithy centers extending deep into the apple may be noted. There is usually a marked irregularity in the shape of the fruit and many of the most seriously injured apples are dwarfed and drop about midsummer.

The two species of red bug have practically identical habits except that the eggs of the true red bug hatch soon after the leaves of the fruit buds open while those of the false red bug hatch about a week later. The delayed dormant spray with nicotine added is just about right to catch the young of the true red bug while those of the false red bug may not be numerous until just as the blossoms are about to drop and are therefore most easily destroyed as a rule by adding nicotine to the calyx spray. In case of very badly infested orchards, a special spraying with nicotine and soap just before the blossoms open may be worth while. The calyx or codling moth spray, the application made within a week or ten days after the blossoms drop and preferably early in this period, is the most important treatment the apple grower gives and the one which should receive special

attention, since our work in earlier years has satisfied us that neglect at this time can be remedied to only a very limited extent by later applications. In other words, spraying three or four weeks after the blossoms fall, while of value, is only about one-third or one-half as effective in preventing wormy apples as compared with the calyx spray. This is due to the fact that some two-thirds of the young codling moth larvae enter the apples sooner or later at the blossom end. Evidence gathered within the last few years indicates more clearly than heretofore the accumulative value of thorough annual calyx sprayings if the grower would secure a maximum benefit. It has been demonstrated, especially in the western part of New York State, that a considerable portion of the young codling moth larvae hatch from eggs deposited late upon the small apples and make a characteristic shallow blemish or "side injury" in the smooth surface of the apple before entering the blossom end. It is exceedingly difficult, if not impossible, to poison these small caterpillars before they have inflicted this injury and consequently the spraying of one season has a material effect upon the amount of this type of damage which may occur the following year. This blemish, while not serious of itself, since it is rarely deeper than 1-16 of an inch, has its effect upon grading, especially if abundant and the apples are grown in a state having a uniform grading and packing law.

The benefits accruing from the calyx spray are not limited to codling moth control, especially if a tobacco extract at the usual strength is added, since this latter is of value as in the late dormant spray, in checking aphid and moreover if the spraying is given just after the blossoms fall it may be the most effective treatment possible for control of red bug, something depending upon the season.

The use of arsenate of lead, paste or powder is preferable to some of the newer and cheaper insecticides which have not been thoroughly tested in the orchard. The increased price and the possibility of not obtaining an adequate supply of poison has led to frequent inquiries in re-

gard to minimum amounts. We have been advising five or six pounds of paste arsenate of lead, 15 per cent arsenic oxide, to 100 gallons of water or its equivalent, though careful spraying with four pounds to 100 gallons will control the pest. The main point is the amount of poison deposited upon the tree and not the amount in the spray mixture, though the latter has a bearing upon the former. Spraying is not one of the most costly of orchard operations and we would not advise a great reduction in either insecticides or fungicides, though we recognize that a great dilution can be offset in considerable measure by a very thorough and careful application. Generally speaking our results will be proportional to the thoroughness of distribution rather than to the amount used per gallon.

Arsenate of lime or arsenate of calcium is cheaper than arsenate of lead and should be used on field crops rather than in the orchard, largely because it has not been tested out on fruit trees and there has been severe burning when this poison was used on foliage without a lime preparation. The danger of burning is considerably reduced by applying the poison with a lime sulfur wash and almost entirely so, if we may depend upon reports from the western states, if an excess of recently slaked lime is present. It should not be used on stonefruits. It is credited with possessing superior adhesive properties as compared with Paris green and since it may be applied either dry or wet, it is an excellent poison for potatoes.

A word as to commercial insecticides may be pertinent. A special committee on spraying materials reported at the 19th Annual Normal Institute for New York State Workers as follows: "If, in conjunction with other weak fungicidal and insecticidal properties, we take into account the relatively high prices of these materials, the evidence indicates that these substances are not so efficient or economical as the standard lead arsenate and bordeaux or arsenate of lead and lime sulfur." Practically the same conclusions are voiced as a result of experiments by the New Jersey, Virginia and

Connecticut Experiment Stations.

The apple maggot or railroad worm is a somewhat serious pest in many orchards. The control of this insect depends in large measure on good orchard practices, such as cultivation, the usual spraying and the destruction of wind-falls. There have been very promising results obtained in some orchards infested by this pest by spraying with an arsenical poison at about the time the flies appear on the trees, which in the case of winter apples, is apt to be from early until toward the middle of July. Those having serious difficulty with this pest may well try this method, especially if the orchard be somewhat isolated or there be an opportunity to secure by co-operation similar treatment in nearby orchards.

A discussion of this character would hardly be complete without mention of two recently introduced insects known as the oriental peach moth and the apple and thorn skeletonizer, both of which have established themselves in New York State and have not, like the gypsy and brown tailed moths, entered the country through New England.

The oriental peach moth is probably generally distributed over most of Long Island and specimens have been received from Stamford, Conn. It also occurs at Rutherford, N. J., and in the vicinity of Baltimore and Washington. Its presence is indicated by wilting leaves and bored terminals in late summer. It is specially destructive to peach and attacks apple and pear and probably breeds equally well in cultivated pome and stone fruits. Badly infested trees may have practically every twig attacked and as a consequence there is a much branched, bushy growth. This pest also attacks peaches, generally entering near the stem and penetrating to the pit. The habits of this new pest are such that no practical control methods can be suggested at the present time.

The apple and thorn skeletonizer has become well established in portions of Westchester County, N. Y. It is an European insect classed as of minor importance and the probabilities are that it will not be specially dangerous, though in

the infested area it was so numerous last summer as to skeletonize the foliage of entire orchards as completely as the canker worm does in New England. It is easily distinguished from this latter since the caterpillars are light green, very active, about one-half-inch long and usually there are only two or three feeding near the center of each leaf. There is no webbing to gather and enclosing the leaves in masses so characteristic of our native fall web worm or seen to a less extent in the nests of the brown tail moth caterpillar. There are two generations and possibly three each season, the caterpillars feeding until late fall and the insect wintering probably both as pupae and adults. The feeding habit is such that spraying with poison should control the pest very readily.

The pear psylla is one of the most destructive of our pear insects and a very difficult one to control. The adults or flies, as is well known, winter in any nearby shelter, usually under the rough bark on the trunks of the trees, though frequently taking advantage of the protection offered by adjacent stone walls, brush heaps, fence posts, and the like. The insects are active during mild days in winter and commence laying eggs with the appearance of warm weather in the spring. These eggs are usually all deposited upon the smaller twigs and fruit spurs before the blossom buds have developed greatly and generally speaking pear growers will find it extremely desirable to make a delayed dormant application of the lime sulfur wash at winter strength before the blossom buds have separated or pulled apart. This treatment means the destruction, if the spraying is thorough, of all the psylla eggs and should be supplemented by clean culture in and about the pear orchard to eliminate any shelters such as brush piles and stone heaps where the insects might linger longer than they normally would and thus, by a delayed oviposition, vitiate in large measure the benefits, so far as pear psylla control is concerned, to be obtained from this late application. Failure to secure satisfactory results may necessitate later applications of nicotine and soap for the destruction of the young psyllas any time during the sea-

son when the insects are seen to be sufficiently numerous to warrant such treatment. This supplemental spraying, however, is not nearly so effective as the delayed dormant treatment advised above. It is also possible to destroy many of the flies in late fall or during warm spells in winter, though generally speaking we believe this to be more costly and as a rule less effective than the spraying recommended above.

Pear psylla infestation is indicated by sticky drops of honey-dew first on the twigs and then on the leaves, the amount increasing with the advance of the season and frequently becoming so great as to smear most of the foliage and drop to the ground. A sooty fungus grows in this honey-dew and produces a characteristic blackening, especially toward the latter part of the season. There is no destruction of the buds or spoon-shaped deformation of the leaves characteristic of thrip injury.

The pear thrip is an extremely destructive and exceedingly insidious enemy of the pear grower. It has been responsible for the almost total loss of the crop on certain varieties of seckel and to a less extent on bartletts in large orchards in the Hudson Valley. It produces what has been known as "Blossom blight" and in severely infested orchards the leaf as well as the blossom buds may be blasted before the developing tissues have pushed out to any great extent. The thrip itself is a slender black insect only about 1-20 of an inch long. It appears before or just as the fruit blossoms begin to crack and its small size enables it to enter the buds and quickly get beyond the reach of sprays. Six to ten of these insects in a bud means the blasting of the blossom. The presence of this insect is indicated first by drops of sticky matter upon opening buds followed by shriveled remains of flowers and leaves and this latter may be so marked as to result in practically no foliage on the upper portions of trees until into June. The treatment is early and thorough spraying with a contact insecticide—nicotine and soap being one of the best—before the buds open, just after the blossom buds have pulled apart and after the young thrip ap-

pear upon the partly expanded leaves. The idea is to hit the insects at times when they are not sheltered. Experiments have shown a considerable degree of protection to result from thorough spraying with a thick lime sulfur wash—60 to 80 pounds of extra lime being added to 100 gallons—just before the blossom buds start. It appears desirable to delay this to the latest practicable date and at the same time it is essential to get it on before the buds crack, otherwise the insects may enter the buds and work for some days beyond the reach of sprays.

Injury by minor insects, though frequently somewhat serious cannot be forecast readily and on that account the restriction of the spray schedule to the control of the more serious annual pests is advised and dependence for the guidance in emergency work, if the latter be necessary, upon the direction of local experts.

This latter suggests an important point, namely the value of the well posted county agent. It is impossible with variations in soil, exposure and variety to formulate rules which will enable every grower to spray at times when he can secure the greatest benefit. An expert having personal experience in the control of the more injurious insects under varying conditions is the best possible party to indicate the time when spraying operations should commence and this is particularly true of some of our serious pests which work rapidly and are comparatively inconspicuous, especially such easily overlooked insects as the pear thrips and the pear psylla. The former may blast a crop before its presence is suspected and the latter is one of the serious and dangerous pests of the grower in the Hudson Valley as well as in the western portion of New York State.

The method of application is important, the main problem is to secure a uniform and rapid distribution of the insecticide. The former is essential and the latter important. The higher the pressure, other things being equal, the more rapidly can thorough work be done, the idea is to cover each leaf and fill the calyx cup when spraying for codling moth

without excessive dripping. This calls for constant watchfulness and the exercise of good judgment, especially if the pressure is high and a moderately coarse nozzle employed. The spraying may be from the rig or the ground, or both, much depending upon the equipment and in many cases one man on the outfit and another on the ground will give by far the best results, especially if the latter is not constantly hampered in his actions by a limited amount of hose. The "spray gun," practically a modification of the nozzle generally employed for gypsy method work, has been used in a number of New York orchards and by some at least with a considerable degree of satisfaction. The successful employment of this device depends very greatly upon a judicious manipulation, with the exercise of constant care to keep the nozzle a reasonable distance from the foliage, otherwise there is apt to be some burning.

Remembering the need of securing a maximum benefit at a minimum expenditure of time and materials, we would lay special stress on the delayed dormant spray where conditions justify its use and especially on the calyx or codling moth spray, the former being desirable in orchards where scale is present and early leaf feeders somewhat numerous and the latter necessary for practically every apple tree if we would grow moderately perfect fruit.

AFTERNOON SESSION (Wednesday)

February 27, 1918.

President Margeson Presiding.

THE PRESIDENT: Is there any new business to come before us at this time? I think Mr. Munson has something that he would like to bring to our attention.

MR. MUNSON: It would be well to consider at this time first the matter mentioned in regard to sending apples to the men over-seas. This matter, I believe, Mr. President, should be brought up and a committee appointed to look into it and do whatever they think best. I make that as a motion.

PRESIDENT MARGESON: Will anyone second this motion which Mr. Munson has put before us in regard to sending apples over-seas to the men in active service? [Motion seconded.] Those in favor of having a committee appointed to take care of this matter please manifest by raising the right hand. How will you have this committee appointed?

MR. MUNSON: By the Chair.

PRESIDENT MARGESON: Those in favor of this procedure, please manifest by raising the right hand. Those opposed. (Motion carried.)

PRESIDENT MARGESON: Is there anything further?

MR. MUNSON: It is customary in most associations that have been meeting this year, to remit the dues of the members who have joined the service. I do not think our association wants to do different than that, and I move that the dues of those members who have joined the colors be remitted.

PRESIDENT MARGESON: It is moved and seconded

that the dues of the members who have joined active service be remitted for the present year or while they are in active service. Those in favor manifest by raising their right hand. (Motion carried).

MR. MUNSON: At our meeting yesterday there was a matter brought up of the emergency news service, which some of the members thought out to reach them through the extension service. I guess the best procedure for getting that to the members is a question, but here again, Mr. President, I would move you that a committee be appointed by the Chair to take up this matter of emergency news service and take what action it seems advisable to take. (Motion seconded.)

PRESIDENT MARGESON: It is moved and seconded that a committee be appointed to take up such matters as they think should be gotten into the hands of the fruit growers from time to time. Those in favor will manifest by raising their right hand; contrary minded; it is carried.

MR. MUNSON: Just one more matter. That is, during the past year you are aware that we have held no field meetings. This has been due to shortage of help and so forth, and the Executive Committee of the association deemed it wise not to call the members away from the farms, during the busy season. They would like some instructions from the members as to their desires in having field meetings this summer,—whether they want them or whether they think that the emergency, or the help proposition, would keep them from attending so that it would be unwise to have these meetings. If there is anybody here that will express an opinion on the matter, I am sure the Executive Committee will appreciate it.

PRESIDENT MARGESON: I think it is very timely, gentlemen, in regard to this matter of field meetings, whether we should hold them or whether we feel it is drawing too much upon the time of those who would like to attend. We would be glad to have any discussion on the subject now. We would like to have any expression from anyone present.

. . . I take it for granted that no one wants field meetings.

MR. MUNSON: I might say this in regard to it: That there does not seem to be any enthusiasm about having field meetings this year, but it comes to the minds of several men that it might be possible to arrange with certain growers to have what they call "at home" day, when fruit growers could visit their place if they so desired during this next summer and that the men who held this "at home" day could simply arrange to give the men who called there some time in explaining what questions they might present. I do not know whether that would be acceptable to the Association or not. It seems to me that during the present situation, we ought to make some efforts to keep in touch with the work of the men in our Association during the summer and give opportunity to those who desire to look into the different practices of fruit growers along these lines.

MR. MANN: Why wouldn't it be a good idea to leave that idea with the Executive Committee, and if they see opportunity to hold a meeting, or if they see some specially interesting places or crops in fine condition, to make arrangements so that they can be visited, whether by the society or an open field day.

PRESIDENT MARGESON: Do you make that as motion, Mr. Mann?

MR. MANN: Yes. (Motion seconded.)

PRESIDENT MARGESON: It is moved and seconded that this matter be left to the Executive Committee. Those in favor will please manifest by raising their right hand. It is a vote.

PRESIDENT MARGESON: Are there any other committees to report or any new business at this time? I would like to ask if there is anyone present or if anyone present knows of anyone who is an expert at grafting. Now, we will have the report from the Nominating Committee, Mr. Stevens.

MR. STEVENS: Mr. President and gentlemen, your

committee have this list to report (see front of this volume).

PRESIDENT MARGESON: You have heard the report of the Nominating Committee, what will you do with it?

A MEMBER: I wonder if the Nominating Committee were aware that Everet E. Derby of Leominster had enlisted in the service of his country.

MR. STEVENS: We were told so, but any member of our Association who has gone across, deserves to be retained.

PRESIDENT MARGESON: What will you do with this report?

A MEMBER: I move it be accepted.

PRESIDENT MARGESON: You have heard the report of the Nominating Committee, which is now before you of officers to serve you for the next year. Those in favor of accepting the report, please manifest by raising their right hand. Contrary minded. (Motion carried.)

I would like to say again in regard to the stationery, that your Secretary, Mr. Brown, has a cut which was specially prepared for the Massachusetts Fruit Growers' Association, and anybody desiring it, may obtain stationery from him at a reasonable price, by which you will advertise your Association. You can use it in your correspondence. Any member can have it adapted to meet his needs.

MR. MANN: I want to offer one suggestion. You can decide the value for yourself. On this list of directors, there is only one ex-president,—the retiring President. Now, my idea would be that after a man has been through these offices and held the position of president two years, he is much more valuable as a director than many of the rest of us. It seems that we should increase that list, and keep three ex-presidents on the board of directors. I just offer that as a suggestion.

MR. MARGESON: Being an ex-president, I don't want to say much on it.

MR. MANN: You have got to be on there now, anyway.

MR. MUNSON: If Mr. Margeson feels at all bashful about putting any such proposition before the audience, I will be glad to, because I feel that men that have had experiences in the offices know considerable of the work that needs to be done during the year, and I will entertain the motion that Mr. Mann's intention be put to the meeting. You make that as a motion, Mr. Mann?

MR. MANN: I will.

MR. MUNSON: It has been moved and seconded that three of the recent ex-presidents be on the board of directors. All those in favor of this motion please signify by raising the right hand. Opposed, same sign. It is a unanimous vote, Mr. President.

MR. MARGESON: I am sure, as an ex-president, I will be very much interested in the affairs of our Association. My interest will not cease when I cease to be president.

If there is no objection, the Nominating Committee will attend to that. The new State Vegetable Growers Association is meeting with us to-day and we are very glad to share this session with them, and turn the meeting over to President J. W. Stone of Watertown who will preside at the next address. President Stone outlined the work of the new association and then introduced Mr. Stephen R. Dow, of Boston, who spoke on "Mobilization of High School Boys for Farm Work."

MOBILIZATION OF HIGH SCHOOL BOYS FOR FARM WORK.

Stephen R. Dow, Federal State Director, of the Massachusetts Division of the United States Boys' Working Reserve.

Massachusetts has the reputation of being first in every great national crisis. Governor McCall appointed the first Committee on Public Safety. Massachusetts also had the first relief train on the way to Halifax following its recent disaster. We also had the first sugar shortage, also the first coal shortage.

The Committee on Public Safety early last April realized that the farmers of Massachusetts were facing a shortage of labor and a sub-committee was appointed and given this important matter for its attention. With the co-operation of the school officials, this committee placed 1600 high school boys on farms throughout the State. Every state in the Union has now undertaken similar work and the Federal Government, under the statutory power of the Department of Labor, has recognized this important work by organizing the United States Boys' Working Reserve. This coming summer the Massachusetts Committee on Public Safety, through the Committee on School Boys for Farm Service, will conduct the work in Massachusetts in co-operation with the United States Boys' Working Reserve.

The success of our country in the war depends not only on large and efficient fighting forces, but on our ability to create such a supply of food that the needs of our fighting men, our Allies, and our own people may be met.

With thousands of men called away from our farms to fight or to work in factories, our country is suffering from

an unprecedented and ever-increasing farm labor shortage. The only available source to meet this shortage of labor must come from the ranks of boys in school and in non-essential occupations who, loyal to the core, will be only too eager to do their share in this agricultural work when the appeal is properly presented to them.

There are about 5,000,000 boys in the United States between 16 and 20 years of age inclusive. Of this number it is estimated that 2,000,000 are either idle or engaged in non-productive occupations for a substantial part of the year. It is for the latter group that Uncle Sam has organized the United States Boys' Working Reserve.

Able bodied boys not less than 16 nor more than 21 years of age are enrolled as members of the Reserve for agricultural work upon signing an application card for membership provided they obtain:

1. The written consent of their parent or guardian.
2. Their school physician's endorsement.
3. Subscribe to the oath of service before the enrolling officer.
4. Agree to hold themselves ready for service on the farm beginning May 1st through October 12th.

It is intended to have an enrolling officer in every high school to take their application for membership in the Reserve.

The wages paid by the farmer must necessarily vary since different kinds of work, different localities, and experience, command varying rates of compensation. Therefore the Committee has determined only the minimum wage.

The supervisor and the farmer will arrange wages fairly, but the boy who goes on a farm to help win the war does not expect an easy job or big wages. He goes just as his big brother goes to the trenches, ready to work hard and forfeit possible comforts in order that he may serve his country in its hour of need.

I. The minimum wage will be as follows:

A. Boys who work on farms where they receive board

and lodging :

- a. First week : board, lodging, and \$2 cash.
- b. Thereafter : Board, lodging, and at least \$4 a week.
- B. Boys who live at home, working on neighboring

farms :

- a. First week : \$1.25 a day.
- b. Thereafter : At least \$1.50 a day.
- C. Boys, who live in a camp, working on neighboring

farms :

- a. First week : \$1.25 a day.
- b. Thereafter : At least \$1.50 a day.

II. In all cases it is expected that farmers will pay the boys an amount in EXCESS of this schedule if they are worth it,—particularly those boys who have had previous experience. This will be determined by agreement between the farmer and camp **supervisor**.

In some cases the farmer will prefer to pay by the hour. This can be arranged through the camp supervisor but in all cases will be based on the above schedule.

Many of the boys last year averaged \$2 a day and some able boys exceeded this rate. It is up to them to perform their work so efficiently that higher wages will naturally result.

The expense for running the camps last year averaged \$5 a boy per week. Where a boy worked for \$1.50 a day or \$9 per week he received \$4 a week in cash after paying his share of the camp expenses. Camp expense consists solely of food for the boys, supervisor and cook, and the cooks' wages. All camp equipment will be furnished by the Massachusetts Committee on Public Safety.

The Committee on Public Safety will establish a camp in any community where there is sufficient work to keep 25 boys continuously employed during the summer. After the camp is established it is expected that it will be self-maintaining. The boys can work on farms within a radius of three or four miles from the central camp. Twenty such camps were established last summer and it is expected that

at least 50 will be in operation the coming summer.

The Committee requests the farmers of every town in the State to get in touch with the office at the State House on this question of high school boy labor. Many of the farmers will want one or more boys to live with them on their farms, and these we are prepared to furnish also.

Of the 1600 boys who did farm work last summer we shall have a greater proportion available for this summer's work and these we shall use as leaders of small groups of inexperienced boys. The four agricultural schools in the State have offered their services for training boys from the neighboring high schools in the rudiments of farming and we hope to have from 700 to 1000 take this course before the first of May.

The county farm agents through the Commonwealth are co-operating with this committee and will gladly report any calls from the farmers for boy labor.

The importance of this movement has been felt throughout the length and breadth of the United States and boys are being enrolled by the thousands in every State in the Union.

The movement is no longer an experiment as its tremendous growth demonstrates.

If Indiana, Illinois, and Iowa, can each use from 75,000 to 100,000 high school boys, surely the farmers of Massachusetts should not suffer for want of labor while there is a high school boy unemployed in the Commonwealth. (President Stone turned the meeting back to President Margeson.)

PRESIDENT MARGESON: We are certainly very glad to have the Vegetable Growers meet with the Fruit Growers. They have brought to our attention some timely suggestions.

MR. STEVENS: The Committee on Nominations makes this recommendation: That the last three ex-presidents be added to the list of directors, H. L. Frost, Professor Sears, and I. I. Margeson. I move that the Secretary be instructed

to cast one ballot for this list as reported by your committee.

PRESIDENT MARGESON: Those in favor, please manifest by raising their right hand. Those opposed. (Motion carried.) The Secretary will cast the ballot. We will declare the entire board of officers elected, as the ballot has been cast by our Secretary at the present time.

We will now call for Mr. DeLue, who will speak to us on "Strawberry Seedlings."

“STRAWBERRY SEEDLINGS”

Dr. Frederick S. DeLue, Boston.

Mr. President, Ladies and Gentlemen, I was expecting to come here and give a few very informal remarks, but I got a few days ago a note from your Secretary asking me if I could have a copy of my paper, and I see by the notice that it was a matter of 10 minutes, so I presume that is a very good way of shutting me off, because when I start out on these subjects, I do not know when to stop.

The subject of raising strawberry seedlings seems to be very little understood and, so far as I can find, almost no mention of it is made in the literature. It is for this reason, I believe, that so few new varieties of merit have been introduced. Were it better understood it would be more readily undertaken, for, in my opinion, no other branch of fruit culture can compare with it in absorbing interest.

For the scientist who may be interested in heredity and environment, I know of nothing to compare with it, not even the guinea pig nor sweet corn which are so generally used, for the results are reached so quickly and so many more determining features are available for making our conclusions a little more accurate.

The subject, however, requires the most careful thought and study practically the greater part of the year, for during the season when plants are dormant one is studying field notes and charts or diagrams preparatory to new matings and seed sowing for the next season, and during the growing season there is a constant succession of changes in plant and fruit.

The great majority of people will take the subject up for the purpose of improving on the varieties which we already have, for no one who has ever eaten berries of the

highest quality from a well kept home garden will ever be satisfied with berries as they come in the ordinary market.

As the great bulk of the strawberry industry is carried on by the commercial grower, so has the market for plant growing been dominated by the commercial grower, for he demands first of all that the berry be sufficiently firm so as to arrive on the market looking well, as practically all the berries of high quality are soft berries and poor shippers; so has quality come to be neglected. Thus the public never experience the pleasure of eating a real strawberry.

It was with the idea in mind of combining the good points of the varieties popular with the commercial grower and the home grower that I took up the subject.

My experience with seedlings dates back about ten years. Starting with about thirty of the best known varieties, they were all thoroughly mixed and compactly planted so as to more thoroughly allow of cross fertilization. The latest blossoms of the earliest varieties and the earliest blossoms of the latest could well fertilize one another.

The finest specimens of fruit from all varieties were selected and crushed and then allowed to stand until fermentation had taken place, so as to soften the pulp and make separation from the seeds easy. They may stand so crushed in a covered dish for days or weeks or months. The fermented mass is then poured into a wire sieve and pressed through the mesh while running water is running through the sieve. The pulp so separated being lighter than the seeds, floats, allowing the seeds to sink to the bottom of the dish, when the water above can be poured off carrying the pulp with it. After several rinsings the seeds come perfectly clean, and may be then poured out on blotting paper to dry.

Planting may be done as soon as the seeds are dry enough to scatter, or may be held until fall or the following spring. The seed bed should then be prepared by leveling and making as smooth as possible but not enriched, and should be light and sandy. The seed should be very thinly scattered on the surface and then lightly raked over and

rolled with a heavy roller. The surface of the bed is then covered by clean straw or hay free from seed until the tiny plants begin to make their appearance, which will be in about six weeks.

There is nothing now to do to the bed except to keep the surface from drying out and the weeds pulled until the plants get three or four true leaves or are one to two inches tall. They should then be dug up with a trowel and tips of the roots trimmed off and transplanted into rows one foot apart and three or four inches apart in a row. When the plants begin to crowd and the roots come near the surface, they are again lifted from the rows and set out this time with a ball of earth attached into rows two feet apart and plants one foot apart in a row.

Cultivation should now be deep so as to force deep rooting and away from the surface. From this time on the care is the same as for any variety planted in hills.

My first eighteen hundred plants were treated as above except that they were again taken up late in the fall and given four feet each way to allow for runner formation or layering in pots.

As the plants begin to develop during the following spring, one should note the size, shape and color of the leaf and its freedom from disease, and whether the plant is low and spreading or tall and upright, and whether it makes many crowns.

As the first stems develop one should note whether they are long or short, stout or slender, whether they remain covered by the foliage or project above it.

As the blossoms appear one should note whether there are few or many on a stem, whether they are staminate or pistillate, and if staminate whether blossom is large with an abundance of pollen, or small with only a small amount of pollen.

As the fruit develops one should note the size, shape and color of the berry, whether the color of surface and pulp are the same—color and size of the seeds, and whether prom-

inent or depressed. One should also note whether the berry is firm and resists crushing in fingers, and after crushing whether it is juicy or dry and mealy. Also note whether the berry is free from a hard core, and whether it is sweet and sprightly or flat and insipid.

The first season it is well to allow all of the fruit to remain on the vines as it ripens so that one may judge of the productiveness of the plant, and the length of its fruiting season; whether all on the cluster ripen at once or come along one at a time; whether the first or king berry is very large and those following very small, or the first and the last nearly of the same size.

Symbols should be used to designate special features common to all. For foliage the writer used X, XX, XXX. For size and strength of blossoms for the staminate varieties B, BB, and for the pistilate P, PP, and for the most promising plants after fruiting season C, CC, CCC, CCCC.

As the runners develop one should note the length and thickness of runner wire. Just before they begin to strike root one should set pots and as many as possible should be taken from each. This allows one to know the relative value of each as a plant maker.

Before the roots push through the pots into the ground, the runner wire should be cut and pot removed to a partly shady place so that they will not dry out, and where they can stand until the ground is ready for setting out into little groups. Each variety in a group by itself is now planted in sections of three rows each—the distance between rows being fifteen inches, and the distance between sections two and a half feet. The paper pots are removed from the ball of earth and planted fifteen inches apart in rows, so that the plants now stand in the sections fifteen inches each way.

It is well to set them out into these sections as early as possible so that the roots will strike deep, and thus prevent heaving out of the soil during the winter. They should be carefully mulched as soon as the ground freezes.

When the plants begin to grow the following spring,

the characteristics of both plant and fruit should again be noted, and after fruiting, those varieties worthy of further test should be cleaned up by removing all the old leaves around the crowns, taken up with a ball of earth attached, and set out in single rows three and a half to four feet apart, and one and one half to two feet apart in the row to allow for runner making, which will multiply the number of plants for further use, and allow us to make another valuable test the following year. It may now well be that some of our supposedly poorer varieties, as grown in hills, show up to best advantage when fruiting in the small runner plants. Likewise those varieties which were not promising enough to take pots from in the original bed, being allowed to set their plants on the ground all around them, now become some of the most highly prized. Two of my most productive and most valuable varieties came from the original bed of hill plants, and one of these has since taken the silver medal the past year.

After weeding out those varieties now known not to be superior, another severe test is made by allowing the beds made up by runner plants to go through several winters without mulch to test their rooting system. The thin and shallow rooted varieties will heave out of the ground and so should be discarded.

My own plants have survived four or five winters or more without any mulch, and out of 7000 varieties I have now remaining 150, which are very promising. The only two which I have thus far exhibited at the Massachusetts Horticultural Society have taken silver medals. The "Judith" was awarded the silver by the Massachusetts Horticultural Society the summer of 1915, and three first prizes the summer of 1917 by the same society at their annual strawberry show. At the same time they brought at wholesale in the open market at Boston sixty cents per quart for the first shipment.

The "Judith" is a bi-sexual variety and one of the five most productive varieties out of 7000. It is the first to ripen,

though not the first to blossom. It is very large and carries its size throughout the whole season. It is also one of the latest, having a long fruiting season, making it especially valuable for the home garden. The color is a deep red all through and it is quite glossy. In shape it is truncated cone, and when packed in a box look as much a like as do peas. The seeds are small and bright yellow. The flavor is especially fine, and it is very sweet and juicy, and though the berry is so firm as to allow of being dropped from a height of four feet from the hand to the ground without bruising it, it is not mealy or coarse in flesh, but very smooth in texture and without core.

The stems are stout enough to bear up well the large clusters of berries and of sufficient strength to allow of easy picking.

The foliage which is medium light green is strong and vigorous, and remains so after fruiting. It is tall enough to cover the blossoms, thereby protecting them against frost.

The runners are strong and root easily, and they form abundantly enough to fill the row completely. The runner wire is just about the right length to allow of proper spacing of the plants without crowding.

Thus the game goes on slowly, and after ten years of close study and much hard play I have one variety which I believe is worthy of introduction to the fruit growers of the country for further test.

MR. MARGESON: We would like to have time for discussion, but we can perhaps bring up questions a little later. Is Mr. Whitcomb present?

GROWING RASPBERRIES

Mr. N. H. Whitcomb, Littleton.

Mr. President and Members of the Association, I have been attending these meetings of the Association for several years with a good deal of profit and pleasure, but since answering your persuasive Secretary in the affirmative, I think I can sympathize with the aggrieved husband at the funeral of his wife when he was informed by the undertaker that he would be obliged to ride to the grave in the same carriage with his mother-in-law. He replied, with a sigh, "I can, if it is necessary, but I assure you, you are taking away all the pleasure of the occasion." And it is certainly true that it is embarrassing to a man that has spent more than 30 years mostly behind the cultivator, you might say in the bushes, to stand before an audience like this after listening to the very able addresses and papers you have listened to, and try to tell you even his humble experience.

I will simply tell you what I have done, not how to do it, because anyone here who is interested in the subject knows what to do a good deal better than I. You might think I would be well qualified to speak about this, having grown them so long, but they have always been grown on the same farm, on one of our New England hills with mainly a southeastern slope. They also extended over the hill, and on the other side, so that part of the slope has been a northwesterly slope. The soil of that hill is typical, I think, of our New England soils. The surface soil is a medium dark loam, with cobbles of varying size. We have had those to contend with, and it seemed in the first few years we were growing more cobbles than plants, because we no sooner got off one crop and plowed and cultivated, then we got a bigger one than before; but in a few years we overcame that. Below

this is a rather yellowish loam that is almost free from stones, for perhaps nine or 10 inches; and then below that we get the subsoil of clay, which I think will hold water rather longer than the best tin cans I can buy nowadays.

Our raspberries have all been set as fillers among our apple trees which we have set in the last 25 or 30 years,—15 or 18 acres of apple trees, and have set the raspberries on 10 acres. Our trees have been set mainly 40 feet, so we have set four rows of raspberries between the trees, making them eight feet apart. We have set one or two fields in hills four feet apart, but on the whole we have placed the plants in rows eight feet apart.

We prepare the land as you would for any crop, being careful not to get the land too rich for the first year, and set the plants anywhere from 15 to 20 inches or two feet apart in the row according to the strength of the plant and the richness of the soil. In regard to the time of planting, I do not think you can ever get a raspberry plant out too early in the spring. After planting, the care of the raspberry for the first two or three months is very simple. While there is a question in regard to sod growth among apple trees, I think there is no question about clean cultivation with raspberries. We plan to cultivate just as often as we can, and then we try to cultivate once in between. That is, there is no danger of cultivating too much. For the newly set plants we cultivate up to the 1st of August, or perhaps a little later if the ground should be inclined to grow too many weeds. With our bearing plantations, we only cultivate up to the 1st of July.

We never have winter covered the young vines, but we have one more sad rite to perform for the bearing plantation, and that is burying it. I say sad, because I have always been the one to perform the leap frog part of the operation, holding the vines down.

When we first began to raise berries we had some trouble with their winter killing and breaking down with the snow, which is liable to cause quite a good deal of damage,

and we looked for a remedy. I thought, "If I have got to winter cover raspberries with earth, I will stop raising them." I have probably covered them 20 times since, so that shows any fool is liable to change his mind, and it isn't a serious operation nor very expensive. You can cover an acre of raspberries for \$25 in good shape. When you have them covered, you cannot charge all that expense up to covering, because when uncovered in the spring, with a little work they are in prime condition to start the season.

Our method of covering is about like this: We plow a furrow—or perhaps, two as close in as we can. The bad wood is all broken out, of course, before we begin covering operations. One bears the canes down, gathering them with his arms and hand and pressing them down to the ground. Then one on each side throws some dirt on the canes. While they are covering them, the one who is holding them down takes a new lot and lays the tips side of the other bunch behind him, and the dirt is thrown on to them, so when he gets through with that operation he has the tips down, and according to the size of the cane, the bend will be up anywhere from a foot to 15 inches from the ground. We use a one-horse plow and plow two furrows of earth as close to the vine as we can, and have the furrow turn over nicely. Then plow another furrow, and two men go along with a shovel and throw the second furrow on to the first. That will leave us with probably half of our cane covered with an arch at the bud that will not be covered. I have never been able to cover that completely, nor found it necessary. I never had winter killing to any extent covered that way. It would be impossible to cover the whole length of the cane in a thrifty plantation.

Of course, the first work in the spring would be to uncover them, which is comparatively easy. We plow one furrow on each side with a light plow. Then a man goes along, using a light potato digger, hoeing away some of the earth about the bigger end of the vine, and then lifts them out and pulls away the soft dirt. We do not attempt, at this time, to level

the ground or straighten the canes entirely. Nature will do that if left alone for 10 days or two weeks. We like to uncover just as early as we can after the danger of a light frost is over. I have even had small shoots half an inch long, and it doesn't have any bad effect.

The fertilizing is one of the first things in the spring. Just what you use depends on the growth that your canes have been making. If our canes are on fairly good land, we like to have them make about a six-foot growth of cane. We have found it necessary to apply anywhere from 700 pounds up, perhaps, in some extreme cases on the poorer parts of the land, 1500 commercial fertilizer of 3-6-8 or 3-8-10, varying the potash and phosphoric acid. We have always mixed our own commercial fertilizers for this work, and as times have changed, we have had to rely on different sources for the elements. We used nitrate of soda for the nitrogen, and sometimes some tankage. Last year, we had but little acid phosphate for source of phosphoric acid. I know some land had not received any stable manure for 15 years before the berries were set on it, as the land was taken up from pastures and never had been under cultivation at any time.

Of course we cultivate as often as we can from the day they are uncovered. We cut them back in the spring usually a third at least. We do not practice cutting back on the summer canes, because if we cut back during the growing time, we will get a branching cane, and it is hard to cover. We find the branching canes are always bad, because they grow so stiff they are liable to break, but if we cut them in the spring down to about three feet, we don't hurt them. Then they send out the long, lateral branches that come from near the ground and from which we get our finest berries. Cutting them back delays the ripening a little. If we want a few early berries, we get them on the slim end tips, but they are not worth much.

We have had an awful lot of experience with picking. There used to be a time that we could take our two-horse team and single wagon and go into the village two miles

away and bring home all the school girls and boys that we could carry. I can see a man in the audience, whose wife, then a school girl, has picked lots of berries for me. Now we have to rely on Italian pickers. We had always managed to get them picked for 1 1-2 cents. This last summer we started in for two, but had an Italian strike, and had to do what the rest did before we got through,—2 1-2 cents. They were high enough last year to warrant the extra expense.

Our berries have always been marketed in Boston, sending to the commission men. Now, I know there is a good deal of talk about marketing the products direct from the farm, but I believe that the retail matter of marketing farm products is another business, just as much as in manufacturing it is a separate business to distribute the goods. Manufacturers rely on a distributing agent. I have had very good success and been well satisfied with the consignment of my berries to a commission man. We have shipped for several years to the same firm, and the results have been very satisfactory. They are picked in the morning as soon as they are dry, and then taken by auto truck at night and landed in Boston as soon as the stalls are open in the morning,—anywhere from two o'clock to five.

The cost of raising the berries is one of the important and interesting items. I think, for a term of years, we have never got the top prices, but it is safe to say that our berries have averaged 10 cents a pint. Last year we had berries sell for 16 and 17 cents a pint by the commission men, but that is too high. I believe it is detrimental to the raspberry grower to have his berries sell as high as that. Our President referred to not expecting to get too much for our apples. I believe there is danger that the farmer is liable to be as bad as the other fellow; he wants to get all there is in it. There is a point to which you can force prices that cuts down the consumption, and will injure a man in the business. The expense of raising the berries we have figured through a term of years at about two cents a pint. That includes all the

growing expense. The picking expense and marketing is about four cents a pint. That leaves about four cents a pint profit. I think with us an average crop has been about 60 bushels to the acre. Probably some say: "I raise 100." I don't doubt you have. I think I have picked single rows in my piece at the rate of 30 bushels at one picking; but at the same time I think that over a series of years a yield of 60 bushels to the acre is about as much as one ought to expect. That doesn't seem very much, yet these berries have all been raised as fillers, in an apple orchard, and have been kept there ten years, so that the orchard is just coming into bearing with raspberries as a filler crop. While cultivating the raspberries excellent care of the trees has necessarily been taken and they did not cost a cent. To a young man with a mortgage on his farm, as I had when I started, it has been a pretty fairly good investment. I have been satisfied to stay in the business for 30 years, and I think any young man that is starting an apple orchard, that hasn't any more cash than he needs, should not be afraid to set it with raspberries.

The matter of securing plants is quite an important proposition, for there are lots of differences in the plants. We were most always able to take our plants out of our own plots, and when we did, we had good success. When we bought, we had varying success. The cheapest plants that we ever bought were the first lot; we thought we got stung, and probably did. A tree agent sold us 2000. We paid him \$90 for the 2000, but they were the cheapest plants we ever got. I thank you. (Applause.)

DR. FELT: I would like to ask Mr. Whitecomb if, instead of covering them with dirt, straw would have a good effect.

MR. WHITCOMB: I couldn't say as to that, because I never use anything but dirt. I shouldn't be afraid to try it. Of course, the straw wouldn't prevent thawing and freezing to the extent that the dirt does, although it would help. There might be some danger of using straw from the mice getting in. Earth is the cheapest way to do it, and the cheap-

est way, while not always the best way is, for the man looking for the dollar that is in it, the course a good many of us are apt to pursue.

A MEMBER: I would like to inquire what varieties you raise.

MR. WHITCOMB: I think there is but one variety of raspberries. We have always raised the Cuthbert. We have tried the Loudon and several other kinds, but with us the Cuthbert has been the only berry that has had merit enough. Of course, I have been in it so long that I am prejudiced. Probably other berries have come along in the last few years that have more merit than the Cuthbert.

A MEMBER: Do you spray your raspberries at all?

MR. WHITCOMB: No, sir.

A MEMBER: Does the raspberry row bother about spraying the apple trees?

MR. WHITCOMB: No; we find that we can manage to get through where they are set eight feet wide. We can drive between our raspberry rows. Of course, they bother, but if they are netting \$150 an acre, we can afford to be bothered a little.

On the last piece we set the trees 40 feet apart. Then set the double fillers, and another filler in between, 20 feet, so we only set in that case one row, and set the raspberries 10 feet from the trees, but in our first plants we set them eight feet, and while, they did bother, we had no great trouble in going between. I always used to tell the men when they went to spray or cultivate remember when they came into the field, that we set the trees there first. That was to be the first care, to look out for the trees, and if they had to run over anything, to run over the raspberries. We have lost very few from damage. At the end of the rows we have to turn, and run down a few vines, but we always get too many anyway. I think they should be thinned a lot, four good canes to the foot is enough. I probably never had a field but what averaged six, but couldn't get myself to cut them thin enough.

MR. WHITCOMB of Amherst: In regard to the pack-
age, shipping in the pint boxes. Is that the way they are
shipped?

MR. WHITCOMB: When we began, I think the first
ones were shipped in quarts. That was all there was then.
For the last 15 or 20 years we have shipped wholly in the
oblong pints. That has, to us, been most satisfactory packing.
In picking, in order to carry these pints, we make a tray,
out of orange boxes, with a handle in the middle. It will
hold some 10 or 12 pints,—five or six on each side of the
division. We have tried them with legs, thinking they
could be handled better in the field, but pickers fall over
them, and when carried into the packing shed, they were
in the way, and we lost more than we gained.

Another thing in picking: I have always had to cau-
tion the pickers a good deal—and said: “You notice that
each raspberry has a hole in it. That hole is the only profit
I get. If you crush that hole, you spoil my profit.”

MR. WHITCOMB of Amherst: Do you find that you
do not have to support the Cuthbert any? That is, the Cuth-
bert is the one variety that needs the most support. We
have to wire them.

MR. WHITCOMB: I think we wired one field. But I
want them all spread out. If you wire them up close, you
keep the sun out and don't give them a good chance. If
you have good strong canes and have cut them down to
about four feet or three feet and a half, they will stand up
pretty straight until they come to bear. Then gradually
reach out, very few getting into the dirt, and in picking time,
if you have a good growth of berries, you will have a row
there at the top that is as wide across as you can reach, and
have berries all through it; but if you have them wired in
tight, you get a few berries on each outside edge, but not
in the middle, and the fruit is dry and blasted, not having a
chance to mature.

In regard to the time of picking, we have always picked
our berries Mondays, Wednesdays and Fridays. We haven't

raised many raspberries, but probably in the 30 years that we have been in the business, we have raised 3000 bushels,—about 100 crates a year., It is a very modest way that we have been in the business, but we have not usually found it necessary to pick on Sunday. Now, I know it is quite a custom, and I have had my commission men ask me, “Why don’t you pick your berries Sunday and get them in here Monday morning?” “Well,” I replied, “I don’t know why, I think I am too lazy. If I plan to work six days, that is all I want to. I want Sunday for going to church.” (Applause.) If I raise a good raspberry and get it into market in good shape, if they can’t buy it Monday morning, they will buy it Tuesday morning.

THE CHAIRMAN: I think Mr. Whitcomb has had a little over 10 minutes, but we have been glad to hear from him on this subject.

A MEMBER: I would like to inquire if the \$150 for an acre, he meant gross receipts or profit?

MR. WHITCOMB: Net profit. We get about four cents a pint profit, and at 60 bushels to the acre, that gives us four cents profit on 3600 pints,—that is \$144. There was never a chance to make more money in the raspberry business than today. Raspberries sold at 16 or 17 cents a pint last year at wholesale.

MR. SMITH of Wellesley: I merely wanted to call your attention to referring to the surface of the earth as “dirt.” It seems to me those who work as farmers and gardeners and fruit growers might express themselves in the terms that they use.

A MEMBER: I would like to add one word. I think Mr. Whitcomb has made it very clear. He speaks of his soil, how he made a success of raising raspberries on it.

At Concord, our land is very different from the land Mr. Whitcomb describes in Littleton. On his soil he can grow a firmer raspberry and market it in better condition, so it really cut us out in raising raspberries in Concord as a market crop, because the raspberries were soft; and they went to

pieces, did not stand up well, and we gave it up. Likewise, the market is supplied from New York State, where their raspberries are much firmer than raspberries grown on heavier soil. I think it is a very interesting crop to grow. I grew it more than 60 years ago when I used to grow the Franconia. We thought we did not get good prices when we did not get 40 cents a box for them, and they were marketed in the old fashioned boxes with a cover, and we took great pains to face them in good shape.

But there is one thing he spoke of that has helped him very much. There is no crop of small fruits that succeeds better when grown in partial shade, than the raspberries. The apple trees really helped him out a good deal. We found it so years ago, and that is one thing that has been favorable for his success in growing raspberries,—the shade of those apple trees.

THE CHAIRMAN: Now, the next speaker was Mr. Hittinger. Is Mr. Hittinger present? I understand he is not present. We will call for Mr. Stevens, of Wellesley, on "Grape Culture."

“GRAPE CULTURE”

Mr. Abel F. Stevens, Wellesley.

Mr. President and Gentlemen, I find myself this afternoon very hoarse. I am before you with a few things written out on the practical side, the detail of the subject. I find that I am a good deal like the two darkies down on the Mississippi River that had the habit of going to sleep in the middle of the day and basking in the sunshine in flat boats on the river, tying up there to a little twig by the side. A bright little pickaninny cut the string and pushed it out into the stream and it went quite a way down the river, when it struck a snag and woke up Sam. Sam looked up and said, “We ain’t here. Bill, Bill, wake up here, quick; we ain’t here.” Bill looked up and says, “No, we are five miles from here.” So my voice is about five miles from here.

If the noble apple is the “king” of fruits, the delicious grape is certainly the “queen.” It is generally conceded that “Adam’s fall” was caused by an apple, but my own observation has been that many a man can trace his own downfall to a “peach!”

HISTORY

The antiquity of the grape reaches back to the Creation, for we find that the grape is mentioned 215 times from Genesis to Revelations, so it dates back to the “Garden of Eden” and has been cultivated by man for 6000 years. The history of grape growing in United States is most clearly related by Professor Bailey in “The Evolution of Our Native Fruits.” This book is far more fascinating than a novel and far better for you, brother fruit growers to read, than any novel which is only poor fiction. Bailey’s book deals in sterling facts. Previous to 1830 many attempted to grow the European wine grape (*Vites Vinifera*) but after many failures attention was directed to our native varieties, that grew so luxuriantly in many states.

In 1825 the delicious Catawba was introduced and the noble Concord in 1853. These were the forerunners and parents of nearly all of our best standard varieties today, and rapidly have new seedlings appeared since then, mostly from our native species (*Vities Labrusca*), (*Vitis Aestivalis*), *Vitis Ripana*), and (*Vitis Rotunifolin*); while today we have a most excellent race of hybrids from these species, and especially the secondary hybrids seedlings, combining the delicious quality of the *Vitis Vinifera* with the hardiness, vigor and freedom from disease of our native varieties—a wonderful combination.

In the culture of the grape many varied systems have evolved, showing a great adaptation and variation to the locality, thus proving the grape to be the most versatile of all fruits. The site selected for the large commercial vineyard should be one of an open exposure to the sun and sufficient slope of land to provide good air as well as water drainage. Select a warm, light porous soil. Avoid a cold, wet, heavy, clay land, for the grape is a “child of the sun.” It loves warmth and sweet, pure air drainage.

A vineyard in close proximity to a large body of water has an ideal location as the tempering influence of water upon climate is shown in the healthy foliage and superb clusters of fruit. Should the subsoil be hard, it should be treated with dynamite. We always use one quarter stick of 20 per cent to each hole before setting the vines, putting the dynamite two and one half to three feet deep, thus loosening the hard, cold subsoil for many feet around, underneath the plant, which always shows a marked effect in rampant, healthy foliage and extra quality of fruit. Thorough preparation of the soil shows by results that will justify expenditure.

FERTILIZERS

This is of the greatest importance to successful culture. Many years of careful experimenting with different kinds has proved to us the great value of ground bone and sulphate of potash with phosphate to balance—3, 2, 1, using

about one pound per vine, well spread around and raked into soil over five feet area; and a most excellent fertilizer for the grape is good hardwood ashes which contains five per cent potash, two per cent phosphorous and one per cent wood lime. Now in November, after pruning the vines and carefully raking up all trimmings, old leaves, etc., which must be burned up clean in large heaps, and the ashes carefully spread around the vines, apply between each row and vines in the rows, four cords of well-rotted cow manure per acre. In early spring turn under with light plow four inches deep, thus we fertilize the growing vines with the necessary plant food, without an excess of nitrogen, which is detrimental to healthy roots and fruitful cane. Keep the cultivator going each week from April to August.

PLANTING

Select good, strong, one-year vines. Cut canes to four buds. Set 8x8 feet, spread out all roots, cutting off ends broken. Have all holes three feet wide by two feet deep. Cover roots with fine, rich soil, one foot deep, treading the earth very firmly, leaving a two-inch depression around each vine to hold water when needed. Keep the fine tooth cultivator running once and twice a week if very dry weather prevails, thus destroying all weeds as well as forming an excellent "dust" mulch about our growing vines.

PRUNING

All vines must be pruned annually. We prefer November. The type of trellis will govern the system of pruning, i. e., as to length of new canes and number of strong buds to each, also the habit of the variety. As a rule, all strong, rampant growers cut back to two strong buds to each lateral shoot from main cane, while on the less vigorous varieties leave longer lateral branches to balance the growth. Remember the object of trellises is to simply hang the vines up in the air and sunshine so that the fruit may ripen into extra quality and beauty. Prune always with the idea that the

fruit of this year is borne only on the shoots developed from the buds of last year. Never leave weak shoots as the crop of fruit is developed only from the strongest buds. The fruit crop should be from a five year old vineyard, about 15 pounds, while 25 pounds per vine is a heavy crop,—or 25 to 50 bunches, a vine, so leave 15 to 25 strong buds to each vine and each of these should carry two or three good bunches. Thus, 680 vines producing 20 pounds each, equals 13,600 pounds or 6 4-5 tons per acre. It is a waste of energy to leave too much bearing wood. One third to two thirds of all annual growth should be removed in November as the object in pruning is to get the greatest amount of bearing wood in the smallest possible space. This means there must be a method of renewal of new canes from near base of vines as needed or yearly. This is the “renewal” system while the “spur” system renews only parts of the vine annually. In the renewal system there are the single arm and the double arm or “fan” system. The single arm gives the choicest fruit, while the double arm renewal gives the largest quality. Now these two systems of pruning apply to the “vertical trellis” while the best and most popular is that system known as the “horizontal” or “canopy” system.

To build: set single row posts 7 ft. long 3 ft. deep, 8 ft. apart, across top of each spike a 2x4 joist, 2 1-2 ft. long, staple three No. 10 wires, center and ends, upper side of cross arms. Run vines to center wire, nip back and form two branches, these tied in each direction on center wire. Cut to four feet each, the side shoots from the bearing canes. Use the “spur” system in pruning. This ideal trellis is the best, simplest to spray, easiest to cultivate and the very best for our Northern zone of grape culture. This system is cheap, does away with summer tying and the drooping vines; shades and protects trunks and roots. It also gives free air circulation under trellis. Gives the best crops and highest quality of fruit. The art of raising grapes consists in converting superfluous foliage into superior fruit. So the practical prob-

lem is to concentrate the vitality of the vine into fruit. Cultivation modifies the habit of the vine.

A natural division of species is the "Raisin Grape" of the sub-tropical while the "Non-Raisin" is of the temperate zone. Our best table grapes come to perfection at the northern margin of grape cultivation. Here they reach perfection of quality and quantity. Ever remember that quality determines the commercial value of any fruit.

DISEASES AND INSECTS

Anthracnose, a fungus disease which makes deep holes and scars on young canes and ruins the foliage. Remedy: Spray with four pounds copper sulphate to 50 gallons of water BEFORE buds open. Follow later with bordeaux. In fact we know of no more potent factor to control all serious grape fungus diseases than bordeaux, using from three to six sprayings. We believe that this mixture is better adapted to the grape than any other fruit.

Black Rot, a fungus growth. Spray bordeaux, first after fruit is set and three to five times later. Burn all prunings, diseased fruit and foliage.

Downy Mildew, brownish white patches on under side of leaves. Use flower of sulfur, follow with bordeaux. Spray when seen. This controls it. Sulfur is most excellent for all forms of mildew.

INSECTS

The "Berry Moth" is the parent of a very small worm that burrows into green grapes spoiling the fruit. Spray with arsenate of lead, but bagging the clusters is best. Burn all dry foliage.

Cane Borers. Clean away soil near roots of vines and wash with "Borowax" and then bank up soil. Burn any dry foliage. Dig out borers first.

Rose Beetles. Spray with kerosene emulsion. Use one pound alum to four gallons water. Sweep off dormant beetles and burn in oil. Cover single vines with netting. Set a white flowering shrub near vines.

VARIETIES

In order of ripening.

Black	Red	White
Campbells	Brighton	Green Mountain
Worden	Delaware	Diamond
Concord	Vergennes	Niagara

“Stevens” Hybrid Seedlings.

All of superior quality.

Black	Red	White
Prince	Ruby	Golden Queen
Superb	Delacona	Perfection

Members of the Massachusetts Fruit Growers' Association, it is my best wish that each of you may “sit beneath his own vine and fig tree” and enjoy these delicious fruits—God’s best gift to man!

While we enjoy what others have planted, let us now plant that others may enjoy. Mr. President, when the plantings and prunings and culture of earth shall culminate in the blessing and purity and perfection of heaven, may we all sit down at that great feast of immortal fruits. I thank you.

MR. MANN: I would like to offer a motion that the thanks of this Association be returned to the Worcester County Horticultural Society for their cordiality, and also the speakers of the day for their interesting entertainment.

THE CHAIRMAN: It is moved and seconded that the members of this Association return a vote of thanks for the hospitality of the Worcester County Horticultural Society for their kindness and entertainment. Those in favor of Mr. Mann’s motion please manifest by raising their right hands, contrary minded; it is a unanimous vote. I think it is time now to close our two days’ session. As there is nothing more to come before us, we will now stand adjourned.

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Charles W. Mann, Methuen.

D. Chauncey Brewer, Harvard.

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The Commonwealth of Massachusetts

STATE DEPARTMENT OF AGRICULTURE

WILFRID WHEELER, COMMISSIONER

DEPARTMENT CIRCULAR No. 9

April, 1919

CONTROL OF THE PRINCIPAL INSECTS
INJURIOUS TO THE APPLE
ABOVE GROUND

THOMAS J. HEADLEE



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CONTROL OF THE PRINCIPAL INSECTS INJURIOUS TO THE APPLE ABOVE GROUND.

THOMAS J. HEADLEE, PH.D., ENTOMOLOGIST, NEW JERSEY AGRICULTURAL
EXPERIMENT STATION.

INTRODUCTION.

In the discussion which follows, an effort will be made to treat of the species concerned and the operations for their control in the order in which they occur during the growing season. Throughout this discussion it is assumed that we are dealing with a bearing apple orchard. It must be remembered, in considering the recommendations set forth, that they are based on the writer's experience in New Hampshire and New Jersey, and that while they probably apply pretty well to Massachusetts conditions there is a possibility that some of them may not fit entirely the local conditions.

FIRST TREATMENT.

It is possible, with our present knowledge, to say that the first spraying which the apple orchard should receive should control San José, oyster-shell and scurfy scales, and the rosy, the green and the oat aphid. In the past it has been customary to recommend a dormant treatment for the scale insects, and a growing season treatment for the plant lice.

About four years ago the New York Agricultural Experiment Station at Geneva came out with a recommendation that an effort should be made to kill the plant lice just as the buds are opening, and to combine this treatment with the ordinary dormant spray. The past three years' experience in New Jersey has confirmed this idea, and shown that it is possible to combine this treatment for plant lice with the ordinary dormant

treatment for scale insects, and with a single spraying operation to bring all of them under satisfactory control.

The treatment for controlling the scales and plant lice should be made between the time that the development of the buds show silvery and the time that the small leaves stick out from them like squirrels' ears. This description refers to the fruit buds and not to ordinary leaf buds. In the studies at the New Jersey Agricultural Experiment Station it has been shown repeatedly that not all lice have hatched by the time this stage has arrived, but it has also been shown that the eggs which are still unhatched have split their outer covers and have become very susceptible to destruction by spraying mixtures.

When the number of aphid eggs is extremely large, such as is the case this year (1919) in New Jersey, so many of the eggs may be tucked in under the buds out of reach of the spray that a considerable number of aphids may appear after this treatment has been completed. The orchardist should keep a close watch. If this happens he should immediately re-treat his orchard with a mixture of 40 per cent nicotine, water and soap, using 1 part of the nicotine to 500 parts of water (three-fourths of a pint to 50 gallons), and adding soap (whale oil or laundry) at the rate of 2 pounds when water is soft, or 3 to 5 pounds when water is hard, to each 50 gallons.

Standard liquid lime-sulphur concentrate (testing 32° Baumé) combined with water at the rate of 1 gallon to 8 or 9 gallons of water, plus 40 per cent nicotine at the rate of 1 part of the nicotine to 500 parts of the lime-sulphur and water, all things considered, has proven the most satisfactory mixture.

The writer realizes that there are on the market to-day a number of substitutes for the standard liquid lime-sulphur concentrate, such as dry lime-sulphur, soluble sulphur (sodium sulphur), B. T. S. (barium sulphur), etc., but, assuming that the efficiency of these substitutes is measured by their total sulphur content, believes that any one of them will cost at least twice as much as the standard liquid lime-sulphur concentrate, and will be no more efficient. It should be recognized that up to date none of them have had anything like the test which has been accorded to the standard liquid lime-sulphur concentrate.

The writer is also aware that the recommendation of 40 per cent nicotine at the rate of 1 to 500 (three-fourths of a pint to 50 gallons) is much stronger than that which has been recommended by many experiment stations and other agencies. His experience, covering at least the last three years in New Jersey, has, however, unmistakably shown that far better results follow the use of 1 to 500 (three-fourths of a pint to 50 gallons) than those which follow the use of the weaker mixtures.

In applying these mixtures for the control of scales and plant lice it is necessary that the coating of the trees be made as nearly absolutely complete as is practicable, for all are sucking insects, and must be hit in order to be killed.

The machinery advisable depends upon the labor factor. With high-pressure pumps and large delivery nozzles the coating may be obtained with a much shorter expenditure of time and labor, but an equally good coating can be obtained with lower pressures if time enough is taken to do the work.

It should also be said that this first treatment, containing as it does lime-sulphur, should have a destructive effect upon fungous diseases.

SECOND TREATMENT.

Between the time the small leaves project from the flower buds like squirrels' ears, and the time the trees come into bloom, apple scab infection is likely to take place, red bugs, canker worms and other leaf feeders to appear, and the forerunners of the plum curculio to make their appearance in the orchard. This period is therefore one during which something should be done to prevent injury by fungous diseases and insect enemies. When the buds begin to show pink the trees should be thoroughly treated with a mixture composed of 1 gallon of standard liquid lime-sulphur concentrate to 40 gallons of water, to which arsenate of lead has been added at the rate of $1\frac{1}{2}$ pounds of the powder or 3 pounds of the paste to 50 gallons. The whole tree should be well coated, but an especial effort should be made to see that the young flower buds and expanding leaves are well covered. The best coating is likely to be obtained by delivering the spray as a fine mist under high

pressure. A coarse spray is likely to run off the tree and to leave the critical parts of leaves and flower buds without the necessary protection, and may possibly do more or less harm through burning.

If red bugs are present 40 per cent nicotine should be added to this spray at the rate of 1 to 500 (three-fourths of a pint to each 50 gallons).

The question of machinery in this application is the same as that discussed in connection with the first treatment.

THIRD TREATMENT.

Beginning when the blossoms are three-fourths or more off the trees, and before the blossom ends of the apples have closed, there is a period of from five to seven days in which mixtures may be applied which will tend to protect the trees from codling moth, plum curculio, red bug, general leaf feeders, apple scab and other fungous diseases. At this period the arsenical poison may be placed in the blossom end of the apple, where it will remain throughout the season ready for the apple worm when it tries to enter the fruit through this door. The young fruit may be so thoroughly coated as to protect it from the attacks of the plum curculio, which will normally come a few days later. If the red bugs have not previously been destroyed they may be killed by adding to the ordinary mixture 40 per cent nicotine. At this time that coating which will protect the fruit and foliage from canker worms and other leaf feeders and fungous diseases for the next week or ten days may be made.

The mixture which is probably best is composed of 1 gallon of standard liquid lime-sulphur concentrate to 40 gallons of water, plus $1\frac{1}{2}$ pounds of powdered arsenate of lead or 3 pounds of the paste to each 50 gallons of the mixture. If red bug is to be fought, 40 per cent nicotine should be added to the mixture at the rate of three-fourths of a pint to 50 gallons.

The material should be applied as a fine mist. Effort should be made to give to the fruit and foliage a thorough coating, and especial attention must be given to coating thoroughly the spreading lips of the blossom end of the apple. Again, the question of machinery for applying is one which depends upon

the labor available. High pressures and large nozzles mean much saving in labor, but cannot be said in other respects to produce better results than relatively low pressures and small nozzles.

FOURTH TREATMENT.

This fourth treatment is necessary only where the plum curculio normally stings a sufficient number of the apples to seriously damage the crop. It is based on the fact that the writer has never observed an instance in which the plum curculio has stung the fruit through a good spray coating. It is his observation that this insect hunts up the spots which the spray coating does not cover, and there does its work. In his experience the principal damage by the plum curculio occurs within a space of five or six days, and that in the past this damage has taken place in the period between the blossom fall and the next recommended spray. At this time the growth of the apple is exceedingly rapid, and the spray coating administered to it at the fall of the petals is quickly broken, giving the plum curculio every opportunity to find spots that are free from the spraying mixtures.

It is therefore recommended that this treatment be begun not more than one week after the blossoms fall. The material should be the same, with the exception of the nicotine, as that recommended for the blossom fall spray, provided, of course, that the varieties are not especially subject to russet. This question of damage by russetting will be discussed later in this paper.

The material should be applied as a fine mist, and both fruit and foliage should be very thoroughly coated. The machinery question here is the same as in preceding treatments, and needs no especial consideration.

FIFTH TREATMENT.

Ten days after the fourth treatment, or approximately three weeks after the blossoms drop, the first brood of codling moth worms will begin to enter the apples. Inasmuch as many of the eggs of this insect are laid upon leaves at a considerable distance from the apples, with the result that the young worms

feed more or less on the underside of the foliage as they make their way toward the apple, and inasmuch as nearly 20 per cent of the worms which reach the apple will attempt to enter through the sides, it is necessary that both fruit and foliage be thoroughly coated at this time with a poisonous mixture. In view of the further fact that fungous diseases of one sort or another are always with us, it seems advisable to use a fungicide as well.

The mixture should in this case be the same as that recommended for the fourth treatment, and a special effort should be made to coat the under and upper sides of the leaves and all portions of the fruit with the material. The mixture should be applied as a fine mist, because in this way the most complete coating possible can be obtained. The machinery here is the same as in preceding treatments, and needs no especial consideration.

SIXTH TREATMENT.

Eight or nine weeks after the blossoms fall the second brood of codling moth worms begin to enter the apples, and the coating given the trees five or six weeks before has almost entirely disappeared. Furthermore, the protection against fungous diseases has likewise gone with the disappearance of this coating. It is therefore necessary at this time that the fruit and foliage be recoated, the foliage primarily from the standpoint of protection from leaf feeders and fungous diseases, and the fruit from the standpoint of protection from the apple worm. The material used in this treatment should be the same as that recommended in the previous treatment, and it should be applied as a fine mist, with an especial effort to give to the foliage (particularly the upper side) and the fruit (all sides) a complete coating consisting of fine specks of the spray material. The machinery question is here the same as in the preceding treatments, and does not require especial consideration.

SPECIAL TREATMENTS.

The apple maggot, or railroad worm, will probably in most cases, at least where clean orcharding is practiced, be taken care of by the above-outlined treatments, the flies being poi-

soned from licking up the globules of spray between the time they emerge and the time they lay their eggs. There may, however, be some cases in which, because of non-cultivation of orchards, and because of no effort to destroy the dropped apples, this insect may not be thus brought under control. Where such difficulty is anticipated the orchardist should take some of the infested apples of last year's crop, place them upon medium, moist soil in a box, and cover the open end of the box with wire mosquito netting. He should maintain the moisture of this soil by adding a little water from time to time. In due time the adult flies will appear in the box. Shortly thereafter, assuming that the box has been kept out of doors under outdoor conditions, he should apply to his trees a spray consisting of 4 pounds of powdered arsenate of lead to 100 gallons of water. In view of the fact that it is expected the flies will be killed by consuming the droplets of the spray liquid, it is probable that a spray slightly coarser than the one recommended in the regular treatments would be best. Ordinarily these flies appear in early July, almost coincident with the sixth spray of the schedule, but of course may not always do so. However, it is advisable that the orchardist practice, wherever possible, clean orchard culture, and depend upon the regular sprayings to take care of this insect.

The apple leaf hopper is an insect which may or may not appear in the orchard in any given year. It is therefore necessary for the orchardist to detect it after it has hatched and before it has reached the winged stage. This can be done by examining the under sides of the foliage from time to time, keeping a sharp watch for a small, slender, greenish white insect which is able to move rapidly over the leaves, but which cannot at this stage fly. When these insects are discovered the orchard should be promptly sprayed. If a regular spraying is due, simply add to the regular spray material 40 per cent nicotine at the rate of three-fourths of a pint to 50 gallons. If no regular spray is due, treat the trees thoroughly with a mixture composed of three-fourths of a pint of 40 per cent nicotine to 50 gallons of water, to which soap has been added at the rate of 2 pounds where the water is soft, or 3 to 5 pounds where the water is hard. In making these treatments especial pains

must be taken to coat the under sides of the leaves, for that is where the leaf hopper is usually found.

The bud moth, which is a small reddish brown worm that bores into the swollen buds, eats out their contents and later attacks the foliage, is usually not troublesome when the regular spraying schedule outlined in this paper is practiced year after year. In orchards where it is especially troublesome it may be necessary to make a special application of arsenate of lead just as the buds begin to expand. In that case about $2\frac{1}{2}$ pounds of the powdered arsenate of lead should be used to each 50 gallons of water, and an especial effort made to coat the buds with a fine misty spray. Possibly something could be done by adding lead arsenate to the first treatment at the rate of $2\frac{1}{2}$ pounds to 50 gallons.

Russetting and burning Apples with Spraying Mixtures.

Some varieties of apples, such as Williams, Ben Davis and Grimes, are easily russeted with lime-sulphur at summer strength. In our experience apples may be russeted by material applied when the buds show pink, and when the petals fall or later. It is suggested that growers who have varieties especially susceptible to russetting and that are rarely troubled with scab use self-boiled lime-sulphur as a substitute for the applications recommended in treatments 2 to 6 inclusive. Furthermore, self-boiled lime-sulphur has been found to be very effective in stopping the ravages of the rose bug.

When lime-sulphur, summer strength, is applied to apples under high temperatures, especially if applied very heavily, it is likely to produce a most serious burning of the apple fruit. This type of burning is one which the apple does not readily outgrow. The writer has seen enormous damage done in this way. It is the writer's experience that Bordeaux mixture, which is sometimes used in place of lime-sulphur in sprays recommended in treatments 2 to 6 inclusive, is very likely to russet and burn in wet weather, while lime-sulphur is very likely to russet and burn in hot dry weather.

Liquid v. Dust.

We now have data bearing on the question of the use of dust mixtures for control of fungous diseases and insects which are derived from a period of about six years. Dust has not been able, apparently, to control plant lice, red bug, leaf hoppers, scab or other fungous diseases in a way to compare at all favorably with liquid applications. Dust can, therefore, not be recommended as a substitute for liquid applications on apples.

Substitutes for Arsenate of Lead.

Calcium arsenate and other recent combinations of arsenic with minerals, other than lead, have been placed on the market at figures which make them, on the basis of equivalent amounts of arsenic, much cheaper than arsenate of lead. Calcium arsenate and such others as the writer has examined apparently break down much more quickly than lead arsenate, and are therefore less safe for use on the foliage and fruit of apple trees, which are not tolerant of arsenic as are potatoes and tomatoes.

The Commonwealth of Massachusetts

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WILFRID WHEELER, COMMISSIONER

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FACTORS AFFECTING HARDINESS
IN FRUITS

U. P. HEDRICK



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FACTORS AFFECTING HARDINESS IN FRUITS.

PROFESSOR U. P. HEDRICK, HORTICULTURIST, NEW YORK STATE
EXPERIMENT STATION, GENEVA, NEW YORK.

The chief hindrances to fruit growing in North America are winter freezes and spring frosts. No part of the Continent where fruits are grown, excepting favored portions of California, is free from the danger of a freeze that will kill the trees, or a spring frost that will destroy the blossoms. The losses suffered during the winter and spring of 1917 and 1918 threaten the existence of some fruits in many parts of the United States and Canada. One of the problems which growers of fruit now face is how best to avoid or check injury from freezes and frosts.

The problem is not an insurmountable one, for one finds here and there varieties of orchards almost or wholly uninjured, and possibly adjoining others with trees or buds partly or wholly killed. What conditions of the trees, of the soil, or of the care make the difference? There must be reasons for the injury of the one and not of the other. If we could intelligently explain the eccentricities and anomalies of winter-killing and spring frosts we might do something to avoid injuries from unseasonable weather.

The writer has made two efforts to find some explanation of the varying behavior of peach trees during freezes and frosts. In the spring of 1905 he addressed letters to about 100 of the best peach growers in Michigan, asking for their experience as to the hardiness of the peach in tree and bud. In the spring of 1907 about the same number of letters were addressed to peach growers in New York.

This paper is a brief review of the answers obtained. The great importance of the subject seems to have been obvious to the peach growers, for almost without exception answers were given by those addressed, and in such manner as to show

their interest. The experiences given and the theories advanced are many and conflicting, but out of the great mass of material obtained there is much that is suggestive.

1. INFLUENCE OF SOIL ON HARDINESS.

It is usually held that trees are hardiest on sandy, gravelly or stony soils. In the orchards of Michigan the growers consulted held this to be the case almost without exception. But in New York the kind of soil seems to make but little difference, providing it is warm and dry. If these two factors be favorable, even the tender peach seems to thrive in any of the soils of New York.

In the investigations made, then, this point is clear; the peach must have a warm, dry soil to secure the greatest possible hardiness inherent in the species. This holds with all fruits. Only in such a soil can trees make a strong, firm, well-matured growth that seems to be conducive to hardiness. A warm soil is especially necessary to secure a growth that will withstand cold. Plants in a warm soil, so physiological botanists tell us, have more and smaller cells in their tissues, and therefore a more condensed sap, both of which conditions seem most favorable to hardiness.

Many growers in both States speak of the desirability of a gravelly subsoil to secure a hardy tree. Such a subsoil seems to be conducive to the warmth and dryness of roots, and it is probable that, so far as hardiness is concerned, it matters little whether this subsoil be overlaid with sand, gravel, loam, clay or combinations of these.

2. DOES THE AMOUNT OF MOISTURE IN THE SOIL IN WINTER AFFECT HARDINESS OF TREES?

The evidence as regards this point is clear. Either extreme of moisture — excessive wetness or excessive dryness — gives favorable conditions for winterkilling. A wet soil is conducive to sappiness in the tree and also freezes deeply.

On the other hand, severe cold, especially cold alternating with warm weather or accompanied with dry winds, causes evaporation of water from trees, and if the soil be so dry as not to furnish moisture to replace the evaporated water,

harmful results ensue. Several experiences were given in Michigan in which trees were injured far more from the winter freeze in a dry than in a wet soil in the same orchard. It is a matter of common observation among fruit growers that twigs and buds which are more or less shriveled in winter from lack of water or lack of maturity are almost invariably winterkilled in cold winters.

3. WHAT EFFECTS DO FERTILIZERS HAVE ON TREE GROWTH, AND HENCE ON SUSCEPTIBILITY TO COLD?

It has long been thought that fertilizers with any considerable amount of nitrogen, as barnyard manure, cause trees to make a heavy, rank, soft growth susceptible to freezing. This theory finds expression in such statements as: "Hardy under neglect;" "Tender under high culture." The majority of the growers consulted in this investigation still hold that such is the case, but a very considerable number of them, and among them some of the best fruit growers in the two States, say that trees are more likely to suffer from cold if underfed than if overfed.

Their experiences indicate that vigorous vegetable growth in early summer can be made of great service in counteracting cold, and that half-starved trees, or those which have been allowed to bear too heavily, are apt to suffer most from freezing. The influence of the preceding crop was strongly shown in orchards of all fruits last winter, 1917-18. In all orchards where the trees bore a light crop the preceding summer there was less injury than with trees that bore a full crop. By using properly balanced fertilizers, by stopping cultivation at the right time, and by judicious pruning, so that the growth can be kept firm, the top of the tree compact and the branches well set with buds, conditions favorable to hardiness can be obtained. It is common knowledge that late fall growths are susceptible to winter injury of both wood and bud.

4. DO COVER CROPS PROTECT TREES FROM COLD?

There were no conflicting opinions on this point. Growers who had planted cover crops were agreed as to the value of this method of protecting trees from winter freezing. Many

individual cases were cited of orchards having cover crops surviving the cold winter when near-by orchards without the covering crop, holding a muffler of leaves and snow, were killed. Fruit growers in the two regions consider the cover crop the most effective treatment of their orchards to avoid winterkilling, holding that they protect the roots from cold, cause the trees to ripen their wood quickly and thoroughly, and that they assist in regulating the supply of moisture.

5. IS THERE ANY DIFFERENCE IN HARDINESS BETWEEN
LOW-HEADED AND HIGH-HEADED TREES?

All growers in both States prefer low-headed trees, claiming that both trunks and branches are more often injured in high-headed trees. If this be true the reasons probably are: winds dry out the wood of high-headed trees, making them more susceptible to cold; low-headed trees are usually more vigorous and therefore less susceptible to cold; and lastly, low-headed trees have better protection to the trunk from the sun and hence from sunscald, one of the effects of freezing and thawing. Attention is called by several growers to the fact that buds on high-headed trees usually suffer less from spring frosts.

6. ARE WINDBREAKS A PROTECTION TO TREES OR TO BUDS?

There was much difference of opinion. From the experiences given it seems that the value of a windbreak depends largely upon the topography of the land. A windbreak so situated as to form still air can only be detrimental so far as cold is concerned. So planted as to deflect or to cause air currents they become of value in keeping off frosts. More often than not, however, windbreaks seriously check atmospheric drainage, and the damage by frost is increased. Another disadvantage is, should the windbreak be to the north, the buds on the trees thus sheltered are forced and are therefore more liable to injury by late frosts. The testimony was, for the most part, unfavorable to windbreaks.

7. WHAT DEGREE OF COLD WILL KILL TREES?

There was a most surprising uniformity in the answers to this question. Nearly all of the correspondents set 20° below zero as the temperature that will kill the peach tree under normal conditions, though some had known them to withstand temperatures of from 20° to 30°, depending upon the condition in which the trees went into winter.

During the almost unprecedented cold of last winter in New York sweet cherries were quite as tender as peaches; pears were a little but not much hardier than peaches; apples were, of course, hardier than pears, but some leading varieties of apples and pears, as Baldwin and Bartlett, are not much hardier than the hardiest peaches. Sour cherries were the hardiest of the tree fruits.

8. WHAT DEGREE OF COLD WILL KILL PEACH BUDS?

From the answers to this question we are forced to conclude that much more depends upon the condition of the buds than on the temperature, assuming, of course, a temperature below zero and not greater than 25°, which seems to be the limit that peach buds can stand, even under most favorable conditions. The chief factors influencing tenderness of buds are maturity of buds, variety, and the time at which the buds of a variety finish their resting period and become ready to grow. Some of the factors influencing temperature are lay of the land, proximity to water, stresses of changeable weather, altitude, latitude and currents of air. Fruit buds of other fruits, sweet cherry excepted, are seldom injured.

9. ARE TREES FROM NORTHERN NURSERIES HARDIER THAN THOSE FROM THE SOUTH?

Many opinions were expressed, but few men had grown trees from different latitudes under such conditions as to answer the question fairly. The answers were in no way decisive, and the question is still an open one to be settled only by direct experimentation with trees of the same varieties from North and South, grown under identical conditions.

10. DOES THE CHARACTER OF INDIVIDUAL TREES HAVE ANYTHING TO DO WITH HARDINESS?

Answers to this question were very indefinite and often conflicting. It was held by some, and with a fair show of experience to confirm the contention, that trees naturally high-headed, with few branches, long, spindling trunks, branches and twigs, have soft wood and are therefore more susceptible to freezing; on the other hand, that individuals having naturally short bodies, a goodly number of branches starting low, with short-jointed wood bright and clear when cut, and thickly set with buds, were the least easily injured by cold.

The individuality in these two classes of trees is given them by treatment and environment, as pruning, cultivation, soil and distance apart. One tree of a variety can hardly be supposed to be more hardy to cold than another through inherent variation. Whether greater inherent hardiness exists in some trees in a variety can be determined only by carefully conducted experiments.

11. ARE SMALL-GROWING VARIETIES OF PEACHES WITH COMPACT HEADS HARDIER THAN THE FREE-GROWING SORTS WITH LARGE HEADS?

Practically all growers say that the compact growing sorts are the hardiest. As would be expected, the small-headed varieties are those with the least succulent wood. The following varieties are named as being the most compact growers, and hence hardier than the average: Hill's Chili, Crosby, Gold Drop, Barnard, Kalamazoo, Triumph, Wager and Fitzgerald.

12. IS THE WOOD OF SOME VARIETIES MORE SUCCULENT THAN THAT OF OTHERS MAKING SUCH SORTS SUSCEPTIBLE TO COLD?

Every experienced orchardist or nurseryman knows that there is a great variation in the texture of wood. Some varieties have a much more succulent growth than others grown under the same conditions. Succulency of growth is in some cases a well-marked varietal character, and one that can be avoided in selecting sorts to plant where hardiness is a requisite. Summarizing the answers from New York

and Michigan the following are the peaches most often named as having the softest and sappiest wood: Early Crawford and Late Crawford are named by practically all correspondents as being most succulent in growth, following which, named in order of degree of succulency, come Chair's Choice, St. John, Niagara and Surprise.

13. ARE YOUNG OR OLD TREES HARDIEST?

Beyond all question young trees suffer most in severe winter freezes. Practically all fruit growers agree to this, and as proof, growers give their experience in the several severe freezes that have occurred during the past few years in which young trees universally suffered most. It is probable that young trees are injured most because they make a much greater and much ranker growth than the older ones, and hence more sap remains in them during the winter. The formation of buds in the older trees is helpful, too, in maturing the wood. There are, however, many exceptions to the statement that young trees are less hardy to cold than old ones.

Old trees can be forced to produce large quantities of new wood susceptible to winterkilling, while, on the other hand, the superabundant growth of young trees can be kept down by orchard treatment. It is fair to assume, too, that old trees possessing very low vitality are less hardy than vigorous young trees. Thus it is often to be noted that old trees which have suffered from the ravages of insects and fungi are easily killed by cold.

While young trees are more susceptible to freezing than old ones, yet they are much more likely to recover, if recovery is possible, and their return to a normal condition is more rapid. This is probably true because of the greater vigor of the younger plants, and because of the possibility of an entirely new covering of bark for small trees often impossible with larger ones.

14. NAME THE VARIETIES MOST HARDY IN WOOD.

There was, as would be expected, great difference of opinion as to the sorts most hardy. The following peaches, in order named, are possibly most hardy: Crosby, Hill's Chili, Gold Drop and Wager. Carman, Belle of Georgia, Elberta, Cham-

pion and Greensboro, none of them in the lists of hardiest, are harder than the average.

The Russian apples seem to be perfectly hardy in the apple regions of the United States, the most prominent of these being Yellow Transparent, Red Astrachan, Oldenburg and Wealthy. McIntosh and Fameuse follow the Russians in hardiness. Seckel and Kieffer stand out as the hardiest pears, while Windsor is probably the hardiest sweet cherry.

15. NAME THE VARIETIES MOST TENDER IN WOOD.

Here, too, opinion differs, but not so much as in naming the lists of hardy sorts. The list of peaches runs: Early Crawford, Late Crawford, Chair's Choice, St. John, Niagara.

In the last terribly cold winter in New York Baldwins proved most tender to cold, followed, among standard sorts, by Rhode Island Greening, Northern Spy and Ben Davis.

RECOMMENDATIONS.

What lessons are to be learned from the data set forth? It is plain enough that some varieties of every fruit are inherently harder than other varieties, and that selections of hardy sorts can be made for doubtful situations. Again, all can agree that hardiness is in great measure dependent on maturity of the plant, not only of the whole tree, but of parts of the tree, those parts with the poorest sap flow being least hardy. It is well established, also, that soils may be either too wet or too dry for the hardiest condition possible. It is probable that cover crops and snow offer the best protection against winterkilling of the roots. It seems certain, from the data in hand, that overbearing in the season preceding a cold winter weakens trees so that they are susceptible to cold, as also do the attacks of insects and fungi. Lastly, and possibly most important, the notion that trees are harder under neglect than under high culture seems false; the more vigorous the tree, provided it matures its wood, the harder.

The Commonwealth of Massachusetts

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FRUIT MARKET POSSIBILITIES
IN THE EXPORT TRADE

A. W. OTIS



BOSTON

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FRUIT MARKET POSSIBILITIES IN THE EXPORT TRADE.

A. W. OTIS.

The subject assigned to me — “Fruit Market Possibilities in the Export Trade” — is a very broad one, and is open to consideration in many different ways.

The first word, “Fruit,” is a general term, and the word, “Export,” has to do with the marketing field anywhere outside the United States. We know the United States is a very large and important part of the world at the present time, at least, but when it comes to consideration of fruit market possibilities there are some very important markets outside our own country.

APPLE EXPORTS.

Apples have been shipped from the United States to Europe for approximately sixty years. My own experience dates back to 1880, and while considerable quantities had been shipped prior to that time, the season of 1880–81 was the beginning of a very important branch of the apple business. The exports that season were, in round numbers, 1,300,000 barrels. The quantities have varied from season to season according to conditions, — some seasons being about the same as 1880, and others much lighter, — but the next really important season was that of 1896–97, when nearly 3,000,000 barrels were shipped. I say “important,” not because of the really satisfactory financial results for those in the business, — as for many it was disastrous, — but for what it did for the apple growers in opening up new markets.

The crop was enormous in growing districts. Growers hardly knew what to do with their fruit, and some wished they had let it rot on the ground.

Thousands and thousands of barrels were sold for 75 cents per barrel, packed and delivered on board cars, or less than barrels cost now. Even at this, buyers lost 75 cents, and more if they had money to make good the deficits on their sales.

The season had its bright side, for by January the bad returns had caused very many shippers to stop entirely, and the low prices in England had been the cause of opening up new markets, and after January 1 there was a general improvement and a very good business. The benefit, however, came in later years, as the low prices had created an increased demand for American apples which has continued up to the present time.

In the summer of 1897 we had many new concerns from the other side represented here, looking for business, and they have been looking for American apples ever since.

In early years shipments were almost entirely sent to Great Britain, a very large percentage going to Liverpool, the balance being divided between London, Glasgow, Hull, Bristol and occasionally a few to other places.

Liverpool was the principal distributing market, — the others being more distinctly consuming markets, — depending on their own and near-by populations. Liverpool, being a great shipping port, handled immense quantities weekly, finding an outlet, not only in other places in Great Britain, but also on the Continent.

After a few years Germany became quite an important factor in the business, and was distinctly so just before the war. Hamburg had its free port established by the German government, which enabled it to build up a large business with Russia, Norway, Sweden and other places. Some of us, at least, hope this business will continue, but that it will be supplied either directly or through more friendly channels.

Other markets have developed in South America, Africa, Australia and other trans-Pacific ports.

The demand has grown steadily, and it is no exaggeration to say we have the world for a market. At the present time I have inquiries from Holland, France and the Scandinavian countries. Some of these places are not likely to be large

customers, but will doubtless want some of our apples every year.

In this connection I will refer to a personal trip taken in 1913 for the purpose of looking up new outlets, calling upon dealers in many places, from Naples in the South to Stockholm in the North. I found them interested in and ready to handle the American apple, but generally in a limited way, particularly in the South. I do not believe it advisable to ship to too many small places, but think it better to let them get their supplies from the distributing centres with which we have better steamer connections.

It is for the fruit growers to consider this export outlet, not as a sure thing, that will take whatever is sent and want more, but from a safe and sane standpoint, and do everything possible to increase the demand. A long step in this direction has been the standardization of packages and grades.

I believe the western grower did much to establish a good demand for his fruit by his methods of grading and packing. Within the past seven or eight years grading laws have been enacted in most, if not all, of the important apple-growing States in the East. It is gratifying to a fruit dealer, and certainly to an exporter, handling apples from all States to note the tendency to uniformity in these laws, so far as may be possible, considering the difference in fruit grown in the different States. A uniform grading law is, I believe, ready to be submitted, if not already acted upon, in the six New England States. I would urge you all to do what you can to have the law established. It probably is not perfect as drafted, but it will do much to establish the apple business on a more solid foundation.

Varieties handled in the export trade are worth considering. For years the Baldwin was very largely the apple of commerce. The Ben Davis, a variety not very popular in our markets, follows the Baldwin in the export trade late in the season, giving very good results frequently to shippers. A recent letter even mentioned the Ben Davis as being more desirable under the present abnormal market conditions, than some larger and very handsome apples. The Baldwin to-day is a standard variety, but other apples from other parts of the

country than New England are sought for by many foreign dealers. The Newtown Pippin, from the Hudson River district, was considered for years as the highest-priced apple in the English markets. It was available in very limited supplies, and I recall some years ago that sales were made at 70 shillings, or, in our money, about \$16.70, and it seemed an extravagant price. At the present time the English government has established a maximum price for the receiver to sell barrel apples at 67 shillings and 8 pence, — equal to \$16.06. All varieties and grades have sold at this price, except some apples arriving in very poor condition. We should, however, remember that the present conditions are very unusual; the country is bare of fruit and the people almost famished for apples. In the same family with the Hudson River Newtown, but quite a different apple, is the California Newtown and the Hood River Newtown. Both are very popular, especially in London. What surprises a New England fruit man is why a California Newtown sells in such quantities, as from our viewpoint it is not attractive, and still London buys them by hundreds of thousands of boxes every year.

In 1880 the exports from Boston were almost entirely from the dealers in and around Quincy Market, and, at the most, there were not over fifty different shippers from Boston. From that time the business has grown by leaps and bounds, and it is safe to say there is not a grower or apple dealer of any importance in this country who has not some knowledge of the foreign markets and their bearing upon market conditions here.

Districts which may be named as very much interested in the export business are the following: Maine, New Hampshire, Massachusetts, New York, Virginia, West Virginia, California, Oregon and Washington.

Transportation is a very important point to consider. From the beginning the steamship companies have been interested in apple shipments, and looked upon the business with favor. When building new steamers the requirements of the apple shippers were considered with regard to proper ventilation. At the time the war broke out we had many popular steamers

in our Boston trade, some of them capable of carrying 20,000 to 30,000 barrels in good condition. I regret to say most of the favorite steamers have been lost, and we are now glad to take what the steamship companies offer, and I doubt if an exporter would seriously object to anything that would float.

The methods of handling apples in the different foreign markets vary, though the auction is a more general and usually satisfactory way for distribution. It means a quick sale and prompt returns, as well as fair dealing for seller as well as buyer.

Packages for export business should have consideration. The standard barrel has always been recognized as a proper package, but should be well made, and properly coopered. Boxes, such as are used in the West, are not, in my opinion, to be recommended for New England export business, at least.

The Boston bushel box has been growing in favor for several years, and it probably has come to stay in the export business. It should, however, have special attention when being made to have it strong, or otherwise losses will be heavy.

To sum up the question as to the export marketing possibilities for American apples, I would say the business has grown from a very small beginning; the apples are now known in nearly every country in the world, and, with normal times in the shipping business, we shall have a demand for our fruit every year in such quantities and on such terms as to have a very important bearing on the apple-growing business of the United States.

Besides apples, pears have been shipped in increasing quantities for many years prior to the war. The pear is so tender it has been considered necessary to have refrigeration on the steamers. We have no records as to the quantities shipped, but do not think any considerable shipments from New England have been sent. Our pears are almost too tender and will not keep, and Pacific Coast pears, New York State Bartletts and Kieffers have been exported in considerable amounts; also some plums, prunes and other summer fruits. Cranberries from New England and oranges and grapefruit from Florida and California have been exported in limited quantities.

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THE EFFICIENT MANAGEMENT OF
LABOR ON THE FARM

F. C. SEARS



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THE EFFICIENT MANAGEMENT OF LABOR ON THE FARM.

FRED C. SEARS, BAY ROAD FRUIT FARM, AMHERST, MASS.

I suppose I should apologize to the farm management experts for presuming to talk on the subject assigned to me, and I do so apologize at once. But as a matter of fact, I shall not attempt to give a scientific discussion of the subject as they would do. I shall merely offer a few practical and more or less detached suggestions that have grown out of my experience in helping to manage the Bay Road Fruit Farm at Amherst, and out of my earlier experiences on my father's farm in Kansas.

Very few classes of people have had as many jokes perpetrated at their expense as the hired man. He is usually represented as inefficient, frequently as lazy, sometimes as dishonest, and occasionally as all three. And he is blamed for a large part of the failures in operating farms. "The thing would have gone all right if we could only have had efficient help."

Does he deserve this characterization? In nine cases out of ten he does *not*, if we consider the real, typical, rural hired man, and not the I. W. W. hobo who sometimes drifts out on to the farm merely with the expectation of passing some of his time there, and *not* with an honest intention of doing any work.

The hired man is pretty largely what his employer makes him. If he is well and efficiently managed he accomplishes a deal of work in the course of the year; if his employer has not any executive ability, does not know how to manage himself efficiently, let alone his hired man, then not much of anything is accomplished by the two combined. No one can study, even

casually, the work accomplished under two different foremen or owners without being impressed at once with the difference.

One man keeps all the loose ends gathered up, has something timely for his men to do every moment in the day, keeps his men happy and yet going at a high rate of speed, — in fact, drives his work instead of letting the work drive him. The other man plants his corn three weeks late so that it does not mature in the autumn; does not dig his potatoes in the fall till the ground has frozen enough to spoil a lot of them; puts up his ice in March, and says that farming does not pay. And he can prove it, too!

The writer holds no brief to defend the hired man. Doubtless there are many inefficient men among the class. But so there are among preachers and doctors. Probably as a class hired men are *not* as progressive as employers, else they would be employers themselves. But doubtless, also, if the tables were turned, and the employers were working for some one else, many of them would loose a trifle of their enthusiasm. Self-interest is a big help in keeping up one's interest in the task in hand. In any case, efficient, modern business' management would accomplish wonders if it could be tried out on the average farm. So let us employers shoulder our share of the responsibility and try to improve our methods. If this is sound doctrine, if management can "cut the cost in two," it is certainly worth studying, and the following are some principles which have appealed to the writer in his experience in helping to manage a 400-acre farm during the past ten years.

1. Know exactly how much work is done each day by each man, and if it is not enough, find out why he did not do more. This is, of course, especially important with new men, because in this way one soon locates the man who, for one reason or another, is not accomplishing as much as he should. But it is a mighty useful practice, even with men who have been on the job for years. There are very few of us who are not helped in our work by knowing that somebody else is keeping an interested eye on what we are doing. This is not saying that we are loafers, — most of us are not, — but we take a pride in doing well, and that pride is increased and our effort stimulated if we know that what we accomplish is known by the boss.

2. Get the men interested in their rate of accomplishment,—so many acres plowed in a day; so many trees pruned in a day. This grows naturally out of the first suggestion, and is even more important than the first. If Mike is pruning apple trees ask him, when he comes in at noon, how many trees he finished that forenoon; do the same thing at night; and then, in the evening or Saturday afternoon, sit down with him and figure out how much it is costing the farm per tree to get the pruning done. Do the same thing with the boys who are thinning apples, and go around occasionally to talk the job over with them. Keep them posted as to how the cost of this week compares with that of last week or last year. It is much better to let the men keep their own records, even if the boss keeps them also as a check, because this very thing stimulates their interest in the matter. Another great advantage in interesting the men and boys in what they are doing, and in the rate at which they are doing it, is that it gives them something to think about. Some operations are more monotonous than others, and the more monotonous the operation the more important it is that the operator's interest should be stimulated. Take the job just mentioned, — thinning fruit. Few operations of the orchard are more important, and yet few, indeed, are more deadly monotonous. There is no change, no let-up. Hour after hour, day after day, week after week, just pulling off those tiresome little apples and letting them fall to the ground. One does not even have the satisfaction of filling up baskets with them, and thus feeling that he is accomplishing something.

Moreover, we must remember that the hired man or boy does not derive the same satisfaction that the owner does from the thought of how much good he is doing to the crop by his thinning or other operation. That one factor might be enough to keep the owner in high spirits right through the job, but we cannot expect it to stimulate the hired help in the same degree. Personal accomplishment, even in so uninteresting an operation as thinning apples, is something to take a pride in, especially if the boss knows about it and expresses his interest in it.

3. Supervise the beginning and quitting of the men each day. See that they get on the job promptly in the morning and at

noon, and that they do not come drifting in ten or fifteen or twenty minutes before quitting time. This is a rather difficult matter to handle, particularly on the smaller farms, but is a great deal more important than is generally recognized. If the time lost in beginning late and quitting early were accurately kept track of it would be an eye opener to most farm employers, and the aggregate of it in the United States in any one year would be enough to build the Panama Canal several times over.

4. Do not get too many men on any one job, and no matter how many men there are on the job, see that the work is so arranged that each man can be held responsible for what he does or does not do. If the job is picking apples do not put a half dozen men on a tree. They will get in one another's way, and nobody can be found to shoulder the responsibility for the apples in the barrels that had the stems pulled out, or the fruit spurs that were harvested along with the apples. Moreover, there is no way of keeping any reasonable track of the amount of work that each man is doing. If each man is working on a separate tree he gets the credit for the good work he does; he finds it difficult to dodge the responsibility for any poor work he may do, and the boss knows just how much work each man accomplishes. Here, again, the element of pride in one's accomplishment plays an important part, and very few men will be found who will be content to lag behind on their row of apple trees, or have the boss find more fruit spurs and fewer apple stems in their barrels than he does in the other fellow's.

5. Study your men and put each one on the job he is best fitted to do. There is a wide difference in the capabilities of different men for different work; one is a star with a team, another is a star on pruning, a third can do better spraying than anybody else, while a fourth cannot do anything particularly well. In this connection do not take it for granted that because a particular man has become expert on one job, and another on another job, that therefore both have found their proper niche in the scheme of farm work. To give a personal illustration, on the farm in which the writer is interested we had two men, one of whom ran the tractor and the other

was the salesman. Each was considered an excellent man for his particular job, but the huckster was considered a wonder. He could sell more fruit at better prices than any man who had ever undertaken the work. But he finally became indispensable (in his own opinion), and it was necessary to get rid of him, greatly to the regret of the management. The tractor chauffeur was the only available man to take his place. He was put on the job with fear and trembling. There was not one chance in a hundred that he would get away with it, nor one chance in a thousand that he would be equal to the indispensable Mike. His administration started just as the last of the Yellow Transparent apples were being marketed. They were not quite as good a grade as those that had gone before, yet this inexperienced tractor driver sold them for somewhat better prices than his expert and experienced predecessor had been able to get. It developed that he was not quite as inexperienced as we had thought him, for he had sold apples for an employer down in Connecticut, and onions and garden truck in a small way on his own hook. He has gone on improving until now he could give the expert Mike many pointers. He is less picturesque and profane, but more polite and persevering. He can see a dollar just as far as Mike did, and is even more certain of getting it.

6. Do not let the men be too fussy about what kind of weather they get out in. Of course this can be pushed too far till the men get ugly and won't work satisfactorily, but if they have been handled so that they are interested in what is going on they will be quite willing to take an occasional light shower of rain or some snow without thinking that they must run to cover.

Turning next to the questions of the management of team labor on the farm we find almost as fertile a field here for reforms. One of the first and most important of these reforms is to change the mental attitude of the owner on the subject of the use of teams. Ninety-nine men out of a hundred regard the team just as they do the ice pond or the well, — as something useful and necessary to the most successful carrying on of the farming operations, but as something which may be used or not, just as may be found convenient. They would no more

feel that it was a reflection on their farming that they did not keep their teams busy, than they would that they did not keep somebody constantly at work pumping water out of the well.

Of course this attitude is dead wrong, but most men do not see it or, if they do, they do not "let on." If they could be made to realize that the cost of their team labor would be just half as much per day if they would use the teams twice as many hours it would be not merely a change but a revolution. The team ought not to stand idle an hour, if this can possibly be avoided. If it cannot be used at home it ought to be hired out. It cannot, of course, on most farms, be kept at work ten hours a day for six days a week for fifty-two weeks in the year, but that ought to be the ideal. One thing which will help to realize this ideal is to do every piece of work possible on the farm with teams instead of men. Few farmers realize how much more costly man labor is than horse labor, else we would see more corn fields that were check-rowed so as to be cultivated both ways, and fewer that had to be hoed by hand.

Another great saving in cost might be made if our teams were made to carry a full-sized load. How often one sees a fine team and one or more apparently able-bodied men coming in from the field with a mere handful of hay on the wagon, or going *out* to the field with a wheelbarrow load of manure. And yet this method practically doubles the cost of the labor item. If possible have the teams go loaded both ways. This is perhaps not very often possible, but it could be done much more frequently than it is if a little thought were put on the matter.

Lastly, on this matter of teams, do not put but one man on the job, unless it is such work as hauling hay or loading barrels of apples, where two men are absolutely indispensable for the man labor involved. The sight of two husky men and one team running a cultivator or a plow is enough to shake one's faith in the evolution of man, at least those particular men. There is something wrong with the man who cannot hold a plow and drive a team at the same time. He is a cripple, either mentally or physically or both, although he may not know it. The old saying ought to be amended to read, "He that by the plow would thrive, must always hold the plow *and* drive."

Another great field for reform which is frequently entirely overlooked is the adequate and careful preparation beforehand for each particular job, and the longer beforehand the better. Too many of us do not discover that there is a broken casting on the mowing machine until we drive out into the hay field with it in July and start to mowing. This ought to have been discovered way back in February or March, and the repairs ordered then. We order our apple barrels in September, when they are harder to get and cost us more than they would have in May or June. We discover in March that the power sprayer is out of order, when we ought to have found that out in November, and have had the engine expert give it a thorough overhauling. Another phase of the same question is preparing one day for the work of the following day. If planting corn is the job, we must not only see to it that the corn-planter is in working order, but we must be sure that there is a neck yoke and set of whiffletrees on it; that the oil can has not been borrowed from it and not returned; that there is a monkey-wrench in the tool box, and that the seed corn is ready. Unless some thought is put on just such details as these we are pretty sure to get out in the field and find something missing and have to return to the house for it. An old neighbor of the writer's out in Kansas used to remark, when he had to go back to the house after a clevis or a wrench, "Well, he who has not brains has legs;" and more than one of us has to depend a good deal on our legs. It makes a vast deal of difference in the work accomplished during the day whether we get on the job in the morning at the drop of the hat, or whether it takes us till 9 o'clock before things are really in running order.

One ought also to have a special list of work for rainy days and parts of days posted up somewhere or carried in the hip pocket, so that it is ready at a moment's notice. A good many days' work is lost on the average farm in the average climate because the boss does not know what to put the men at when a sudden shower stops haying or spraying. Some loss is inevitable, but most of it could be avoided by a little forethought.

Another point worth considering, though of less importance than the last, is the shifting of men and teams from a job that

is finished to a new one. Do not move them any further than is absolutely necessary in any one half day, but try to hold them in one part of the farm until quitting time, even though they do have to be put for a time on to work which is not quite so pressing as some job on the other side of the farm.

Then just a personal word to the boss himself. It is a big undertaking to run a farm competently, even if it is a small farm. In fact, in some ways it is a bigger job to run a small farm than a big one. But in any case it is a job to take pride in and to put one's best thought into. If things are to be made to go right one must get over the farm frequently, — if possible every day, certainly every week. It does not take long for the red-humped caterpillars to ruin an apple tree, or for the blight to get a start in the potato field, or for the peaches to get too ripe to handle well. In these inspection trips do not be too much of an optimist. Be critical. It is all right to see that the corn has grown a lot, and to be pleased by that fact, but at the same time see that the weeds are getting a start and that the field needs to be cultivated again.

Above and beyond all else keep the work moving. Keep the quality of the work high, too, but do not let the speed slacken. Hustle things.

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ORCHARD, BERRY, AND VEGETABLE FERTILIZERS

DR. H. J. WHEELER



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ORCHARD, BERRY, AND VEGETABLE FERTILIZERS.

BY DR. H. J. WHEELER.

The Massachusetts fruit and vegetable grower who was formerly able to secure an abundant supply of horse manure from the cities and towns is finding to his sorrow that the automobile and truck are so rapidly driving horses from our cities that the supply of manure is not keeping pace with the demand. Furthermore, the city ordinances in some cases require that the liquid manure shall be conducted into the sewers; consequently the manure which the grower is able to purchase often represents merely the "dry bones" from which the real "spirit" has departed.

To illustrate what I mean I will merely call your attention to the average analyses of the solid and liquid portions of horse manure. The solid manure contains about the following:—

	Per Cent.
Nitrogen,55
Phosphoric acid,30
Potash,40

It must be borne in mind, however, that the nitrogen in the solid manure is in a very unavailable form, probably not having more than one-third to one-half the efficiency of the nitrogen in the best organic and mineral ammoniates. The percentage of phosphoric acid is not only low, but the phosphoric acid is also slowly available.

The average composition of liquid manure is about as follows:—

	Per Cent.
Nitrogen,	1.35
Phosphoric acid,	trace
Potash,	1.25

When the liquid manure is absorbed by the solid, so that the mixture represents the normal proportions of the two, the average analysis is about as follows:—

	Per Cent.
Nitrogen,70
Phosphoric acid,25
Potash,55

It will be seen from the foregoing analyses that horse manure, like most other animal manures, is very deficient in phosphoric acid. If manure is to be used in the most economical manner where an abundance of it is available, one should apply enough to supply all of the nitrogen that is required, and supplement it with phosphoric acid, and, if necessary, with additional potash. Unfortunately, the cases are rare where enough manure is available or where its cost is so low that one can follow this procedure; hence the usual practice, and the more rational and economical one ordinarily, is to make smaller applications and then supplement the manure with a fertilizer containing a suitable, moderate percentage of nitrogen, a high percentage of phosphoric acid, and a moderate percentage of potash.

Before proceeding with a discussion of fertilizers in detail, a word should be said about liming. Not long ago, upon looking up some of the experiments with lime in recent years, I found it frequently happened, in cases where lime and fertilizer were used on the same acre of land, that this single acre gave a larger crop than 2 acres, one of which was fertilized and the other limed. In other words, 1 acre, if treated properly, often produces a larger crop than 2 acres when liming is neglected on one and fertilizing on the other. I shall speak further of liming in connection with the discussion of various crops.

It is important in using fertilizers to understand the effect of the individual ingredients on both the soil and the plant. For example, where nitrate of soda is applied to the soil, plants remove the nitric acid faster than they do the soda; hence the residue of soda combines with carbonic acid, forming sodium carbonates. If nitrate of soda is applied year after year in large amounts on a heavy clay soil which has a tendency to bake, the sodium carbonates formed will finally deflocculate the

soil seriously. In other words, they will break up the large aggregations of soil particles of considerable size into such an increased number of smaller ones, that the soil will bake worse than before and become exceedingly difficult to till.

I recall having seen an instance of this kind in connection with experiments conducted by Professor Wohltmann at Poppelsdorf near Bonn, Germany, in 1898. Land which had been fertilized with nitrate of soda year after year finally became so compact and baked so hard that it was almost impossible to work it. If nitrate of soda is used on a sandy or gravelly soil which does not contain much clay or silt, this danger is, of course, not to be feared.

In semiarid regions where alkaline soils prevail the results from using nitrate of soda year after year as the sole source of nitrogen may prove detrimental, not only because the soil is deflocculated, but also because it is rendered too alkaline for the best growth of many plants.

It must be borne in mind in connection with the use of nitrate of soda that it moves freely up and down in the soil. If, therefore, nitrate of soda is used in considerable quantities on open sandy and gravelly loams, such as abound in many parts of New England and particularly in eastern Massachusetts, there is danger that heavy rains may wash considerable of it out through the subsoil. On soils of a heavy clay or silt type, however, the danger of loss by leaching would not be so great.

Sulfate of ammonia has certain distinct advantages over nitrate of soda as a source of nitrogen, for the reason that the ammonia enters into chemical combination with the silicates of the soil in the same manner as lime, magnesia, soda, and potash are known to do. When the ammonia is thus combined, it is not readily subject to loss by leaching. Nevertheless, it gradually becomes available and is taken up by the crops either as ammonia or as nitric acid after its nitrification. In the meantime, it is held in a safe combination in the soil.

In one particular, sulfate of ammonia acts differently from nitrate of soda. For example, if sulfate of ammonia is used year after year on land which is slightly acid or considerably acid at the outset, the acidity gradually increases. This is

obvious when you recall that sulfate of ammonia consists of ammonia combined with the strong mineral acid, — sulfuric acid. When the ammonia has been nitrified or changed to nitric acid in the soil, still another mineral acid is produced; and when this nitric acid has been finally removed and utilized by the plants, most of the sulfuric acid remains behind as a residual product, just as soda is left as a residual product when nitrate of soda is used repeatedly.

In connection with my early experiments in Rhode Island I found that reasonable quantities of sulfate of ammonia proved poisonous in one instance the first year instead of acting as an efficient fertilizer; in another part of the State, it did not become injurious until the second year; and in still another locality, not until the third year. The injury was due to the fact that the soils were fairly to strongly acid at the outset, and their acidity was increased by the sulfate of ammonia to such an extent as to interfere with the proper growth of the plants.

I recall with much interest having visited Professor Storer in 1891 or 1892 for the purpose of consulting his library at the Bussey Institution. My object was to make a careful study of all trials of nitrate of soda and sulfate of ammonia which had been made anywhere in the world up to that time. I told Professor Storer of this experience with sulfate of ammonia at the Rhode Island Experiment Station, adding that I apprehended the difficulty was due to the existing acidity of the soil and that I proposed to apply lime in the effort to correct the condition, in the hope that the sulfate of ammonia would then become an effective fertilizer. In response he warned me that some German investigator had applied lime under somewhat similar conditions and that ammonia was liberated. I believed, however, that if *proper quantities* of lime were used *in the right way*, there was nothing to be feared in this respect. Upon making the experiment the lime was actually found to work wonders, causing the sulfate of ammonia to become a highly effective fertilizer, better even for some crops than nitrate of soda.

When organic ammoniates, such as dried blood, fish, or meat, are used, ammonia is first formed from them in the soil, and

subsequently this ammonia is changed to nitric acid. These substances all have a tendency, therefore, to lessen the basicity of the soil, or, in other words, they tend to make acid soils slightly more acid than before, and alkaline soils less alkaline.

It is possible for one who is thoroughly familiar with the chemistry of these compounds and of these reactions to prepare mixed fertilizers in such a way that they will not change the chemical reaction of the soil, or they may be mixed so that they will make the soil slightly more acid or slightly less acid, as desired. You may ask if this has any practical significance. In reply, I will merely mention the fact that in experiments with cranberries I found that 350 pounds of a properly compounded fertilizer gave \$35 to \$40 more profit to the acre than the same quantity of a fertilizer which was not suitably compounded.

In regard to organic ammoniates, probably the best and most effective is dried blood, but the quantity produced in the entire country is so small that it is but a "drop in the bucket" by way of furnishing organic nitrogen for the 7,000,000 to 8,000,000 tons of fertilizer used per annum in the United States. Another excellent source of organic nitrogen is fish waste, but the supply of it is relatively small. The chief sources of organic nitrogen are tankage, cottonseed meal, and certain other waste materials.

Did it ever occur to you that the fertilizer industry, by treating waste wool, feathers, hair, and other materials so as to make the nitrogen highly available, is helping to keep down the price of nitrate of soda, sulfate of ammonia, blood, fish, and tankage, and is thus performing a very distinct service to users of fertilizers everywhere in the country? I refer to the possibilities connected with the wet mixing of fertilizer. I could, with your permission, take the hair from your heads, your felt hat from beside you, the wool from the backs of your sheep or waste wool from the industries, as well as many other materials rich in nitrogen, and transform them by chemical treatment into compounds which are completely or almost completely soluble in water. Materials prepared by the wet mixing process have been referred to in a bulletin published by the United States Department of Agriculture as "processed

fertilizers," and in this publication it is stated that "It has been shown that by the process used in the case of this fertilizer the nonavailable nitrogenous materials have been made highly available, not only because the nitrogen compounds can be ammonified quickly in the soil, but also because these compounds are directly utilizable by plants."

It is fortunate, indeed, that such materials, which have a relatively low value as fertilizer if applied in their natural or untreated state, can be transformed into entirely different chemical combinations which have an exceedingly high availability and value for fertilizing purposes. This not only aids in keeping down the price of other organic ammoniates, but it also insures a larger supply of highly available ammoniates.

According to the tests of availability which have been made by various experimenters, the important organic ammoniates stand in about the following order as concerns their availability: —

1. Dried blood.
2. Fish.
- 2 to 3. Tankage.
- 3 to 4. Cottonseed meal.
5. Solid horse or cow manure.

Other organic ammoniates, such as roasted or untreated leather, rank so low in availability that they are unfit for use in fertilizers. The agricultural experiment stations are now making tests of the availability of the organic nitrogen in fertilizers in order that the purchaser may be protected against any unscrupulous manufacturer who would be so unwise as to use such materials in their untreated and unavailable state.

What has been said illustrates some of the advantages of the proper compounding, preparation, and mixing of fertilizers. Something should also be added about the importance of having fertilizers in such mechanical condition that they can be stored with the assurance that when the time comes to apply them they will be in good mechanical condition for distribution by machinery or by hand. The fertilizer manufacturer knows that if certain fertilizer ingredients are mixed a short time before their application, they very promptly set or become

hard and lumpy, and therefore unfit for satisfactory or even distribution. One of the important features of manufacturing is to combine and treat these materials in such a way that they will remain in good mechanical condition even if stored for many weeks.

In regard to the fertilization of the orchard, I should emphasize the fact that every orchardist ought to watch the growth and fruiting of his trees as carefully as the breeder of cattle watches the growth and feeding of the individual animals.

FERTILIZING FRUIT TREES.

Apple Trees. — If apple trees are not properly fertilized they seldom bear every year, fruit spurs and buds do not develop as they should, the trees tend to deteriorate, and the orchard is not likely to yield its maximum profit. On the other hand, it is important to avoid overfertilizing an orchard, particularly with nitrogen. If too much nitrogen is used, it will lead to the abnormal growth of leaves and branches, so that the fruit will be overshadowed, poorly colored, and of inferior keeping quality. Where a soil is naturally deficient in phosphoric acid and potash, these fertilizer ingredients are needed in addition to nitrogen.

No man can tell another just how much fertilizer or what grade of fertilizer he should use; but by bearing the preceding suggestions in mind, the intelligent grower should be able to gauge the amount and select the kind of fertilizer suited to the requirements of his whole orchard or individual trees. For very young apple trees, from 1 to 2 pounds of fertilizer to a tree should be sufficient. The quantity should be increased each year, and when the bearing stage is reached 5 to 10 pounds or more may be needed. Large, old trees may require from 25 to 50 pounds.

Peach Trees. — Peach trees in bearing require heavier fertilization per acre than apple trees. As soon as they begin to bear they may need from 10 to 30 pounds or more of fertilizer per tree, depending upon the natural fertility of the soil.

Apricots and Quinces. — Apricots and quinces are probably not grown extensively enough in Massachusetts to require particular mention. They should be properly fertilized, and quinces, at least, require much lime.

LIMING FRUIT TREES.

It is highly important to consider the effect of lime upon the different kinds of fruits. *Apple trees* will thrive fairly well even on quite acid soils without liming, yet lime may help their growth to a slight extent. If, however, some cover crop which is very dependent upon lime is to be grown in the orchard, liming may be advisable. Great caution should be exercised in liming *peach trees*. If lime is used at all, it should be applied in small quantities and at not too frequent intervals. *Plums, cherries, and quinces*, on the contrary, all need lime on acid soils. In fact, in many cases financial success with a plum or cherry orchard, and also with quinces, may hinge upon whether the land is properly limed at the outset and at occasional intervals thereafter.

In this connection I am reminded of a visit which I received some years ago at the Rhode Island Agricultural Experiment Station from Mr. J. W. Powell, the well-known horticulturist of New York. He told me about his plum or cherry orchard in which the trees were not growing properly. I thereupon showed him an experiment, which I was then conducting on acid soil, which showed the wonderful effect of lime upon the growth of these trees. Many years elapsed before I met Mr. Powell again, but when I did he wrung my hand in grateful fashion and told me that my suggestion about liming his orchard resulted in its salvation.

FERTILIZING SMALL FRUITS.

In fertilizing *strawberries*, great care must be taken to use a sufficient amount of nitrogen to insure strong, vigorous vines. A fair amount of phosphoric acid in available form should be used, and the fertilizer should usually contain a moderately high percentage of potash. This is for the reason that the strawberry has a shallow root system and requires a large amount of potash in the formation of the fruit. Many years ago I made a number of analyses of strawberries, and, if my memory serves me correctly, nearly half of the ash of the fruit consisted of potash.

If strawberries are overfertilized with nitrogen, the tendency

is to produce so much foliage that the fruit fails to ripen properly, and the berries are likely to be soft and unfit for shipment. One can use a fertilizer containing a moderate percentage of ammonia and a good percentage of phosphoric acid and potash in the spring as a top or side dressing, just as the plants begin to fruit. After picking has ceased, if it is necessary to promote the growth of vines still further, a fertilizer containing a higher percentage of ammonia may be applied, but no more should be used than is necessary to insure an adequate growth of vine during the remainder of the season. By restricting the amount of ammonia to what is really necessary and by fertilizing liberally with phosphoric acid, and particularly with potash, the best quality of fruit is likely to be produced.

Raspberries. — The red raspberry, like the strawberry, requires extreme care in fertilization. If an excess of nitrogen is used the canes will grow too large, and the fruit will be unduly shaded, poorly formed, and will not stand shipment. The careful grower will use just enough fertilizer early in May, or possibly some of it a little later, to supply sufficient ammonia to insure a reasonable growth of cane for the following year.

It is a good plan to start the plantation in a field which was plowed in the autumn or which was planted to some hoed crop the previous year.

In the case of blackcap raspberries, there is less danger of overfertilizing with nitrogen, although they will not need high fertilization.

Blackberries must also be fertilized with a reasonable amount of ammonia if one would insure sufficient growth, but the amount of nitrogen applied should be so limited as not to cause an excessive growth of cane.

Gooseberries and *currants*, as well as raspberries, should receive a fertilizer containing adequate nitrogen, a fair percentage of phosphoric acid, and a fairly good supply of potash, if the best sort of fruit is sought. Overfertilization of gooseberries and currants with nitrogen should be avoided, yet a reasonable amount of new growth should be promoted each year.

LIMING SMALL FRUITS.

Lime should seldom be applied for *strawberries*, as it may injure the plants, and it may, particularly if used in large quantities, encourage the growth of common white clover to such an extent as to cause it to become a pest in the strawberry bed.

The *blackcap raspberry* will thrive well on quite acid soils, even if no lime is used. Nevertheless, there are possibly some soils on which a light application of lime may be helpful.

Blackberries seem to be very indifferent to lime. While they may not be injured by liming, they usually seem to thrive perfectly without it on soils which are exceedingly acid.

Red raspberries seem to respond well to liming on soils where the blackcap raspberry may not respond at all. On very acid soils, therefore, lime should be used for the red raspberry.

Gooseberries and *currants* usually do not thrive well on exceedingly acid soil. Liming is therefore necessary for the best growth of these plants.

FERTILIZING VEGETABLES.

In regard to *potatoes*, good crops have been grown during the past two or three years on old grass land and on old pastures by the use of a fertilizer containing no potash, provided it contained 4 to 5 per cent of ammonia and 8 to 10 per cent of available phosphoric acid. There are, nevertheless, many indications that the potash supply in many places in New England and farther south is running short. When a marked deficiency occurs, the potato leaves tend to curl under at the edges, the tissue between the ribs tends to puff up, and later the upper side of the leaves often takes on a bronzed appearance, due to the death of some of the cells. Wherever such conditions have been observed, it is of the utmost importance that the fertilizer used should contain not less than 4 to 6 per cent of potash.

In Aroostook County, Maine, fertilizers are usually applied for potatoes at the rate of from 1,500 to 2,000 pounds to the acre; but here in Massachusetts, where the production of such

large crops is practically impossible, the application should generally be limited to from 1,200 to 1,700 pounds to the acre. If, however, stable manure is turned under or the land is particularly rich, an application of even as little as 1,000 pounds to the acre in the drill may be sufficient.

I cannot sufficiently emphasize the importance, wherever fertilizer is applied in the drill by hand instead of with the fertilizer planter, of its being thoroughly worked into the soil before the seed is dropped. I once had 2 or 3 acres ruined because the man who applied the fertilizer thought it was sufficient to drag a chain along the furrow after the fertilizer had been strewn in it. This might have answered very well if the potatoes had been planted early in the season while the land was moist, but the planting was done late, when the ground was somewhat dry and warm. When the latter condition prevails, the greatest care must be taken to have the fertilizer mixed most thoroughly with the soil or applied with a potato planter having a fertilizer attachment of such a character that it will not permit the seed and fertilizer to come into direct contact.

Beets, Carrots, Turnips, and Radishes. — All of these plants need a fertilizer containing a high percentage of ammonia and quite a high percentage of potash. A liberal percentage of available phosphoric acid is also desirable. Turnips and radishes are especially responsive to phosphoric acid, while beets need less than either turnips or cabbages.

It is interesting to note how some of these crops affect the soil for the crops which follow. In 1917 I grew with the assistance of Mr. Herbert Reiner, at Portsmouth, New Hampshire, beets, carrots, and cabbages on one uniform field and fertilized all of them alike. Sweet corn followed the next year, and it grew far better where the carrots had been grown than where either beets or cabbage had preceded.

Several years ago I had a similar experience at the Rhode Island Station with onions on a series of plots. One plot of land had been devoted to potatoes for two years, another to onions for two years, and still others to buckwheat, mangels, and various other crops for the same length of time. In all there were about fifteen different plots of land, each of which

had been devoted to the growing of a particular crop for two years in succession. All had been fertilized and treated alike in every respect and all had been tested in advance as to the uniformity of the soil by growing the same crops in rows across all of the plots. When onions were grown the third year, the yields ranged from 12 bushels to 412 bushels, according to the crop which had preceded. The poorest onions followed mangels, cabbages, buckwheat, and turnips; they were better following onions than they were following potatoes; but the best crop of all was secured on the area which had been devoted to redtop the previous two years. The other grasses, clovers, corn, and cereals seemed to be better crops to precede the onions than buckwheat or some of the root crops. This is merely suggestive of the fact that we ought to study carefully the effect of crops upon those which follow, so that we may plant in the best order of rotation.

Beets cannot be grown successfully on very acid soils unless lime is used, yet liming the same soil might prove injurious to radishes. Carrots and all types of turnips respond well to liming on acid soils.

Peppers and *eggplants* are both greatly helped by lime if they are grown on very acid soil. The fertilizer used for these plants should be rich in nitrogen, moderately rich in phosphoric acid, and should contain a considerable quantity of potash.

Cabbage, cauliflower, kale, Brussels sprouts, and similar plants are all greatly helped by liming on very acid soils. On account of their extensive leaf growth, they require fertilizers not only containing high percentages of nitrogen but also of potash. Some of these plants have a particularly low feeding power for phosphoric acid; hence the fertilizer should contain a high percentage of this ingredient in available form.

Lettuce, spinach, and upland cress are among those crops which are most sensitive to acidity; consequently on very acid soils it is of the utmost importance that the land be limed heavily before one attempts to grow them. In this respect they are like onions and beets.

These crops require a fertilizer with a high percentage of nitrogen, a fair percentage of available phosphoric acid, and a moderate to high percentage of potash. In the case of spinach

sufficient nitrogen in suitable forms should be present in the fertilizer to produce plants having thick, dark green leaves. A properly compounded and highly available fertilizer is needed in order to get the best results with all of these crops.

Onions are likely to fail or partially fail if the soil is exceedingly acid, and even on soils which are only moderately to slightly acid applications of lime are likely to be helpful. If the soil is deficient in lime, in nitrogen, in phosphoric acid, or in potash, even though all of the other fertilizer ingredients mentioned are present, onions tend to lag behind in growth. In such cases they have thick necks, and do not ripen as they should. If onions are grown on soils which are properly supplied with lime, and if they receive sufficient nitrogen, an abundant supply of available phosphoric acid, and a liberal supply of potash, the tops of the onions should fall over and ripening should proceed in a normal manner.

Several instances have been brought to my attention within the last two or three years where growers were not able to succeed with onions, and generally it was found to be due to the fact that the land needed lime or that the grower had not used enough available phosphoric acid, although in some cases it was due to a deficiency of either potash or nitrogen.

Cucumbers, Cantaloupes, Watermelons, and Squashes. — All of these crops, except watermelons, respond in a high degree to liming on very acid soils. In fact, cucumbers and cantaloupes especially cannot be grown successfully on exceedingly acid soils until they are limed. The watermelon furnishes a marked contrast to these plants, for good crops can be grown on soils which are so acid that beets, spinach, lettuce, onions, and cantaloupes utterly fail. Nevertheless, I have known instances where a small application of lime containing considerable quantities of magnesia seemed to be slightly beneficial, or at least not noticeably injurious. Whether this was due to the fact that watermelons need more magnesia than is required by some other plants, I am not prepared to say. It has been asserted that this is true of some of the flowering *Ericaceæ*.

Cucumbers, squashes, and melons should all receive heavy fertilization with nitrogen, a fair to liberal amount of phosphoric acid, and a liberal quantity of potash.

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THE HOME MANUFACTURE OF FRUIT PRODUCTS

W. W. CHENOWETH



Co-operative Extension Work in Agriculture and Home
Economics, State of Massachusetts



The Massachusetts Agricultural College
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and the
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Co-operating

THE HOME MANUFACTURE OF FRUIT PRODUCTS.

Fruit products should be used more abundantly in the diet. When properly made they are nutritious, wholesome and appetizing. The chief reasons why they are not used more extensively may be stated as follows: (1) a lack of knowledge concerning the real food value of fruit products; (2) their rather high cost because of the large amount of sugar used in their manufacture; (3) the cloying effect on the appetite of these rich products which gives them rank among the confections and luxuries rather than among foods.

The purpose of this bulletin is to try to correct these fundamental errors by showing: (1) that fruit and fruit products do possess a considerable food value; (2) that it is not necessary, nor is it desirable, to use such large quantities of sugar in manufacturing most fruit products; (3) that fruit products properly made do not have the cloying effect on the appetite and may be eaten in quantity; (4) to lay the foundation for a standardization of home-manufactured products; (5) to show how such products may be easily and cheaply made in the home.

"Eat an apple a day and keep the doctor away" has long been a familiar saying. Just how much medicinal value, if any, there is in an apple or in fruits generally no one seems to know, but that there is at least a grain of truth in this old saying seems certain. Apparently all authorities are agreed upon the general proposition that fruits are agreeable, pleasant to the taste, have some food value and are at least healthful if not medicinal.

Fruits contain certain things which the body needs. Those most generally emphasized are the acids, the minerals, the more recently discovered substances called vitamins, which are so necessary to complete nutrition, and last but by no means least, the sugars.

The average person has, in the past, been content to eat his fruit because it tickled his palate and gave him an agreeable, comfortable feeling. Little or no thought was given to the possible food value.

Fruits, as has been stated, contain considerable quantities of sugars, and sugars are a source of much energy. Those of us who must work for a living need a great deal of energy, and if we can get a part of this energy from fruit and fruit products, why would it not be the proper source. As already stated we get more value than just sugar, but for the moment let us confine ourselves to the sugar values only of a few of our fruits and fruit products.

Chemists and others, who during their spare moments have analyzed fruits and a few of the fruit products, give the composition as shown in the following table:—

Average Composition of Fruits.

FRUIT.	Water (Per Cent.).	Protein (Per Cent.).	Fat (Per Cent.).	Sugars and Starches (Per Cent.).	Energy Value per Pound (Calories).
Apples,	84	.4	.5	14.0	290
Blackberries,	86	1.3	1.0	11.0	262
Cranberries,	89	.4	.6	10.0	212
Cherries,	81	1.0	.8	16.0	350
Currants,	85	1.5	-	12.5	260
Grapes,	77	1.3	1.6	19.0	450
Peaches,	73	.7	.1	7.6	153
Pears,	84	.5	.4	12.5	245
Plums,	78	1.0	-	20.0	382
Red raspberries,	86	1.0	-	12.5	250
Black raspberries,	84	1.7	1.0	12.5	300
Strawberries,	90	1.0	.6	7.5	177
Granulated sugar,	-	-	-	100.0	1,860

The above data have been taken from various government publications. At best they are to be considered as only suggestive. Varieties of any one of the above fruits will show a considerable variation in sugar content, and since these figures show only average conditions we would naturally expect some samples to possess less food value in sugar content, while others would show more.

The energy value of a pound of granulated sugar is given as a standard of comparison in order to have a comprehensive notion of the energy value of the various fruits. This is our best unit of measure, since the food value of fruits rests largely on their sugar content.

Let us further illustrate the food value of fruits and fruit products, using as our unit of measure a pound of granulated sugar. The following amounts of fruits and fruit products contain approximately the food value or energy value found in a pound of sugar.

- 4½ quarts Baldwin apples.
- 1½ pounds dried apples.
- 2½ pounds apple butter.
- 2 pounds cider jelly.
- 1¾ pounds cider syrup.
- 1⅞ pounds grape butter.
- 1¾ pounds dried raspberries.
- 2 pounds raspberry jam.
- 2 quarts canned raspberries.
- 1½ pounds plum butter.
- 4 quarts pear butter.
- 8 pounds fresh peaches.
- 3½ pounds dried peaches.
- 2½ quarts canned peaches.
- 2 pounds peach butter.

It should be remembered that the above fruit products are made according to modern notions, not by the recipes and rules of our grandmothers.

The amount of sugar in fruits as shown by the foregoing table varies from 7.5 per cent. in strawberries to 20 per cent. in plums, although it will be greater in some varieties of grapes. The amount of sugar in any particular kind of fruit will vary with the variety, and to some extent with the season, but most of all by the condition of the fruits regarding maturity. The sugar content of any fruit is at its maximum when the fruit is just ripe. Under-ripe fruit contains not only less sugar but also an excess of acid, while over-ripe fruits are likely to be deficient in both sugars and acid.

As a general rule, it is safe to say that fruits are most desirable for manufacturing when they are fully ripened, but before they become soft and stale. At this stage fruits possess their highest quality, which adds to the value of the product. It should not be forgotten that few, if any, fruits are improved in quality by manufacturing processes; also it is most economical to use fruits when their sugar content is at its maximum.

The relative values of unripe and ripe fruits is well illustrated in the following table: —

FRUIT.	Condition.	Sugar (Per Cent.).	Acid (Per Cent.).
Concord grape,	Nearly all colored,	8.60	1.91
Concord grape,	Fully ripe,	15.92	.95
Delaware grape,	60 per cent. ripe,	13.08	1.92
Delaware grape,	Fully ripe,	25.78	.69
Baldwin apple,	September 13,	10.51	—
Baldwin apple,	November 15,	14.51	—

FRUIT BUTTERS

Fruit butters should be classed among the very best of our fruit products. They are easily made and are highly prized by all who know them. They offer a method of using fruit which is not suitable for canning or drying. They should be classed among the least expensive of fruit products and as the most economical.

They are made chiefly from such fruits as the apple, pear, plum, peach and grape. They differ from a marmalade in that they have a uniform texture. The old-fashioned method of making butter from fruits required a long period of several hours' cooking. Modern methods in both home and factory processes have shortened this to a few hours. If the fruits are cooked until very tender or until they form a pulp, and are then run through a fine sieve or colander, the labor of peeling is eliminated, better color is obtained from such fruits as plums and red apples, and the product is given a fine grain. Under the old-time method the fine grain was obtained by prolonged cooking and stirring.

Fruit butters should be cooked until they are quite thick. Their consistency should be such that they are soft, spread easily and when a

spoon is lifted up from the boiling mass it will come up heaping full, or when a spoonful is placed on a dish no liquid separates from the solid portion.

Toward the close of the cooking period the boiling product is very apt to sputter considerably and serious burns may result if stirring is done with a spoon. In order to overcome this danger and discomfort a device for stirring should be made, as follows: a paddle-shaped stick, 2 or 3 inches longer than the vessel is deep, with a hole near the small end into which a broom handle or other light stick is fastened, gives an -shaped implement which enables the operator to sit at a safe distance from the sputtering butter to avoid being burned. It also removes the necessity for standing near or over a hot fire.

Applying Directions

Most of the recipes given in this bulletin are based upon fairly accurate amounts of products used. In order to use intelligently the directions given, the housewife should have inexpensive apparatus for weighing, and a measuring cup. The ordinary kitchen or family balance, costing from \$1 to \$2, will answer for weighing, while an aluminum or glass measuring cup, costing from 10 to 25 cents, will be all right for measuring.

The fruits should be weighed. Water, fruit juices and sugar may be weighed, though it is usually more convenient to measure them, allowing 2 cups, or 1 pint, to the pound for fruit juices and water. In measuring sugar the measure will need to be heaped slightly if 2 cups or 1 pint are to be counted as 1 pound.

Apple Butter

1 peck ripe cooking apples.
2 gallons cider.
1½-2 pounds sugar.

Wash the apples, remove all bad spots and cut into quarters or slices. Place the pieces of fruit in a porcelain or aluminum vessel, add 3 or 4 quarts of the sweet cider and heat to the boiling point. Continue to boil until the fruit is reduced to a pulp. Meanwhile place remainder of sweet cider in another similar vessel and boil down to 1 quart. Pour the cooked fruit into a sieve or colander, and, using a cup or fruit jar, force the pulp through. Return the pulp to the cooking vessel, add the remainder of the cider and cook with constant stirring until it begins to thicken, which will be shown by the sputtering of the boiling product. Add the sugar and continue the cooking until the desired consistency is obtained. This last cooking process will require two to three hours. If a spiced product is desired add 3 teaspoons of ground cinnamon and 2 of ground cloves just before removing from the fire. Fill the hot butter into sterilized glass jars and seal. About 4 quarts of finished product should be obtained from this recipe.

If a tart butter is desired to be used as a relish instead of a spread omit the sugar.

Apple butter made in this way is an excellent substitute for the rich jellies and preserves so commonly eaten.

If cider is not available add enough water in beginning to start cooking and proceed as directed.

Apple butter is the cheapest and one of the best of the apple products. It is easily made and might well become a part of our regular diet. Cider is not necessary, but adds much to the quality of the product.

Grape Butter

10 pounds grapes.
1 pint water.
1 pound sugar.

Stem the grapes and wash thoroughly. Cook in the water at the simmering point until the skins will slip from the berries. Pour into a colander or sieve and allow the juice to drain off. This juice should be bottled and used as grape juice. (See page 18.) Return the pulps and skins to the cooking utensil, add one-half pint of water and cook at boiling point until the berries are in shreds. Again transfer to colander or sieve. Rub the pulp through and return to the cooking utensil. Cook at boiling point for five or ten minutes. Add the sugar and cook until of desired consistency, which should be thick enough to spread well. If spices are desired these may be added just before removing from the fire.

Have fruit jars clean and sterile; fill the butter while boiling hot into these and seal at once. If a tart butter is desired to be used as a relish omit the sugar.

The skins and seeds may be used for making a fair grade of jelly. (See page 17.)

If grapes are expensive and apples are cheap add one-third as much apple pulp as grape pulp. (See page 10.)

Grape butter is most economically made as a by-product of grape juice; also if made as a by-product there is less danger of crystals forming in the butter.

Peach Butter

1 peck peaches.
2 pounds sugar.

The fruit may be peeled by hand, or it may be dipped into boiling water just long enough to loosen the skin, which then may be stripped from the fruit quite readily and with less loss than if peeled with a knife. The peeled fruit is placed in a cooking vessel with just enough water to start the cooking. Continue to boil with frequent or constant stirring until product begins to thicken; add the sugar and cook until the desired consistency is obtained. If spices are desired add as given for apple butter, or to suit the taste. Fill the hot butter into sterilized jars and seal at once. Should there be any difficulty in obtaining a uniform texture the pulp may be run through a sieve or colander to break up any lumps and to remove any fibrous material. This should be done before the sugar is added.

In peach sections where the crop is abundant there is generally some loss from soft and split fruits and from drops. These can all be made into a delicious butter at a very small cost.

Plum Butter

10 pounds plums.
2 pints water.
2-3 pounds sugar.

The plums are thoroughly washed and cooked in the water until the fruits are reduced to a pulp. The pulps are then rubbed through a sieve or colander. The pulp is next returned to the fire and cooked at boiling point until it thickens somewhat. Sugar is then added. The amount varies with the acidity of the fruit. The cooking is continued until the desired consistency is obtained. If spices are desired they should be added just before removing from the fire. Fill the finished butter into sterilized glass jars, seal and set aside to cool.

A Second Method. — If desired, more water, 2 to 4 quarts, may be added before the first cooking. When skins of plums are badly broken, and before the fruits begin to break up, a part or all of this clear juice may be strained off and used for making jelly. (See page 18.) If all the juice is drained off add a small quantity more of water and continue cooking fruit until it falls to pieces; then proceed as directed above.

The Japanese and native plums make not only the best butter, but are as a rule also most desirable for jelly. Since the varieties differ very much in their acidity it is something of a guess to say just how much sugar will be required. The above amounts will hold fairly constant for Burbank, Abundance and Red June.

CANNING

Fruit that is just ripe, but which is still firm, is best for canning. If too green it is lacking in quality, while if over-ripe it is more difficult to handle, gives a poor appearance, and the quality is not the best.

If the fruit is to be used for cooking purposes it may be canned without sugar, since the sugar can be added at the time of using the fruit without detriment to the quality. If, however, the fruit is intended for dessert it greatly improves the quality if canned in a syrup of proper density. When sugar is scarce or high in price, water fruit juice or a syrup of less density may be used, and sugar can be added at time of serving. Lack of sugar at canning time should not deter one from putting up the usual amount of canned fruit, because the necessary sugar may be added at time of using the fruit.

Much has been written and taught regarding the methods of making syrups for canning. Much of this instruction is based on the old, old principle of always using pound for pound of sugar with either fruit or water. The most widely circulated formula is that requiring 3 parts of sugar to 2 parts of water, and boiling for various lengths of time in order to secure syrups of different densities.

All of these directions give a syrup too heavy or rich in sugar for our mildly acid and sub-acid fruit, and are adapted only to the most acid fruit or for preserving. Too much sugar in the syrup causes the fruit to shrivel and float to the top of the jar; also the fruit is toughened and the flavor masked. The proper amount of sugar will not, as a rule, shrivel the fruit, and it will develop the highest fruit flavor.

Syrups for use in canning are made by adding together the proper amounts of sugar and water and heating the mixture to the boiling point or until the sugar is all dissolved. Any continued boiling will materially increase the density of a syrup, and should therefore not be given.

Commercial canners determine the density of a syrup by using a Brix or Balling hydrometer. These instruments show at once, when floated in a syrup, the per cent. of sugar in the syrup. The Baume hydrometer, which is often recommended and which is labeled "syrup hydrometer," does not give the per cent. of sugar present. It is graduated in degrees, and any reading of such hydrometer is in degrees Baume, and must be translated into a per cent. reading to mean anything to the home canner. This translation is made by reference to a printed table which gives in per cent. the equivalent of degrees Baume.

The housewife, however, does not require these instruments in order to prepare her canning syrups. The table printed below will give a very close approximation. These figures have been worked out especially to avoid the unnecessary expense of costly apparatus. Syrups are based on weights of sugar and water. However, if in measuring the proportions given the sugar is rounded over in the measuring cup the resulting syrups will be sufficiently accurate for household purposes.

SUGAR (PARTS).	Water (Parts).	Syrup (Per Cent.).	Amount of Sugar in 1 Cup of Syrup (Ounces).
1,	4	20	1 $\frac{3}{4}$
1,	2	30	3
1,	1	50	4 $\frac{3}{4}$
1 $\frac{1}{2}$,	1	60	6

Fruits canned in the lighter of these syrups will retain more of their fruity flavor, and will be more highly appreciated by all who eat canned fruit for the sake of the fruit.

Blackberries, raspberries, strawberries, pears, peaches and the less acid plums should be canned in a syrup of 20 to 30 per cent. Sour cherries and the more acid plums will require 50 per cent. syrup.

The amount of syrup required for each quart of fruit will vary within rather wide limits. The size and character of the fruit, and the manner in which it is packed into the jars or cans, will be the determining factors. One can readily acquire the skill to pack fruit so uniformly that the variation in amount of syrup required for any particular fruit will be quite small. A general rule will be about 22 to 24 ounces of fruit and 8 to 10 ounces of light syrup per quart jar.¹

JAMS

Fruits that have ripened on the plant are best for making jams. Slightly over-ripe or soft fruits are much to be preferred to under-ripe fruit. The maximum amount of sugar, the minimum of acid and the highest quality are found in a well-ripened fruit. Such fruits are not only

¹ For literature on methods of canning write the Extension Service, M. A. C., Amherst, Mass.

most economical to use but will give products of highest flavor and quality. All fruit too soft for canning or preserves should be converted into jam or butter.

The small fruits are the ones most commonly used for making jam; all of these make an excellent product. However, jams of superior quality may be made from the seedy small fruits, as raspberries and blackberries, if a small amount of apple pulp is added. A better consistency is obtained and the product is less seedy.

During the season of the small fruits, especially near its close, the summer and early fall apples have attained a suitable size to use for this purpose. The apples should be washed and cut into sixths or eighths and cooked in water equal in amount to one-half the weight of the prepared fruit. Cook at the boiling point until fruit is in a fine sauce. Pour into a colander or sieve and rub the pulp through. Weigh the berries and add one-fourth to one-third as much apple pulp. The amount of sugar necessary to add to the apple pulp will vary according to variety and state of maturity. No hard and fast rule can be given, but a working formula of one-fourth as much sugar as apple pulp will apply in most cases.

If canned apples are available they may be used. The addition of the apple not only improves the quality and texture but it will also reduce the cost of the jam, since the apples when they can be had are less expensive than the berries. Too much apple pulp, especially if apples are immature, will injure the quality.

The cooking of jams should be rapid, *i.e.*, they should be cooked at the boiling point. The sugar should not be added until the product begins to thicken, and the cooking should be continued for at least fifteen or twenty minutes.

Jams should have a fine, even texture with no free liquid separating from the solid portion. The consistency should be such that they spread easily, and they should not be thin enough to run. They are usually finished when they will heap up on a spoon, *i.e.*, a spoon dipped into the cooking mass can be lifted out heaping full. If apple pulp has been added the cooking should cease just before the jelly test (see page 13) becomes pronounced.

If a spiced jam is desired the spices may be added just before removing from the fire. Stir thoroughly to distribute the spices uniformly throughout.

Jams made as directed in this bulletin will not keep in open or paraffin-sealed glasses as well as when equal weights of sugar and fruits are used. It is therefore advisable, and in most cases necessary, to put these less sweet jams into sterilized and hermetic-sealed containers such as the ordinary glass fruit jar.

These jars, rubbers and lids should be thoroughly washed, placed in a pan of water and boiled for a few minutes. The hot jams are then filled into these sterile containers and sealed at once.

Blackberry Jam

Weigh the berries and wash thoroughly. Place in a preserving kettle and crush some of the fruit. Heat slowly until the juice flows freely, then raise to the boiling point and cook until fruit is broken up. When the boiling mass shows signs of thickening add sugar equal to one-

fourth the weight of berries, and cook until the desired consistency is obtained. Transfer to sterile glass jars and seal at once.

The addition of apple pulp (see page 10) will greatly improve the quality and lessen the cost of the product.

Blueberry Jam

Pick over the berries to remove decayed fruit and stems. Proceed as for blackberry jam.

Raspberry Jam

Same as for blackberry jam.

Strawberry Jam

The fruit should be well ripened, — over-ripe rather than under-ripe. Remove hulls and weigh the hulled berries. Wash thoroughly and run through food chopper if a uniform consistency is desired.

Place the ground pulp in preserving vessel and cook at boiling point for ten minutes. Add sugar equal to one-fourth the weight of the berries and cook until the desired consistency is obtained. Fill into sterilized containers and seal at once.

If the berries are obtained near the close of the season the cost of the finished jam may be reduced; also its quality may be improved by the addition of well-cooked apple pulp. (See page 10.)

JELLIES

In making jellies three things must be present in the fruit juice. These are pectin, acid and sugar. All three of these occur in some fruits, while others may lack either the pectin or acid in sufficient quantity. This explains why it is relatively easy to make jelly out of certain fruit juices like the apple and the plum, but difficult or impossible to get good jelly from such fruits as the peach, cherry and some of the small fruits.

The successful home manufacture of fruit jellies will depend upon a number of factors among which the following may be noted as the most important: (1) the proper selection of the fruit; (2) the extraction of the juice; (3) the rate of cooking; (4) the amount of sugar added; (5) length of cooking both before and after addition of the sugar.

The Selection of the Fruit

All fruit is at its maximum quality when it is just ripe. At this time, also, most fruits which normally contain acids and pectin in sufficient quantities to produce jellies are in their prime for jelly making. If one must use fruits slightly over-ripe either add a small quantity of the same fruit that is under-ripe or add another fruit that is known to contain pectin. Most of our acid fall and winter apples, as Wealthy, Oldenburg, McIntosh, Rhode Island and Baldwin, can be relied upon to supply pectin when used while still in good eating condition.

If the fruit is known to contain pectin but is deficient in acid the addition of a small amount of juice from an acid fruit, such as cherry, currant, plum or apple, will correct this deficiency. No hard and fast

rule regarding the amount of this acid juice to be added can be given because the quantity will vary somewhat. It should never exceed one-half of the non-acid fruit.

In order to determine if pectin is present in sufficient quantities add to a small portion of the fruit juice obtained by cooking the fruit an equal volume of 95 per cent. alcohol. A grayish or whitish precipitate will indicate by its abundance the relative amount of pectin in the fruit juice. This test is impracticable in most households, and is seldom or never necessary where the jelly maker's efforts are confined to making jellies from such fruits as currants, grapes, plums and acid apples, provided, of course, these fruits are used before they are over-ripe. In case other fruits, as strawberry, raspberry, blackberry, peach and cherry, are used the necessary pectin or acid may be added by a blending of the juice of the desired fruit and of a fruit known to contain those elements in quantity. (See directions for making jelly with above fruits.)

Experience shows that juices extracted from raw fruits are lacking in pectin, and they are therefore unfit for making into jellies. The same fruits, however, when cooked yield juices which are rich in pectin and which are ideal for jelly making. We must conclude, therefore, that in order to make good jellies it is desirable to extract the juice by cooking the fruit. A general rule is as follows: to all soft fruit add water equal to one-fourth the weight of the prepared fruit, and cook until fruit is done. In the case of hard fruits like apples, plums, etc., add equal weight of water and cook until fruit is tender. If one varies from this rule a corresponding variation should be made in the amount of sugar used and in the length of cooking period.

The Rate of Cooking

The rate of cooking modifies to some extent both the color and the texture of the jelly. Rapid boiling will give lighter color and a tenderer texture, while slow cooking, *i.e.*, simmering, will give dark color and tough or syrupy texture.

The Amount of Sugar added

The old household rule found in most recipe books and practiced in too many homes calls for equal amounts of fruit juice and sugar.¹

In our own experience it has been found that jellies of superior quality and flavor can be made from all fruits tested when the sugar is reduced to three-fourths or one-half the amount commonly recommended. Experience shows that when fruit juice properly extracted is used the sugar need never exceed three-fourths the weight of juice taken. With most fruits one-half as much sugar as juice will give good results, while a few fruits, as apples, will often give a perfect jelly when the sugar is reduced to one-fourth the volume of the juice.

¹ The Bureau of Chemistry of the United States Department of Agriculture gives the following rule:—
"To determine how much sugar should be used with each kind of juice put a spoonful of juice in a glass and add to it 1 spoonful of 95 per cent. grain alcohol; mix by shaking the glass gently. Pour slowly from the glass, noting how the pectin — the substance in fruits which makes them jelly — is precipitated. If the pectin is precipitated as one lump a cup of sugar may be used to each cup of juice; if in several lumps the proportion of sugar must be reduced to approximately three-fourths the amount of the juice. If the pectin is not in lumps but is merely precipitated the sugar should be one-half or less of the amount of the juice. If the juice shows no precipitation under this test it is unsuitable for jelly making and must be combined with apples or other juices rich in pectin."

In reducing the amount of sugar there will be a reduction also in the amount of jelly. This reduction is not as great as one might think. Reducing the sugar to one-half gives a reduction of one-fourth to one-third in amount of jelly obtained. The cost per unit of jelly will be reduced approximately 2 cents per 8-ounce glass if sugar is 10 cents per pound.

The color of the jelly will be somewhat darker, due to (1) a greater concentration of fruit juice and (2) a slight increase in cooking period.

Length of Cooking Period

(a) **Before adding the Sugar.**— If the cooking period is too long the juice becomes too much concentrated, and a white flocculent precipitate will show all through the finished jelly, while if the cooking period is too short the long cooking that must follow the addition of the sugar will result in the inversion of too much of the cane sugar and a consequent loss in sweetening value and a possible caramel flavor.

The length of this cooking should therefore bear some relation to the amount of sugar to be added. It is difficult to set any arbitrary period, since the rate of boiling and the character of cooking vessel will be the principal factors in determining the amount of concentration in a given period of time. Where small quantities of juice, 2 to 3 quarts, have been cooked at a time in a fairly shallow aluminum kettle, at a rate which kept the liquid at a good "gallop," the following rule has been found to work fairly satisfactorily: if three-fourths as much sugar as juice is to be used boil five minutes; if one-half as much sugar as juice is to be used boil ten minutes; and if one-fourth as much sugar as juice is to be used boil fifteen minutes.

(b) **After Addition of Sugar.**— If cooked too long the jelly will be hard and rubber like, while if not cooked long enough the jelly will be soft or syrupy. Experience alone can teach the jelly maker how long to cook her jellies.

The Jelly Test

Various schemes have been suggested to determine when the jelly is done. The thermometer test is recommended by some, while others recommend the hydrometer.

There seems to be no doubt that these tests could be used, but so far neither has proven entirely satisfactory. These tests must by their nature depend upon the density of the fruit juice and upon the amount of sugar added. If either of these differs from the assumed standard the tests will fail.

For the present, at least, home manufacturers of jellies must rely upon the "drop" test or the cold saucer. When the cooking juice has become so concentrated that it forms two distinct drops as the last few drops are poured from the spoon it is nearing the jelling point, and requires more careful attention and frequent testing. When instead of pouring a sheet a half inch or more in length forms on the edge of the spoon, and breaking loose at one end shears or sheets itself off the spoon, it is ready to be removed from the fire and poured into sterile glasses.

Skimming

Just how much the cooking jelly shall be skimmed is a debatable question. There certainly can be no serious objection raised to the removal of any scum that may form upon the surface of the boiling juice before the sugar is added. It is doubtful if it is necessary, and it is perhaps some loss to continually remove the scum after adding the sugar. Any scum that forms may be removed just before pouring into glasses, or each glass of jelly may be skimmed. Pouring the hot jelly through a cheesecloth will remove all scum. If the hot jelly is strained into a warm pitcher it can then be easily poured into the sterilized warm glasses.

Stirring the jelly while cooking, except to hasten the dissolving of the sugar, certainly does no good and were better omitted.

Heating the Sugar

Some writers on this subject insist that the sugar must be heated before being added to the boiling juice. Experience does not bear out this recommendation. The fuss and bother of heating the sugar will certainly overbalance any imaginary defect in quality caused by adding unheated sugar.

Sterilizing the Jelly Glasses

Jelly glasses should be thoroughly washed before sterilizing. The sterilization is to destroy yeasts and molds, not to cleanse the glasses. To sterilize glasses place them in a vessel and cover with water; place over fire and heat to the boiling point. Continue to boil for at least five minutes. Remove and invert to drain. Avoid setting glasses on a cold surface or in a draft. If glasses become cold before the hot jelly is poured into them they should be set in a shallow pan containing a little hot water. This is to avoid breaking the glasses.

Adding the Paraffin

The paraffin may be added in several different ways. If the jelly maker is sure the product is done, thin shavings of paraffin may be placed in the bottom of the glasses before the hot jelly is poured in. The heat of the jelly will melt the paraffin, which being light will float to the surface and harden as the jelly cools. This gives a good seal and avoids some extra labor. The objections to this method are: (1) the jelly cannot be skimmed after pouring into the glasses, and (2) if the jelly has been slightly undercooked the paraffin must be removed until the jelly hardens, after which it will be necessary to add a new seal.

Another way is to have thin shavings of paraffin which are dropped on to the jelly after it has been poured into the glasses. This does not differ in principle from the above method, and has the same objections, except if one works quickly any scum may be removed before the paraffin is added.

Still another — and with most jelly makers the safest — method is to wait until the jelly has cooled and has become hard, then melt in a cup some paraffin, heat to the boiling point and pour on to the jelly.

If a blunt object such as a blunt knife point is run around the side of the glass in such a way as to separate the jelly from the side of the glass to a depth of one-eighth of an inch before the boiling paraffin is poured on, a much better seal will be obtained.

Covers for Jelly Glasses

New jelly glasses have tin covers which should be boiled for a few minutes before placing on the glasses. These tin covers soon become rusted or bent out of shape so that the housewife must resort to substitutes. White note paper or ordinary writing paper may be cut into circles about one-half inch larger than top of glass, and if a little stiff flour paste is added to the outer one-fourth inch of this circle and the paper then laid over the top of the glass the edges may be bent down snugly against the sides of the glass and the paste will hold it in place, and a very neat and efficient cover is formed. Or the paper may be cut larger, fitted neatly over the top, and the edges brought down against the side and held there by a rubber band or a bit of string.

The purpose of the cover is to prevent the unrestricted entrance of molds and yeasts into what should be a sterile package.

Storage of Jelly

Jellies should be stored in a cool, dry place. Warm, damp places encourage growth of yeasts and molds, and are therefore to be avoided.

Storing Fruit Juices

Often for some reason it is not advisable or feasible to make jellies at the time when fruits are in their season. Nor is this necessary, since the juices may be extracted when fruits are at hand, the juice canned or bottled and stored until such time as may be desirable for converting into jellies.

If this method is to be followed, extract the juices as directed under that specific jelly, strain the juice and return to the fire, heat to the boiling point, pour into sterilized fruit jars and seal at once. If bottles are used cork at once with corks that have been allowed to boil for a few minutes in paraffin. Or the juices may be strained, filled into fruit jars and sterilized in the same way as fruits are by the can-cooked method. (See "Home Canning" Bulletin.)

Caution

The housewife should remember that jellies are the most elusive of all fruit products; that for no apparent reason good jelly will not always be obtained even when directions are followed closely. The fault usually is with the juice, but as no practical tests to determine its acid and pectin content are at present available we must continue to make our jellies largely by empirical formulæ, taking our failures as gracefully as we can. In the recipes which follow the writer is giving the results of laboratory experiences. He believes that these directions will give as good results in the hands of the careful housewife, and she is requested to give them a thorough trial.

Apple Jelly

If a light-colored product is desired use apples having a green or yellow skin. Red apples, like Wealthy, McIntosh and Baldwin, give a beautiful pink or reddish colored jelly.

Wash the fruit and remove all defective spots such as scab, worm holes and rot. Slice into sixths or eighths, weigh the prepared fruit, place in a preserving kettle, add an equal weight of water, cover and cook, boiling rapidly until the fruit is tender. Pour into sieve or colander and allow juice to drain off. Strain the juice through a flannel or felt jelly bag, or fold a square of cheesecloth into four thicknesses spread over the colander and pour the juice through. Do not apply pressure to force the last of the juice from the cloth.

Weigh or measure the juice, return to preserving kettle and bring quickly to a vigorous boiling. Remove all scum that forms. After boiling ten minutes add sugar equal to one-half the volume or weight of juice, and continue boiling until the jelly test is given. (See page 13.) Pour into hot, clean, sterilized glasses, filling one-half to three-eighths of an inch to the top, and set aside to cool.

If apples are scarce or high in price, or simply as a matter of household economy, the supply of apple jelly may well be made from the peelings and cores of the apples used in the home. In doing so use water sufficient to cover the peelings and cores.

Blackberry Jelly

It is difficult and often impossible to make first-class jelly from blackberries alone. However, for home use it is a simple matter to combine the juice of this fruit with that of another and thereby produce a high-grade jelly with a decided blackberry flavor.

Clean the berries, weigh and wash thoroughly. Place in a preserving kettle and add water equal to one-half the weight of the berries. Heat to boiling point and continue to boil until fruit has fallen to pieces. Drain off the juice, strain and weigh or measure. This juice is to be blended with apple juice obtained as follows:—

During the blackberry season it is often possible to obtain early summer or autumn apples sufficiently developed to use for jelly making. If this is not the case can or bottle the blackberry juice and set aside until apples are plentiful.

Having the apples, use one-fourth or one-half the weight of berries used, slice and add an equal volume of water. If apples are green boil until the fruit is in pieces; if apples are ripe boil until fruit is tender. Pour into colander and allow juice to drain off; strain the juice.

This juice is added to the blackberry juice in the proportions of one-third or one-half to 1 by measure or weight. Place the mixed juices in a preserving kettle, boil for ten minutes, add sugar equal to one-half the weight of the combined juices, and boil briskly until jelly test is shown. Pour into sterilized glasses and set aside to cool.

The apple pulp may be rubbed through a colander to remove seeds, cores and peel, mixed with the blackberry from which the juice was extracted in proportion of one-fourth or one-third to 1, and made into a very desirable jam. (See page 10.)

Currant juice may be used instead of apple juice if preferred. Extract the currant juice the same as for making currant jelly. (See page 17.)

Currant Jelly

Remove all leaves and the large stems. Weigh and wash and add water equal to one-fourth the weight of fruit. Set over fire and cook rapidly until fruit is tender. Pour into colander or sieve and allow the juice to drain off. Strain the juice and return to preserving kettle. Measure or weigh and cook for five minutes, removing any scum that forms. Add sugar equal to three-fourths the weight or volume of juice and cook rapidly until the jelly test is formed. Pour into clean, dry, sterilized glasses and set aside to cool.

Grape Jelly

In making jelly from the grape the fruit should not be over-ripe. If one must use over-ripe fruit it is wise to mix in a few that are under-ripe.

Remove the berries from the stems, weigh and wash thoroughly, place in a preserving kettle and add water equal to one-half the weight of the berries. Cook at boiling point until the skins slip freely from the berries. Pour into a colander or sieve to allow juice to drain off. This juice should be strained, weighed or measured, returned to the fire and boiled briskly for ten minutes. Add sugar equal to one-half the juice and cook until the jelly test is given. (See page 13.)

There will be less danger from crystals forming in the jelly if the juice is heated to the boiling point, poured into sterile glass jars or bottles, sealed and set aside for a few days or until the jelly is needed.

Grape jelly of medium or low grade may also be made as a by-product of grape butter. After the pulps have been separated from the seeds and skins return the latter to the preserving kettle and add water equal to one-half the weight of berries cooked. Boil vigorously for five minutes, strain the juice and proceed as directed above.

Experience seems to indicate the following method is best to use with grapes in order to avoid the formation of crystals of potassium bitartrate: remove berries from stems, weigh and wash thoroughly, add water equal to one-tenth the weight of fruit and allow to simmer until the skins slip freely from the berries. Pour into colander or strainer and allow juice to drain into a clean vessel. This juice is strained and bottled for grape juice. (See page 18.)

If butter is desired as a second product proceed as directed on page 7. If jelly is wanted return the pulps to the preserving kettle, add water equal to the weight of fresh fruit and boil briskly for five minutes. Strain the juice and proceed as directed for making grape jelly.

The manufacture of grape products is attended with some difficulties not experienced with other fruits. Frequently the potassium bitartrate crystallizes in the product. This is not very serious in the case of grape juice, since the clear juice may be poured off and used. With jellies, however, no ready remedy is at hand. In the case of jams or butter the product may be heated before using, and if the crystallization has not proceeded too far a good usable product will be obtained.

Experience would tend to show that there is less likelihood of crystals forming: (1) if the first run of juice is bottled and set aside until the crystals have been deposited (or it may be used as grape juice); or (2) where small amounts of sugar are used in the manufacture of any grape product.

Peach Jelly

The peach is another one of our fruits which does not give satisfactory jellies unless blended with the juice of some other fruit.

To extract the juice from the peach wash thoroughly and remove as much of the fuzz as possible by rubbing. Cut into halves, or, if cling stones, cut in slices, discarding the stones unless the bitterish flavor of the pits is desired, in which case they may be left with the slices.

Weigh the prepared fruit and add one-half as much water. Cook at boiling temperature until the fruit is thoroughly cooked. Pour into colander and allow juice to drain off. Strain and weigh this juice.

Secure some apple juice as directed under blackberry jelly (see page 16), and add to the peach juice in the proportion of one-fourth or one-half to 1; boil the mixed juices for five minutes, add sugar equal to one-half the weight of the mixed juices and cook until jelly test is observed. Pour into sterilized jelly glasses and set aside to cool. Plum juice (see page 18) may be used instead of apple juice.

The pulps of both the apples and peaches may be run through the colander and mixed in the proportion of 1 part apple to 2 parts peach, and made into a delicious peach butter. (See page 7.)

Plum Jelly

Jelly made from the Japanese and native plums possesses a flavor and quality rarely met with in any other fruits.

The fruit should be ripe but firm. Weigh and wash thoroughly. Add water equal to the weight of fruit, heat to the boiling point and continue boiling for five or ten minutes or until the fruit is tender. Do not cook until fruit falls to pieces. Pour into colander or sieve and allow the juice to drain off. Strain the juice, weigh or measure and return to preserving kettle. Boil rapidly for five minutes and add sugar equal to one-half the weight of the juice. Continue boiling until jelly test is given. Pour into clean sterilized glasses and set aside to cool.

The pulps may be run through the colander and made into butter. (See page 8.)

A good grade of jelly may be made as a by-product of canning where one removes the skins. The plums are dipped into boiling water or steamed until the skins peel readily. These peelings are weighed and three to five times their weight of water is added. Proceed as directed above for making the jelly.

If the English blue plums are used the jelly will be very dark. The red plums are best adapted for jelly if a handsome product is desired.

Raspberry Jelly

See blackberry jelly, page 16.

Strawberry Jelly

See blackberry jelly, page 16.

GRAPE JUICE

The fruit should be fully ripened to secure highest quality juice. Stem the grapes and wash thoroughly. Steam or add just enough water to start the cooking (1 pint to 10 pounds of berries). Heat slowly

to simmering point. Cook until skins slip freely from berries and the fruit is tender. Pour into a sieve or colander and allow juice to drain. If pulps are to be discarded apply pressure to secure all the juice.

The juice should be strained through cotton flannel or through several folds of a good cheesecloth. This juice may then be handled in any one of several ways: (1) Return to preserving kettle, heat to simmering point for five minutes, pour into sterilized jars or bottles and seal at once. (2) Pour the juice into glass jars or bottles, place rubbers and lids in place on glass jars, but do not complete seal. Insert cork in bottles loosely. Stand in a vessel with water to within 1 or 2 inches of top of bottles and over tops of jars. Heat to 180° F. and maintain this temperature for one-half hour. (3) Pour the strained juice into sterilized containers, as 2-quart fruit jars, cover and set in cool place. Keep close watch, and when crystals have deposited on bottom of vessel pour off clear liquid and treat as given under (1) and (2). Should bubbles of gas be seen on surface of juice before the crystals form it is a sign of fermentation, and the juice should be sterilized at once.

Grape juice which has not been boiled will have a more natural flavor. If set aside to allow crystallization to take place the final package will be clear and free from deposit of reddish brown powder and crystals.

APPLE SYRUP

If the acids of sweet cider are neutralized by action of a carbonate and the resulting liquid concentrated by evaporation, a reddish brown syrup very rich in sugars and of a very pleasant, agreeable flavor will result. This syrup may be used in much the same way as maple syrup. It is made as follows: to 7 gallons of sweet cider add 5 ounces of powdered chalk and heat to the boiling point for five to ten minutes. Transfer the cider to a fairly deep vessel, and leave undisturbed for several hours or over night.

Pour off carefully the clear liquid in order not to disturb the heavy precipitate at bottom of the vessel. Add 1 or 2 teaspoonfuls of powdered chalk and boil until the volume is reduced to 1 gallon. Again pour into tall vessels, 2-quart jars answer well, and allow to settle. A fine white powder will be deposited on the bottom of jars after standing for some hours. When the syrup is clear return to cooking vessel, heat to boiling point, fill into sterilized containers and seal at once.

This syrup contains around 20 per cent. cane sugar and 35 to 40 per cent. other sugars. The combination of all sugars present would give it the sweetening value of approximately 3 to 4 pounds of cane sugar per gallon. This compares favorably with the standard maple syrup which carries 3 pounds cane sugar per gallon. The biggest item of expense to the fruit grower is the fuel for evaporation.

SWEET CIDER

In sterilizing sweet cider it should not be heated to the boiling point because by so doing it acquires a cooked flavor.

The cider should be clean and sweet. Filter carefully through felt or cotton flannel to remove as much as possible of the material held in suspension. It will clarify much more readily if allowed to just begin

fermentation. Fill the clarified juice into glass jars or bottles and treat as given under (2) for grape juice (see page 19), keeping the temperature above 160° and below 180° F. for one-half hour. Remove jars from water bath, complete the seal and set aside.

Sterilized cider and all other fruit juices intended for use as beverages acquire a better taste if poured from one vessel to another a half dozen times or more before serving. Or open the sterilized package and pour the cider or juice into a vessel some hours before serving. This treatment will do much to remove the flat flavor so common in bottled fruit juices.

BOILED CIDER

Boiled cider is a standard product in most New England homes. When properly made it is of good color, high quality and finds many uses in a well-ordered household.

The cider should be fresh and from good, sound apples. Place in aluminum or porcelain-lined kettle and boil rapidly, reducing the volume in the ratio of 5:1. Remove the scum which forms, transfer to sterilized jars or bottles and seal at once.

CIDER JELLY

Cider jelly, which is prized by many who know it, is made by boiling sweet cider down until it reaches the jelling point. This generally means reducing the volume in the ratio of 7:1.

Cider jelly of superior quality is made by mixing the cider from sweet and acid apples, using equal volumes. Such jelly is not as sour, and will appeal to those who do not care for the more acid product.

The Commonwealth of Massachusetts

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RASPBERRY AND BLACKBERRY GROWING IN
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S. L. DAVENPORT



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RASPBERRY AND BLACKBERRY GROWING IN MASSACHUSETTS.

S. L. DAVENPORT, NORTH GRAFTON, MASSACHUSETTS.

Massachusetts is not considered to be one of the most important fruit-growing States of the Union; nevertheless, we find in many sections of the State that the industry has developed very rapidly during the last ten years, and that to-day we are producing large quantities of apples, like the Baldwin and McIntosh, of the highest quality. Not only are we producing them, but grading and packing them correctly, and meeting the competition of the fine fruit from the West, and obtaining equally as good, and many times better, prices. What, you ask, has been the cause of this great awakening in fruit growing? Surely we must give considerable credit to the Massachusetts Fruit Growers Association and the fine work they are doing, and also to the State Department of Agriculture, the Agricultural College and agricultural schools for the education, encouragement and leadership they have given. However, I believe that we must give our fellow fruit growers of the West the credit for most of this awakening, for they, through their pioneer work and great success, have aroused us to the wonderful possibilities right here at home.

But most of this development has been with the large fruits, like apples, etc., and we find that very little has been done in developing the wonderful possibilities of the raspberry and blackberry. Here, again, I am wondering if it will not take the West to show us the great opportunity we have in growing these fruits right at home. Already large areas in raspberries and blackberries have been developed in the West, and are increasing rapidly, while we in Massachusetts are hardly doing anything at all.

What is the raspberry and blackberry situation in Massachusetts to-day? If for a moment we turn back to the last census report of 1910 we find that more than 650 acres at that time were devoted to the production of these fruits; but during the last ten years we find that the number of acres has generally decreased, and I feel that our 1920 census will show that the industry is not growing very rapidly in this State. However, it is safe to say that, although the production has diminished, the demand and consumption has greatly increased. Thus we find to-day that Massachusetts is producing only a very small per cent of the raspberries and blackberries consumed, and that the rest are being shipped to us from New York State and from the South. Therefore we wonder what are the reasons for this decline, and again, turning to the present and future, what are the opportunities to-day in growing these fruits.

There have been many reasons why the growing of these fruits have declined in Massachusetts, but I believe to-day that most of these reasons will not hold, and for the right man the growing of these delicious berries offers an attractive future.

In many sections of our State we find favorable soil and climatic conditions for these fruits, and with our markets at our doors our crops may be sold even before they are produced. Thus, again, we realize that we are most favorably located, for what is better than fresh ripe raspberries served the same day they are picked? Moreover, our markets for these fruits are growing wider and wider every day, for we find that with the coming prohibition the demand for fruit juices and other products is increasing rapidly. Further, we note the great development of canning and preserving plants, which are to be the great stabilizers of prices, and which will assure always a market for our crops. But right here in Massachusetts it will be some years to come before the supply will be able to meet the demand for the fresh fruit, and this fact will assure us high prices for quality products.

Now, before we take up some of the essentials of success in growing raspberries and blackberries, let us consider the various groups of these fruits. There are, we find, three groups of raspberries grown in this State: first, the red raspberries and a variation from the red, — the yellow; second, the blackcaps,

or thimble berries; and third, the purple canes, which are the results of the crossing of the red and black varieties. In this part of the country the varieties of red raspberries seem to be the most popular, and at the same time they are probably best adapted to this section. The blackcaps are, when well grown, a much sweeter berry than the red, and, owing to the fact that their fruit ripens practically all at one time, they can be harvested cheaper and thus sell for a little less. In some sections they have become very popular, owing to their high quality and cheapness. In sections of New York State the blackcaps are used very extensively for drying and canning. There may, however, be some question whether it is advisable to try to grow them commercially in Massachusetts. They should, however, be given a trial. The purple canes, which make up the newest group, seem to be well adapted to various sections of the States, and although they are not as attractive in appearance nor as good shippers as the others, they are wonderfully prolific and of good quality. They are becoming more and more in favor, owing to their hardiness and extremely heavy habit of bearing.

The blackberries we may divide into two groups: first, the blackberry; and second, the dewberry. We are all familiar with the blackberry, and if we have had the privilege of eating it ripe, from the vines, we appreciate what a fine fruit it is. The dewberry, or trailing blackberry, is not as well known, but in sections where they grow to perfection they are not only larger, but more juicy and finer flavored than the blackberry. Here I believe some experimental work should be done to obtain varieties suited to this section.

The soil requirements of the various groups of raspberries and blackberries, we find, vary a great deal with each group. The dewberry likes a warm sandy loam, while the red raspberry and blackcaps do best on a medium or gravelly loam. The purple canes like a little heavier soil, and the blackberry a medium to heavy loam. For best results they all require a deep, well-drained soil, well supplied with humus, so that a good supply of water will be available at fruiting time. All should be planted on elevated land, the dewberry on the warmer slopes, and the blackberry on the cooler northern slopes. The

land should be thoroughly prepared before setting, remembering that we are planting a fairly permanent crop. It should be well plowed and finely harrowed, never setting on newly turned sod land, with grass sod, or on land on which water stands.

In preparing the land a good coat of manure should be plowed under, and for subsequent fertilization we must depend on commercial fertilizers and cover crops. The matter of fertilization is one of the most difficult problems to give recommendations on, owing to various conditions of soil, etc., so that only a few general suggestions may be offered. In general, nitrogen or nitrogenous fertilizers should be used very lightly on these fruits. The use of nitrogen and the amounts to use must depend almost entirely on the vigor and growth of the plantation. If there is a lack of growth, or the color of foliage is poor, nitrogen should be used, but if plants are healthy, vigorous and making a good yearly growth, use nitrogen sparingly. The use of an excessive amount of nitrogen gives a very heavy rank growth which is detrimental to the production of fine fruit. A light yearly application of phosphoric acid and potash will, I believe, prove to be of considerable value. Cultivation, however, is of more importance than the heavy use of fertilizers.

The use of lime on very acid soils seems to be of some value for red raspberries, but blackcaps are not usually benefited, and blackberries may be injured.

Now let us consider the very important subject of varieties. Here, we find, is a most difficult problem to select from a catalogue varieties which may prove to be adapted to our section, more especially since most of the nurseries are located outside of the State, and, to complicate the situation still more, we find that many new varieties of reds and purple canes have been introduced in late years. These as yet have not been tested to any great extent, either by growers or our experiment station, so that I believe the best indication in the choice of varieties is to find what varieties are now proving to be a success in your section. Plant those and also try a few of the new varieties in a small way. In the case of the blackberry we do not find as many new varieties.

Some of the good varieties of these fruits are as follows: —

Red Raspberries.

- Cuthbert: old standard variety of fine quality.
 Herbert: a very large, hardy variety originated in Canada.
 June: a fine berry; origin, Geneva Experiment Station, New York.
 Perfection: a large, bright red, firm berry, hardy; only fair in quality.
 Empire: a large, firm, bright red berry, productive, early; origin, Marlboro, N. Y.
 Golden Queen: yellow variety, very sweet.
 St. Regis or Ranere: fall bearing, fair quality.

Purple Canes.

- Columbian: New York origin, very hardy, berries large but soft.
 Royal Purple: season late, very productive, berries large and firm.
 Cardinal: very hardy, productive, with large but rather soft berries.

Black Caps.

- Plum Farmer: Ohio origin, very hardy, withstands drought, berries large, firm, season early.
 Cumberland: Pennsylvania origin, usually hardy, berries very large and firm, midseason.
 Pearl: Missouri origin, hardy, looks promising.

Blackberries.

- Snyder: old reliable, hardy, fruit small, midseason.
 Agawam: hardy, very productive, season medium early.
 Eldorado: hardy, fruit large, sweet, season medium early.

Dewberries.

- Lucretia: berries large, long, very black and attractive.
 McDonald: should be tried.

There are, however, some varieties of blackberries which are not adapted to this section of the country, such as the loganberry, Himalaya blackberry, etc.

Having now decided on our list of varieties, we are ready to obtain our plants, and here, I believe, we often make some serious mistakes. Unfortunately, raspberries and blackberries are subject to certain very serious diseases, such as root gall on the red varieties, anthracnose on the blackcaps, rust on the blackberries, etc., which cannot be easily controlled by spraying. This, then, becomes a serious problem, because if these

diseases once get a good foothold they will quickly put one out of business. Thus it is absolutely essential at the start that we obtain clean, healthy, vigorous stock. Such raspberry stock may be obtained from reliable nursery concerns, or, better still, direct from the growers. However, in regard to blackberry stock we are not quite as fortunate. To be sure, blackberry stock can be obtained, but to get good vigorous stock, true to name and free from disease, is another matter, and right here, I believe, is one of the greatest dangers to the future of blackberry growing, — the way in which blackberry stock is being produced. To-day it is almost impossible to find a nurseryman propagating blackberry stock; in fact, the majority of the stock is produced on berry farms. Here in many cases the plants are taken from the sides of the fruiting rows, without particular regard to disease, age of plantation, etc. We all appreciate that this is not the best way of obtaining plants, and the longer this practice is carried on the more our varieties of blackberries are going to degenerate, and I firmly believe that that is the cause of more than half of the poor results with the blackberry to-day. Here, I believe, is a need for some one to propagate the blackberry, producing fine, healthy, vigorous stock true to names, etc. Not only should this be done to improve the growing of the blackberry, but experimental work, on testing and originating new varieties, suited to our conditions should be taken up.

Further, it is not a wise policy under present conditions to buy large quantities of raspberry and blackberry stock to set direct into your fruiting fields. The chances of introducing diseases are too great. On the other hand, it is far safer to buy smaller lots of stock, put the same in a nursery or propagating field, and grow your own plants from them. Then if disease develops in your nursery you can much more easily eradicate it without much loss. Other advantages are that you will have the stock on hand, in ideal condition when ready to set, and you can produce the type of plants to give best results. With the red raspberry best results can be obtained by the following method: in the spring, when the new green shoots are coming up, dig them up carefully and set them close together in nursery rows for one year. This will give fine vigor-

ous stock. Then in the following fall or spring this stock is taken up, inspected for disease, and, if found clean, is set in the fruiting fields. Plants of this type will make wonderful growth in one season, and the second season will bear a very heavy crop of fruit. Blackcaps and purple canes, however, are usually propagated by tip layering. Blackberries may be grown either from root cuttings or suckers.

Now, having obtained our plants, we are ready for planting. Reds and blackberries may be either planted in the spring or fall, but blackcaps and dewberries should always be planted in the spring.

The system of planting will vary a great deal with different varieties. The reds are grown both in the hedgerows and hill systems. Some varieties may do better in the hill system, while others give better returns in the hedgerow. For Massachusetts in general the latter is preferable. Blackcaps are grown in hills, and the purple canes in both systems. Blackberries are grown in hedgerows and on wire trellis. Dewberries which creep on the ground the first year are usually tied to stakes or to wires on a trellis the second, or fruiting, season. After fruiting, the old canes are cut away, and the following spring the new canes are tied, this being repeated each year.

After setting, the field should be kept thoroughly cultivated and hoed until late summer, when a cover crop should be sown. This is very important, as it protects the land and plants during the winter, and adds humus to the soil. In the growing of dewberries it is essential that a cover crop or a crop of weeds be allowed to grow to protect the plants over winter. In some sections it may be necessary to protect the red raspberry by laying down and covering. This is rather an expensive process, and I believe we should grow hardier varieties and correct other conditions to prevent, if possible, winter killing, by giving considerable attention to the location of the plantation, soil moisture, cover crops and windbreaks.

The latter is very important, as heavy drying winds during the winter and early spring have a great deal to do with the loss of plants by winter injury. Pruning, then, becomes a very important operation in growing these fruits, owing to the fact that the fruit is borne on new canes each season. Thus each

spring they should be thoroughly pruned, cutting out old dead or diseased canes and small weak shoots, and if plants are very thick they should be thinned some; also cut back the tops about one-third each year.

Having now produced our crop, we find that harvesting becomes a most important problem, for a great deal depends on our success at harvesting whether or not the undertaking will show a profit or loss. Raspberries and blackberries are fruits which to be at their best must be picked at just the right time; at the same time, they must be picked carefully and moved rapidly. Never leave the boxes of fruit in the sun, handle roughly or store in a damp place, remembering always that these fruits are very delicate, delicious when in prime condition, but of no value if over ripe or moldy, etc.

Yields and profits of these fruits will vary a great deal, but with present prices and average yields of 3,000 to 4,000 pints of red raspberries, 3,000 to 5,000 pints of blackcaps, and 2,000 to 3,000 quarts of blackberries per acre, we may be assured of good returns.

In closing I believe we should give more attention to the growing of these fruits in Massachusetts. The experiment stations and others should test new varieties to find those best adapted to our State, and also carry on experimental work in producing new varieties which will better suit our conditions, and propagate stock, so that clean, healthy, true-to-name stock will be available and encourage in other ways the growing of raspberries and blackberries. Then and then only will this industry flourish, and we will be able to supply the tremendous demand for these fruits.

The testing of varieties and the production of stock has already been started in a small way in this State, and I believe with this start already made, a bright future awaits those who are interested in growing these fruits.

MR. COOK. I would like to ask if among the purple canes there are good red berries.

MR. DAVENPORT. In the case of the new purple canes, varieties that are being originated, there is more or less variation in the color. Most people object to the varieties of purple

cane berries to-day, saying that they are not attractive in appearance. The public in general in buying those berries are not attracted at first by the appearance, and I think you will find inside of a very few years the purple canes, or some of the purple cane varieties that are being put on the market, will be almost entirely different in color than the ones we have at the present time. In the experimental work that is being carried on in the crossing of various varieties for the purpose of obtaining these purple canes they have been using all kinds and types of raspberries, not only the American Reds but European Reds, some of the ornamental varieties of raspberries, the blackcaps, and all kinds and types of raspberries they have been able to determine, so I am sure we will find the development may be such that in a few years the purple canes or the newer varieties, or some of them at least, will be much more attractive in color than those we have at present.

Mr. WILLIAMS. Would you recommend setting out the Columbian?

Mr. DAVENPORT. I believe the Columbian to-day is one of our safest purple canes to start off. It is an extremely hardy variety and extremely productive.

Mr. WILLIAMS. You prefer that to the red Marlboro?

Mr. DAVENPORT. Yes, I think so, at the present time.

Mr. WILLIAMS. For the same reason?

Mr. DAVENPORT. Yes, sir, a good deal the same reasons.

A MEMBER. How late can you cultivate in the summer? What is the best cover crop?

Mr. DAVENPORT. In the matter of lateness of cultivation, that varies, and it depends almost entirely on the season. If it is extremely dry there is no particular object in putting in a cover crop, and we keep on cultivating until conditions are a little more favorable. We like, however, to start the latter part of July to give one or two cultivations after the crop is harvested, and then sow a cover crop. The cover crops we plant in some cases are buckwheat, in some cases barley or oats, and in other cases some nitrous cover crop. We, however, depend entirely on the soil conditions and what cover crop will do well in that soil. And speaking about cultivation and other things, many people have advocated that during the

picking season of the red raspberry we ought to discontinue cultivation. I believe we ought to increase our cultivation during the harvest season rather than cut down on the cultivation. The more the pickers walk through the field the more they tramp down the surface of the soil. The more they tramp down the surface of the soil the heavier the evaporation. At that season of the year the rainfall is apt to be light, and in order to bring through a good crop it is absolutely necessary and essential that we have a good supply of moisture, and we can hold the moisture we have there by more frequent cultivation.

Chairman MUNSON. Any other questions?

A MEMBER. Wouldn't mulching answer the same purpose?

Mr. DAVENPORT. Mulching during the fruiting season? Yes, mulching during the fruiting season would serve the same purpose. It can be done in a small way where there is only a small amount to be done, but cannot be done very well commercially. In the case of winter conditions, I believe it would be cheaper to grow a cover crop than to try a mulch. In many sections, particularly in the case of the dewberry, their mulch is practically always weeds. Usually from the middle of July they let the weeds grow, serving as a cover crop and mulching the land.

A MEMBER. I suppose that is a matter of cost, isn't it?

Mr. DAVENPORT. Yes. I rather think in the case of the dewberry we might, if we gave it proper protection and planted it on proper soil, be able to obtain fairly good results.

Mr. VAN METER. Do you plow your plantation in the spring?

Mr. DAVENPORT. In regard to the plowing, usually as soon as the land is in workable condition we plow one or two furrows on each side of the row, throwing dirt towards the plants; then a little bit later we start cultivation, depending on soil conditions, and cultivate the soil down level again. I found in some sections, particularly New York State, that there the growers plow towards the plant the first part of the spring; then about two weeks later they go in again and plow the soil back from the plants, before they start cultivation. I do not really see that there is any need or any particular object in

that double plowing. I think by plowing towards the plant the first part of the spring, and then by cultivation, we can keep the land in good condition.

Mr. WILLIAMS. What is the distance between the rows?

Mr. DAVENPORT. The distance between the rows, in regard to raspberries, should vary quite a good deal, depending on the particular variety. With some of the smaller growing varieties 5 feet is plenty, whereas with some of the larger and heavier growing varieties we ought to have at least 6 feet.

Mr. STOCKWELL. May I just say a word? I wouldn't throw any cold water upon what the speaker has said, nothing of the kind, but if you are going to follow the raising of blackberries and raspberries you had better follow the instructions that the speaker has given you very closely. I had two acres of raspberries at one time, and I fertilized very high because I wanted the best thing on earth. I did get a large, handsome growth of plants, but the consequence was nine-tenths of them all died in the winter. I put in an acre of dewberries and they did finely the first year, and next winter they almost entirely died out. Now, you have got to be careful how you handle these things, and you had better follow your instructions pretty closely or you will come to grief.

Mr. MERRITT. I would like to ask Mr. Davenport if he knows if the June Red has been tried out to any extent around here.

Mr. DAVENPORT. I do not know for sure. I think probably Mr. Sprague could tell us. Wasn't the June tried at Turner Hill? I am under the impression it was tried there.

Mr. SPRAGUE. Not that I know of.

Mr. MERRITT. I have a few, but I am not satisfied with them in this locality.

Mr. SPRAGUE. I tried those myself with indifferent results the last few years.

Mr. DAVENPORT. In Worcester County they tried the June and had good results there. It is a variety used a great deal in the work of crossing and originating new varieties. Under New York conditions I found the June in some sections was a very important variety, grown almost to the exclusion of some of the others.

Mrs. GOODWIN. I would like to ask if you know anything about Syracuse Reds.

Mr. DAVENPORT. All I know about the Syracuse Red is that I saw it growing this last year for the first time in one of the nurseries near Rochester, New York. It certainly was liked there. I haven't seen it in a fruit field, but simply in a nursery where they were propagating stock. It shoots up well, the berry is exceptionally good, of fine color and fine size, firm, and is a very attractive appearing berry, and the same applies to the foliage.

Mrs. GOODWIN. I had something like fifty-one canes from which I had some 50 quarts of berries this last year, and won the prize here at the hall, and it proved to be a very firm, very large and very beautiful berry, and held up well.

Mr. COOK. I would like to inquire about the Gibraltar blackcap.

Mr. DAVENPORT. That is a new one on me.

Mr. COOK. King Brothers had a nursery of it, and it proved very satisfactory. Forty years ago blackcap was one of the most productive. I noticed last year in Worcester that the blackcap sold equally as well as the red raspberry, so our blackcap is coming back again.

A MEMBER [from New York]. Relative to the June, it has been one of the most satisfactory breeds I have grown. It is very early, of a good size and a very attractive color. It is subject to yellow leaf, a rather obscure trouble in New York State, which almost all of our commercial reds seem to be subject to, yet it is about as promising as any. The Ontario also looked very good.

The Commonwealth of Massachusetts

DEPARTMENT OF AGRICULTURE

ARTHUR W. GILBERT, COMMISSIONER

DEPARTMENT CIRCULAR No. 19

March, 1920

MARKETING APPLES

D. T. DODD



BOSTON

WRIGHT & POTTER PRINTING CO., STATE PRINTERS

32 DERNE STREET

1920

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THE BEST SYSTEM OF MARKETING APPLES.

D. T. DODD, HUDSON, MASSACHUSETTS.

In order to be a successful fruit grower it is necessary not only to be able to grow high quality fruit, but also to market the fruit in such a way that the net returns may be the largest possible. Like all producers, the fruit grower's problem is how to get the greatest proportion of the consumer's dollar. In Massachusetts the problem of marketing fruit is far different from that which confronts the western grower. Here we have the best markets in the world at our very doors, while the western growers must transport their fruit many thousands of miles to these same markets. The market being far away, the western fruit grower has found that the only successful way to compete with the eastern grower is by co-operating and selling his fruit through an exchange. By this means he gets a uniform standard of grades, a uniform pack and a very high standard grade of fruit. As the fruit is all pooled together and shipped and sold by trained men, the individual grower has the marketing of his fruit taken out of his hands, and can devote all his attention to the growing end of the business. Here in Massachusetts, more particularly so in the eastern part of the State, the individual grower must work out his marketing problem in his own way. As we each have our own methods, no one of which is perfect, we can all profit by finding out our neighbors' successes and failures. In the rest of this article I will describe how I have worked out my marketing problem.

My fruit is sold in two ways, — through commission men in Boston, and direct to the consumer on a roadside stand situated on the main automobile highway from Boston to Worcester. My orchard is located in Hudson about 30 miles from Boston, the stand being about 3 miles from the orchard.

Before discussing these two types of market, I will briefly describe the method of handling the fruit from its arrival in the packing house until it is ready for shipment. The fruit is brought in the left-hand door of the packing house and is piled beside the grader, which is directly opposite this door. The type of grader used is the Pease Perfect grader, which will separate the fruit into four sizes. The grader should really be called a sizer, as no machine can separate perfect fruit from imperfect. The smaller apples fall into a tin shoot under which a box is placed. The rest of the fruit drops into three trays, according to the size of the apple. From these trays it is taken out by hand and put into boxes, the well-colored, perfect and nearly perfect apples being separated from the imperfect or badly blemished apples. By this method the fruit is divided into four sizes, all but the smaller size being graded. The three graded sizes are brought across the packing room and put on the packing bench, each size being stacked separately. The smallest grade is taken to a sorting table and divided by hand into two sizes, the poor apples being thrown out. The imperfect apples from the three trays are also brought to the sorting table and all very bad apples, such as (1) badly mishapen, (2) wormy or partially rotten, are thrown out. On this table the boxes have risers, so that they can be filled full of apples. When the boxes are filled, they are slatted and stenciled and piled up near the right-hand or shipping door, ready for shipment.

In grading the apples by machine the work is done by three men. One turns the machine and keeps it supplied with apples, while the other two men do the actual hand grading. On an average, 20 boxes are run through the grader in an hour. As each man is paid 50 cents per hour, the cost of grading by machine is found to be $7\frac{1}{2}$ cents per bushel.

The three best grades when sold on commission in Boston are packed in layers in the bushel box, great care being taken that the bottom layer is as good as the top. The fruit sold in this way is all put in the Boston market gardener's box, and as it is all sent to market by automobiles, it is sent as an open package. One man does the entire packing. He averages six boxes an hour, and as he is paid 50 cents per hour the cost of

packing is found to be $8\frac{1}{3}$ cents per bushel box. All dropped apples and all other grades are sent in the loose pack, simply being graded.

The packages used are the Boston bushel box for the wholesale trade, and a 4-quart basket and the bushel box for the retail trade. The cost of the box is 23 cents delivered in the packing house. To this must be added the cost of four risers and two slats, and the labor of putting them on. This makes the total cost of the box 25 cents. In selling on commission 15 cents is returned to the grower for the box, making his net loss on the box 10 cents. The cost of the 4-quart basket is 7 cents at the packing house.

The varieties sold are Red Astrachan, Gravensteins, Wealthy and McIntosh. The following are the amounts of each kind sold on commission this year: Red Astrachans, 287 bushels; Gravensteins, 245 bushels; Wealthy, 126 bushels; and McIntosh, 372 bushels, a total of 1,030 bushels sold on commission. The fruit sold on commission in Boston is all hauled from the packing house by automobile truck. By this means the fruit can be shipped in open packages; it arrives on the market in perfect condition, and by leaving here in the evening arrives on time for the opening of the market. The cost of hauling is 21 cents per bushel. The fruit is sent to two commission houses, one on each side of the market. By this means there is keen competition between them to get the highest prices.

Each box is stenciled with the name of the variety, the grade and the commission house. It is also stenciled, "Packed by D. T. Dodd, Hudson, Massachusetts." The fruit being marketed in this way for the last four years has now won a very good reputation, so that top prices are obtained on all grades. Purchasers have learned that the fruit is uniform throughout the box, and that they can depend absolutely upon finding the lower layers fully equal to the top layer. Many are content to order, simply by asking for the grade desired, knowing that they can depend absolutely upon the honesty of the packing. I attribute the good prices obtained to my invariable adherence to this practice.

Best Red Astrachans brought \$6.50 and \$6 per bushel, and the best grade of the other varieties, \$5.50 per bushel. The

net returns on the 1,030 bushels sold was \$3,320, and the average net return per bushel was \$3.23. The cost of selling was 10 per cent of the selling price.

The stand is operated by the Highland Co-operative Fruit Exchange. The members are a group of 25 farmers, living in Marlborough and Hudson. The stand is located about a mile from Marlborough, on the main Boston & Worcester road. It is run and managed by the manager of the exchange. Only products grown by the members are sold on the stand. Each grower pays 12 per cent on his products sold. The exchange is a stock company, so that if it proves a success, each member will benefit from the dividends. The policy of the exchange is to give the buying public an opportunity to buy fresh farm products at less than the retail price in the cities. We do not believe in profiteering, but by charging fair prices expect our patrons to become steady customers. This policy has already proved its value, as we now have many regular customers who buy every week or so. A satisfied customer will tell his friends about us, so that we are constantly increasing our regular trade.

Apples are sold by the basket and by the bushel, peck or quart. Fancy apples can also be bought singly or by the dozen. All the apples, except those in the basket, are weighed out and sold in paper bags, unless the purchaser takes a whole bushel, when an additional charge of 25 cents is made for the box. The exchange furnishes the paper bags, so that the grower has no additional expense for containers, except for the baskets. When sold in baskets the fruit is sold at a high enough price to cover the expense of the container.

From this orchard the same varieties have been sold on the stand as on the Boston market. In computing the number of bushels sold, 8 baskets or 150 single apples are figured as equal to 1 bushel. The following are the amounts of each kind sold on the stand: Red Astrachans, 108 bushels; Gravensteins, 34 bushels; Wealthy, 20 bushels; and McIntosh, 261 bushels. The cost of grading is the same whether sold on commission or on the stand. I have done my own hauling to the stand, using a Ford truck. It is impossible to figure the exact cost of hauling, as many times only a partial load is hauled. However,

as the distance for the round trip is 6 miles, which can be covered in forty minutes, allowing for the time of unloading, the cost of hauling is considerably less than it is for the 60-mile trip to Boston and return. To get at an approximate figure, the cost of each trip may be figured as 30 cents for running expenses, and 34 cents for the driver or a total of 64 cents. On an average, 10 bushels are sent on each load, making a cost of 6.4 cents per bushel for hauling.

Each grower, after consulting with the manager, puts his own price on his products. As a result, the price for the same grade of apples from different farms is not uniform. However, this arrangement has worked very well, as the grower putting up the best pack at the lowest price will far outsell his fellow growers.

The net returns on the apples sold on the stand by me was \$1,119.53, making a net return per bushel of \$2.65. As already stated, the net return per bushel on the apples sold on commission was \$3.23. The reason for this difference is that on the stand the demand for my apples was largely for either dropped apples or the cheaper grades of hand-picked apples, thus leaving the best grades to be sold on commission.

Next year the stand will probably increase its business many times; as this was its first year many experiments had to be tried, some proving profitable and others failures. One of our best experiments was that of having an advertising display on the main stand on Sundays and holidays. The display consisted of either packed boxes or flats of fancy apples put up on an incline. The display was put up early in the morning, the main object being to attract the attention of the passersby. On Sundays and holidays a large proportion of the automobilists are out simply for a trip. In passing the stand in the morning they would be attracted by the display, and would either stop then and buy, or, what was more often the case, stop on their way home in the afternoon. During the morning the display was not for sale, but by the middle of the afternoon it had served its purpose as an attraction and could be bought in box lots.

The Commonwealth of Massachusetts

DEPARTMENT OF AGRICULTURE

ARTHUR W. GILBERT, COMMISSIONER

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SPRAYING

H. H. WHETZEL



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SPRAYING.

H. H. WHETZEL, PROFESSOR OF PLANT PATHOLOGY,
CORNELL UNIVERSITY, ITHACA, NEW YORK.

There are four fundamental principles upon which all methods for controlling plant diseases are based, namely, *exclusion*, *eradication*, *protection* and *immunization*.

It is upon the first of these, exclusion, that all quarantine and similar exclusionary methods and measures are based. The United States quarantine act of 1912, together with its numerous amendments, the rules based thereon and quarantines laid thereunder by the Federal Horticultural Board constitute the most extensive application of this principle ever undertaken. Upon the soundness of exclusion as a fundamental principle in disease control there can be no question; upon the practicability or advisability of its application for the exclusion of foreign pathogenes and pests from this country under modern conditions of commerce and transportation, there is abundant ground for honest difference of opinion which only trials and time can settle.

Eradication of pests and pathogenes which have become established in crop areas of larger or smaller extent has been applied in this country during the last decade on an extensive scale in a number of notable cases, as, for example, the chestnut blight, the white pine blister rust, the citrus canker, and several insect pests. Remarkable success is claimed in a number of these cases, while in others equally notable failure is admitted. The eradication of certain disease-inducing fungi, such as grain smut, the potato scab organism, etc., from limited areas has long been regarded a successful practice.

Protection of crops from the attacks of fungi and insects by the interposition of some sort of barrier is perhaps the oldest and most widely applied of these four principles of control. It is upon this principle that spraying is based. Spraying is, in most cases, a method of protection. It has been for nearly four decades the chief weapon of the fruit grower in combating the insects and fungi that attack his crops.

Immunization, the development of immune or highly resistant strains or varieties of cultivated crops, has but recently received the practical consideration which its promise of profitable application has warranted from the first. The perennial nature of the crops of the fruit grower makes its application to their problems of less immediate promise than in the case of the annual crops of the cereal or field crop farmer.

Our attention, therefore, to-day will be directed to a consideration of the principle of protection and more specifically to spraying as a method based upon this principle.

DEFINITION.

Spraying consists in the application of fungicides and insecticides in liquid form for the protection of our fruit crops. While, in general, spraying is to be looked upon as a method of protection, it is in a few cases a distinctly eradication method as, for example, in the case of the control of peach leaf curl or San José scale. We shall, however, confine ourselves to-day chiefly to its applications in the control of scab and codling moth of apples and the brown rot and curculio of the peach.

HISTORY.

A brief consideration of the history of spraying, particularly in the United States, will afford a desirable background for a better understanding of the practice as now in vogue in this country.

Spraying, as a measure for protection against pests and diseases of plants, may be said to have been introduced into the United States about 1885. Following the discovery of Bordeaux mixture by that noted Frenchman Millardet, in France in 1883, the mixture was almost immediately tried

out in this country for the black rot of grapes, the apple scab and the late blight of potatoes. The results were so satisfactory that within a decade it had become the generally recommended and accepted fungicide for most of the fungous diseases of our crops. It continued to hold this pre-eminent position until about 1906, when, through a discovery by Cordley in Oregon, lime-sulfur was introduced as a substitute for Bordeaux in the summer spraying of apples. The work of Wallace in New York during the years 1909 to 1912 on the control of apple scab by the use of lime-sulfur brought about the all but complete abandonment of Bordeaux as a fungicide for apple scab in that State. Work in the other apple-growing sections of northeastern United States, Canada and the Pacific Coast completely confirmed the results obtained in New York, so that within five years lime-sulfur had largely replaced Bordeaux as a summer spray for apples in most apple-growing regions in the United States and Canada.

It is interesting to observe in passing that experimental work on spraying as a field practice in the control of plant diseases and pests in this country was at first almost entirely in the hands of horticulturists. The reasons for this are not far to seek. Plant pathologists as such were few and their efforts were largely confined to investigational work in the laboratory. They were busy with studies on the nature and life history of the organisms that caused these diseases. Horticulturists were far more numerous and were, from the nature of their work, most closely associated with the grower in the practical problems in the orchards and fields. Disease and pest control was looked upon as a practical problem rather than a scientific one. Plant pathology as a profession had little or no standing, while horticulture was generally recognized as the most advanced and progressive of agricultural professions.

The decade from 1900 to 1910 saw the entrance of the practical plant pathologist into the agricultural field in this country. The first university chair of plant pathology was established in America in 1907. Before the end of the decade plant pathologists as such were appointed to positions in many of the agricultural colleges and experiment stations in this country. Immediately they began to claim their rightful place in agri-

cultural teaching and practice. They rapidly took from the horticulturist those functions and problems to which their professional training and obligations justly entitled them. The process of transferring the plant disease and insect pest work, especially their practical applications, from the horticulturist to the plant pathologist and entomologist is still going on. Another decade will see it completed. This division of labor and differentiation or specialization has had its usual reward in a phenomenal progress in disease and pest control. America, to-day, is twenty-five years in advance of Europe in the science and practice of plant disease control. The day of the professional plant doctor is at hand. Already the progressive farmers and fruit growers are bidding against the agricultural institution of the country for the services of the professional plant pathologists. They are buying their services with their own hard cash, and the institutions must look to their salaries if they expect to retain for State and Federal service the best men in the profession.

WHAT CONSTITUTES A GOOD FUNGICIDE.

A fungicide is a substance which properly and timely applied to susceptible parts of the living plant will protect it from the attacks of pathogenic organisms.

The requirements of a good fungicide are effectiveness against the pathogene to be controlled, safety to the plant to which applied and adhesiveness. As corollaries to these fundamental requirements are to be noted cheapness, ease of application, and miscibility with insecticides.

With the introduction and development of Bordeaux mixture, copper became the all but universal active agent in fungicides. Bordeaux meets the above requirements of an acceptable fungicide to a remarkable degree. Copper is probably the most active fungicidal agent yet discovered. Combined with calcium in the form of a colloid known as Bordeaux mixture, it possesses a degree of adhesiveness as yet unsurpassed. Its injurious action on the living tissues of many plants, especially apples, peaches, plums and cherries, has led, however, to a persistent search for substitutes. Among the substances pro-

posed from time to time to take the place of copper, none has been found to so generally meet the requirements as sulfur. Known and used as a fungicide long before the introduction of copper sulphate, it was almost entirely discarded upon the discovery of Bordeaux mixture. With the gradual appreciation of the injurious action of the copper in Bordeaux upon the fruit and foliage of the apple, and its early recognized unsafety on the leaves of stone fruits, came the demand for a safer substitute in the spraying of these fruits. With Cordley's discovery of the efficiency and safety of lime-sulfur as a substitute for Bordeaux on apples and Scott's development of the self-boiled lime-sulfur for peaches, the fallacy of a universal fungicide was at last definitely recognized. To-day, we accept the fact that both copper and sulfur have a distinct place in plant medicine, and other substances promise to find a place in plant prophylaxis.

RELATION OF FUNGICIDES TO INSECTICIDES.

In the development and applications of a fungicide, one of the chief problems which the pathologist has to meet is its combination with insecticides. Modern agricultural practice requires a rigid economy in operation. The cost of labor and the requirements of timeliness in application demand that in most cases fungicide and insecticide shall go on to the crop in the same operation.

Arsenic in some form continues to be the chief agent in the killing of chewing insects. Nothing has yet proved so effective as nicotine for contact killing of sucking bugs, such as aphids, red bug, psylla and the like. A practical fungicide must therefore be subject to safe and effective combination with insecticides in which both arsenic and nicotine in some form are to be used. Happily, both Bordeaux and lime-sulfur have qualified in this respect to a remarkable degree. Wallace has shown that the fungicidal value of lime-sulfur is even increased by combination with arsenate of lead, without any evident decrease in safety to either. Nicotine sulfate, sold under the trade name of Black Leaf 40, has likewise proved a safe and efficient contact insecticide in combination with both Bordeaux and lime-sulfur.

It is evident, therefore, that we have in our present standard fungicides and insecticides that fortunate compatibility so requisite for practical and efficient use in meeting the problems of disease and pest control.

MODERN SPRAYING MACHINERY.

While the discovery and development of safe and effective fungicides and insecticides have been fundamental to the present-day methods of plant protection, the perfection of machinery with which to apply them has been almost equally important. Bordeaux was first applied with a whisk broom, and the primitive sprayers of the 80's were scarcely more than sprinklers. We regard with amusement and contempt the so-called nozzles through which our fathers squirted Bordeaux and paris green. The knapsack and barrel hand-pump sprayer have been almost entirely replaced by the handy compressed-air sprayers and engine-driven orchard outfits. The mechanical genius of the manufacturers has given us an annual crop of improved nozzles, the most modern development of which is the spray gun. Once satisfied with a pressure of 25 to 50 pounds, we now demand 200 to 300 to get that fine driving mist so generally recognized as essential to effective application. The development of the spray gun was a direct reply to the demand for greater rapidity and conservation of labor in our spraying operations. Speed in operation has been obtained, however, at the sacrifice of certain essentials in application. A greatly increased wastage of spray materials has undoubtedly resulted where spray guns have replaced the pole and angle nozzle. Inferior control or distribution of material over the leaf surface, especially in large trees, unquestionably occurs, with the result that only the lower branches are thoroughly covered, while the attempt to reach the higher parts of the trees has resulted in frequent and serious foliage injury due to drenching of the leaves below. In spite of the claims that the solid stream from the gun will break into a fine mist in the tops of tall trees, an examination of the foliage there, and the poor control of scab and worms frequently to be observed on the higher branches, does not bear out these claims. If one is to judge from the frequent comment of gun

users during the past season, a general return to the slower but more efficient pole and nozzle equipment is setting in. There is no question that under certain conditions, for certain purposes, and in the hands of competent operators the gun has proved a rapid and efficient spraying weapon. But for general orchard spraying and in the hands of the unskilled labor at present available for the work, it is less satisfactory than the best angle nozzle at the end of a 10 to 14 foot pole. Had the tower and double lead of hose been retained, the advent of the spray gun would undoubtedly have proved much less of a disappointment.

TIMELY APPLICATION.

Probably no feature of successful spraying is less understood and appreciated by the average grower than timeliness of application. In spite of accumulating evidence and the persistent teaching of plant pathologists during the past ten years, growers have failed to fully appreciate or have not understood the absolute necessity of getting the spray mixtures on at just the right time. This factor more than any other conditions success or failure of spraying operations. "Spray just before the rains, not after" has been shouted at you from platform and printed page. The deeply rooted notion that rains will wash off the fungicide or poison has been completely disproved and exploded. It has been repeatedly shown that for any given successful application usually not to exceed two or three days are available. Yet in spite of the fact that every intelligent grower knows that not more than 4 acres of full-grown apple trees on the average can be properly sprayed in a day, almost none of you have a sufficient number of spray rigs available to cover your plantings in the period available for successful operation. There are still many growers who spray when most convenient, thereby often missing the most effective time for doing the work. A not inconsiderable number try to beat the game by spraying almost continuously throughout the season with the result that they waste most of their time, labor and materials. A few growers have begun to appreciate the absolute necessity for timeliness in application and have sought to meet the situation by doubling or trebling their equipment,

but the high cost of machinery and labor has made the expense of such measures increasingly prohibitive. Very recently growers have begun to look with hope to dusting as a means of meeting the situation, but for the great mass of our fruit growers a lack of understanding or appreciation of the factor of timeliness constitutes the chief cause of failure to control diseases and pests where spraying is carried out.

DUSTING TO REPLACE SPRAYING.

Of the many problems pressing us for further study and investigation, none is more urgent than that of dusting. Prior to the war we carried out in New York State an extensive series of investigations on the relative efficiency of dusting in comparison with spraying for the control of apple scab and codling moth. Our results showed dusting to be equally effective against these two pests. Experiments since that time in other apple-growing regions, notably Michigan, Illinois and Nova Scotia, have given results in general accord with the results we obtained. But dusting, as a general practice, has made slow progress, due to certain limitations which, however, promise early solution. Among the chief drawbacks to its general adoption by our fruit growers has been the lack of an effective contact dust for sucking insects, like aphids, psylla and red bug. Preliminary experiments, especially in California and Nova Scotia, promise an effective nicotine dust in the near future. Improvements in dusting machinery, cheapening of dusting materials, and a better understanding of the factors conditioning effective application are pressing for attention.

Replying to a questionnaire sent last November to duster owners in New York State, 73 replied that they had dusted apples last season. Of these, 49 reported as good or better control of scab by dusting than by spraying; 51 reported codling moth as well or better controlled; and 68 (over 93 per cent) report that they will dust apples again next season. Even larger percentages replied in favor of dusting peaches and cherries.

The results obtained this past season in Nova Scotia, both in the experimental plots and in commercial orchards, were so

uniformly successful with dusting that its substitution for spraying will undoubtedly take place there as fast as the growers can change machinery.

With the cost of spray materials and machinery almost uniformly high, it is significant that dusting materials promise to be generally cheaper this next season than they were last and the demand for dusting machinery threatens to exceed the possible supply.

Dusting has so many promising and profitable features, especially as a saver of valuable time and labor, that its general adoption cannot long be delayed. The principles upon which it is based are sound; there is no virtue, *per se*, in the application of fungicides in water if the same materials can be applied dry. Professor Sanders of Nova Scotia has developed a new copper-lime dust which gives every promise of efficiency equal to that of the same materials in the form of liquid Bordeaux, and Dr. Brittain of the same province is at work on a nicotine contact dust which in preliminary experiments has given great promise as a killer of the sucking insects. Dry sulfur and arsenate of lead have already proved quite as effective when applied dry as when used in the liquid form.

With the standard fungicides and insecticides all thus available in dry form, there remains only to perfect the methods for their application in order to eliminate entirely the water which now so seriously interferes with rapid and timely operation in the control of our orchard pests and diseases.

THE COUNTY SPRAY SERVICE.

Impressed with the paramount importance of timely application in the control of apple scab and other fruit diseases in our New York orchards, we undertook about three years ago the experiment of organizing and directing a so-called spray service in certain of our best fruit counties. Upon request of the Farm Bureau organization a man with good fundamental training in plant pathology and entomology is placed in the county as special field assistant, with headquarters at the Farm Bureau office. The county provides and maintains a Ford for his use. He is assigned to the county about April 1 and re-

mains until about October 1. His job is to work out in co-operation with the county agent a plan for advising and directing the spraying operation of such growers as make request for the service. The extension pathologist and extension entomologist of the college supervise and direct his work. A variety of schemes for notifying the growers have been tried out, but the relay telephone system handled through the Farm Bureau office has usually proved the most satisfactory and efficient. With one eye on the weather map and the other on the development of the buds, the field man determines the proper time for the most effective application and promptly notifies each grower a day or two in advance. The grower is also advised of the proper strength and combination of fungicides and insecticides to be used. A few criterion orchards, scattered at advantageous localities over the county, are sprayed under the personal supervision of the field assistant, and serve to demonstrate the efficiency of the recommendations sent out to the growers.

At first the State paid the entire salary of the field assistant and furnished supervision of his work without expense to the county. Last season six counties maintained such field assistants, providing one-third the man's salary. This coming season at least 8 counties will have a special field assistant on plant disease and insect control and will pay two-thirds the salary, the college providing but one-third. The growers receiving the service provide the funds for meeting the counties' share of the salary in addition to providing the funds for buying and maintaining the car. Besides general supervision by the extension pathologist and entomologist the college will provide (as it did last season) a special supervisor, who, during the growing season, will give all his time to assisting and overseeing the work of the special field assistant.

The positions of field assistant have been almost entirely filled by seniors or graduate students specializing in plant pathology and entomology. They are young men of marked ability but usually with little actual practical experience. That they have met their opportunities and responsibilities is evidenced in the rapidly increasing demand on the part of our growers for their services. The willingness of the growers to

bear an increasingly large proportion of the expenses of such service is a further indication of their confidence in this plan.

In emphasis of the justification and value of this service I can do no better than quote from a recent paper on the subject prepared by Professor C. R. Crosby, our extension entomologist, and G. R. Palmer, one of our most successful field assistants.

It is becoming increasingly apparent that to be most effective demonstration work in the control of insect pests and plant diseases should be conducted for the most part on the basis of a seasonal program of treatment and not by demonstrating the control of any single disease or pest nor by isolated tests of spray materials or methods of application. The object of this kind of demonstration work is to show the value of the approved seasonal program of treatment as adapted to local conditions and to the weather prevalent during the season, and to teach the growers the most effective and economical method of protecting their crops from insect pests and plant diseases. Both from an educational and financial standpoint demonstrations conducted in accordance with the seasonal program are of greater value not only to the individual but also to the county as a whole. Efficiency requires that the work be done with an organized group of growers rather than with individuals. In order to achieve this result it is necessary that sound expert advice be available and that the necessary information be placed in the hands of the growers at the time when it will be of most use to them.

The plan of doing this work by means of field assistants was adopted because our experiences with industrial fellowships financed by associations of farmers had shown that the greatest good can be accomplished in the control of insect pests and plant diseases by having a trained man located in a definite territory where he can become thoroughly acquainted with the local problems, can watch the crops throughout the growing season and by his intimate knowledge of conditions be able to anticipate and prevent destructive outbreaks. He also is able to win the respect and confidence of the farmers as they become familiar with his aims and methods of work. Our experiences have shown that, in general, graduate students, preferably the younger ones, are more efficient and successful in this line of work than are older persons who have become more or less settled in life and consequently opinionated. It has been generally supposed that for this kind of work mature men would be more desirable, but as a matter of fact such is not the case. Where we have been compelled to use older men not actively interested in science or where we have used graduate students who were past the optimum age for study, we have had more misfits and failures than where younger men with more active interest have been employed. This may seem paradoxical. The explanation is that the salary available is not sufficient to attract mature men of sufficient ability. It is much better for the work to employ young men of special ability in their ap-

prenticeship stage than men of mediocre ability who have nothing better in prospect. A young man who in the course of the next ten years is likely to be occupying a \$5,000 to \$10,000 position is much more valuable for this work than an older man who would be satisfied to take a short-term appointment at \$150 a month. The younger men look on this work as an opportunity to obtain first-hand knowledge of field conditions and methods and are therefore willing to spend the summer season for two or three years in this way since it is a part of their training and of direct advantage to them in their life work. Furthermore, they have an incentive to do their best, since if they make good as field assistants they have a better chance to obtain a good position on receiving the advanced degree; and, moreover, they do not receive a sufficient salary to make them wish to settle down in the work permanently as field assistants.

In western New York, particularly, where the control of apple scab is of the utmost importance, the weather is the vital factor in determining the time at which most sprays must be applied. In this region the work of the field assistants was greatly facilitated by the co-operation of the United States Weather Bureau. A special forecaster was detailed to the Rochester office from April 6 to July 10. Arrangements were made whereby he received from Washington twice daily a special long range forecast, covering the conditions most needed by the service. These forecasts were often modified by the special forecaster. At least one of these forecasts as modified by the forecaster was sent daily to each of the Farm Bureau offices where a special assistant was stationed. A striking illustration of the practical value of these forecasts occurred on May 12, when the forecast indicated that a rain was probable in three or four days. Scab infections had already occurred in considerable numbers in orchards that had not received the delayed dormant spray. A spray warning was issued calling for the application of the blossom pink spray immediately although the blossoms did not yet show pink. The rain began in the afternoon of May 16. Subsequent events showed that this was the critical application for the commercial control of apple scab in western New York this season. In orchards where the application was delayed until after the rain of May 16, 17, the leaves became badly infected with scab and a serious defoliation resulted. Furthermore, in these orchards it was very difficult to keep the fruit free from later infections. Had the special forecast of the Weather Bureau not been available, most of the growers would have waited until the 19th or 20th before making the application, when it was too late to protect the foliage.

During the past season the six assistants we had in the field traveled an aggregate of 34,343 miles, making 3,017 visits, and issued 66 circular letters with a total circulation of 18,207. It is very difficult to estimate the financial return to the growers of the counties concerned, but there is every reason to believe that the increased value of the crops directly resulting from the work would pay several times over the entire cost of the undertaking, including supervision and overhead.

THE COMMUNITY PLANT DOCTOR.

Your attention has been directed in the above quotation to our experience with industrial fellowship laboratories. The work of the field man on an industrial fellowship differs, in two respects at least, from that of the special field assistant. The former has for his primary function that of research or the solution by investigation of problems of pressing importance to the growers. He also performs the function of general advisor or supervisor on disease and pest control applicable to the crops grown by the farmers with whom he works. This, however, is a secondary though very important feature. In the second place his obligations are limited to a much smaller number of growers, usually from 12 to 25. He is the personal or local plant doctor for a very small number of growers, who provide his salary, living expenses while in the field, a laboratory room, and a car for his use in conducting the work. The college provides a complete laboratory equipment and directs his work. The fellow spends the growing season (four to six months) in the field, the remainder of the time at the college in study and investigation looking to his doctor's degree. The fellowship contract is so drawn that the growers may look forward to the services of the same man for a continuous period of from two to four years. The total cost to the growers per year ranges from \$1,500 to \$2,000. It costs the college an approximately equal amount to equip the laboratory and supervise the work.

During the period from 1909 to 1916, the department of plant pathology at Cornell University had about forty-five such annual fellowships, representing a total investment by our farmers and commercial concerns of some \$60,000. During the war, due to a lack of qualified men to fill such positions, the number of fellowships dropped to one, but last year we had three in operation and already requests for a total of eleven such arrangements for next season have been made. Two of these are from small groups of fruit growers. The others are distributed among groups of potato growers, cauliflower growers, market gardeners, truck growers and greenhouse men, and two have been provided by a commercial company for investigations on dusting. Even in the last case the eager co-opera-

tion of farmers is assured to the extent of providing laboratory facilities, orchards, labor and cars for transportation.

This method of solving the plant disease problems of the State has proved highly profitable to the growers. The actual profits in dollars and cents which we are able to show prove this, and the overwhelming demand for more fellowships from many sections of the State indicate the enthusiasm for and the confidence with which the hard headed farmers of New York are turning to scientific methods in solving their plant disease problems.

A MEMBER. I would like to know how you control bitter rot on apples.

Professor WHETZELL. Now, before I can answer that question, I must be sure I know what you are talking about. Bitter rot of apples, as the plant doctors know it, isn't a disease of New York and New England. It is a disease of the South. I do not believe you have bitter rot. There was bitter rot in the Hudson valley this year, but I think you mean a Baldwin spot, a little brown spot under the skin, with a depression over it. If you want to call it "bitter," call it bitter pit. If you call it bitter rot, the plant doctor thinks it a disease which occurs in the South. It cannot be controlled by spraying. To explain to you briefly, we think it happens this way: It is a very common disease the world over where apples are grown. It comes only in those seasons where we have had sudden changes from wet to dry some time during the season.

The explanation is this: Suppose you start off with a wet spring. You have a certain amount of root surface developed to feed a certain amount of foliage with water. If the weather suddenly becomes dry, there isn't enough root surface to get far enough to supply the top leaves and the fruit, and the result is either the leaves or the fruit suffers from lack of water.

It is well known that when it is a fight between fruit and leaves, the leaves get it. In other words, water is withdrawn from the fruit to go into the leaves, and you will notice that spot is always worse around the blossom end. It is around the blossom end that the tips of the sap tubes have their opening

to the outside. Naturally, those are farthest away from the water supply, so when the water begins to be pulled away from the current and there isn't water enough to supply the whole apple, the little tips of the sap tubes out around the blossom end and the cells which surround them, have no water.

You get all degrees of injuries, too, from cells that are dead to those more or less injured. You put those apples in storage and not having enough water in the apple, those cells, slightly injured cannot draw it, and they die; and it gets worse and worse until you have large numbers of those spots under the skin, running into the heart of the apple and turning brown, and it dies. That is the explanation given for bitter pit.

The only thing that can be done, as far as I know, is to make every effort to maintain a uniform water supply during the season. If you have a wet spring and dry weather follows, anything you can do in the way of cultivation to ease that drop from much water to a little water and to keep a high amount of water in the soil will tend to reduce the amount of Baldwin spots.

The fewer apples you have on the tree, the more injury there will be. I do not understand it well enough to explain, but that is the general theory. I have never myself carried on investigations on the thing, but there were extensive investigations recorded some few years ago on the disease in Australia, where the disease is bad. The evidence we collected year after year in the State of New York indicates that bitter pit, or Baldwin spot, is the result of sudden changes in the water supply during the season. We never have Baldwin spots in the State of New York when we have a uniformly wet season or uniformly dry season, because then the balance between root and leaf is not disturbed.

Chairman JENKS. A question is asked, is it worse with trees in sod than those in cultivated areas?

Professor WHETZELL. I have no data on that. My opinion would be it was likely to be, particularly if the sod pumps the water out. It tends to emphasize the change. It may or may not. It depends on the season, and depends on the conditions in your orchard. Probably in that orchard, if the grass was cut and used as a mulch, you might not get that effect.

A MEMBER. Why do you have a Baldwin spot in one tree and not in another tree?

Professor WHETZELL. The only way I can answer that is to ask why does one man get baldheaded and another man doesn't? There is some particular condition respecting that tree. Trees are just as individual as you fellows are. Some of them, because of the particular soil in which they grow, or conditions under which they grow, or their inherited tendencies, or something of that sort, show more Baldwin spots. Just as some of you fellows can wear your hat all the time and not get baldheaded. Others can't wear it at all. You will get baldheaded, anyway.

A MEMBER. I would like to ask Professor Whetzell if he thought he could control apple scab just as well by dusting as he could by the liquid spray. I have often found the liquid spray in the pink stage is just as important as the spray after the blossoms fall.

Professor WHETZELL. In New York State it is more important.

A MEMBER. How can you get dust on the pink stage?

Professor WHETZELL. Just as well as on the calyx.

A MEMBER. Is it as effective on the McIntosh where they are subject to apple scab?

Professor WHETZELL. Taking the averages of the experimental dusting work done in New York, Illinois, Michigan and Nova Scotia, taking the average of the work going on since 1912, — I do not know how many total years that would be for all of them, — but taking those averages, as I took them last week, I found on the average the difference between dusted and sprayed trees, so far as scab control was concerned, did not vary more than 3 or 4 per cent, which is within the range of experimental error. Now that you talk specifically on that particular variety, I do not recall the varieties that were involved, but I do recall that in a number of these cases we had as high as 95 per cent or more of scabby fruit on the checks, and reduced it to 85 to 90 per cent on the dusted. Does that answer the question?

A MEMBER. Do you advocate dusting under any conditions when the trees are in blossom?

Professor WHETZELL. No, it isn't necessary, any more than I would advocate spraying. Now, so far as injury to the fruit is concerned, there is no evidence that spraying or dusting when the trees are in blossom will injure the set of fruit. No evidence, no experimental evidence, as far as I know. The bee men are very certain it kills the bees if you spray or dust when the trees are in blossom. We have dusted trees experimentally in blossom, and we have sprayed trees experimentally in blossom. There is, as far as I know, no experimental evidence to show that spraying or dusting kills bees. I once went over the matter with a professor who made a very careful search for evidence on that point, and he said there was none. I do not say it doesn't kill bees. I do not know. But I say, as far as the experimental evidence goes, there is absolutely none to show it injures the bees and none to show it injures the set of fruit.

A MEMBER. That is the reason I asked that question. Formerly I used to make more than \$1,000 on bees. Last year I lost \$100. A man there locally will spray his trees many times. He knows better. There is no law against him. He sprays with a weak solution, and he claims it doesn't kill the bees, but the whole hive will dwindle down when the poison has been used in that way.

Professor WHETZELL. As far as I know, there is no carefully carried out experiment on that subject to prove it, one way or the other, but the point is, it isn't necessary to spray when the trees are in blossom. There is no particular point in doing it. There may be once in a good many years such weather conditions where it would be profitable to catch the trees when they are in blossom. In other words, the trees usually blossom during a rainless period. At least, the blossoms open when the sun shines. He should have it ahead of the rain. If a man sprays his trees properly with respect to weather, there is practically never any occasion to spray when they are in blossom; therefore, he and the bee man can live happily without arguing the question. They don't need to even discuss the question, because they don't have to spray when they are in blossom.

Chairman JENKS. The question is asked if you know of satisfactory means of controlling pear psylla.

Professor WHETZELL. That is out of my line. That is a bug question, and I wouldn't offer you any opinion on it.

Chairman JENKS. Can you tell us what is the general practice in New York, where they grow so many pears?

Professor WHETZELL. I never tell anything about bugs. I can't forget my line.

Chairman JENKS. The question is asked relative to dry lime-sulfur, and its merits.

Professor WHETZELL. We have carried on no investigations in the State of New York on the use of dry lime-sulfur. We had one or two demonstrations carried out by the Farm Bureau, and I think this is the general status at the present time in connection with the dry lime-sulfur. I am quoting Professor Parrott, who, while he is a bug man, has also launched into some of the things from the other side. As far as fungous diseases are concerned, if enough dry lime-sulfur is used in the solution, it will be just as effective as the liquid, because it is the same thing, but, as ordinarily sold and recommended, the dilution is too weak. I believe Professor Parrott said to our men last year that 23 to 25 pounds per 50 gallons should be used to give the same result you would get with 1 to 8, of commercial lime-sulfur liquid, or something of that sort, for scale. Then you diluted accordingly to get 1 to 40.

A MEMBER. Professor, do you expect that dusting would be as effective as spraying in a season when there is much wind? I mean particularly after the spray has been applied. Say you get up in the morning and get the dust on before the wind came. Would it be possible, if the leaves were dry, that the dust would be blown off?

Professor WHETZELL. I will answer you by an experience of your own. You drive a car? Yes? You wash it sometimes? No? Never wash it? Well, I can't help you. Well, you have seen fellows wash their car. Yes, nice and clean and shiny. Then they drive it through a dusty road, and then they come in and turn the hose on and soak it with water to wash it off, but the dust was still there when they got done. They had to take a rag and wipe it off. If you can't wash it off with a hose, it isn't likely any wind that blows in New England would blow it off. It doesn't blow off. The finely ground sulfur sticks

just the same as the same sulfur put on wet. It sticks like dust sticks to furniture or to the carpet, and it will stick just as well, as far as I know, as it will when it is put on wet. So, so far as blowing off is concerned, you do not need to worry about that, unless you have windier blows here than we have in New York State. The question is often raised whether it will wash off, and I give the same illustration.

Chairman JENKS. Can you give us some idea as to the relative costs of spray materials and labor in dust and liquid spraying?

Professor WHETZELL. There is no question but what dust materials to-day cost more money than the same materials for spraying, that is, than the spray materials that are used. But that is not the way to figure your relative costs of course. If you figure labor saved and time saved and the value of timeliness, — well, leave out that which is the most valuable point, — the time and labor saved, if you figure those in, counting labor costs and cost of materials, in Nova Scotia this year Professor Saunders found that to dust cost about the same as to spray. I think in the two experiments that he made his figures on, the difference was 10 cents less to dust than it was to spray, per acre, — a small amount.

Now, the relative costs of those methods would depend upon many factors which are not constant. A man who has everything right for spraying — water handy, doesn't take much time to fill, and good engines — can put his spray on cheaper than a man who has all these other troubles.

But taking it by and large this last year, so far as I have been able to get figures — accurate figures — experimentally taken by Professors Saunders and Brittain in Nova Scotia, those figures show that the cost, counting labor and materials, was approximately the same for the two.

Now, then, that was counting the relatively high cost of materials for dusting, but, as I pointed out to you, we are in the experimental stage with dusting, and naturally the stuff costs more money than when it is commercial, so you can save on the cost of apparatus. In other words, we are using a crude machine as compared with sprayers, and the duster will be improved. We will get around to it by and by until we control

the dust. We want to go over our methods and our arrangements, and I want to say that those who will do so will do a better job with less material wasted.

Now, another interesting thing. Professor Saunders developed a Bordeaux dust which promises to be as effective as liquid Bordeaux. He found that where he dusted with this Bordeaux dust on apples and compared with it spraying with Bordeaux, although he put 75 gallons of material on in spraying and only 50 pounds in dusting, that he actually got more copper on the leaf surface by dusting than he did by spraying.

In other words, the actual wastage of copper was less in the dusting than it was in the spraying, a thing nobody suspected. The chemist actually found a higher percentage of copper on dusted trees than he did on sprayed trees, so the actual wastage under present conditions in that orchard where he was using Bordeaux in both cases was less for dusting than for spraying.

Chairman JENKS. What is the smallest acreage you would suggest putting on the dust at its present stage of development?

Professor WHETZELL. I would leave that to the individual. I never recommend anything. That is one thing I want you to remember when you go away from here, — Whetzell did not recommend a single thing. I am trying to give you the facts as I have them and my opinion, which you can take for whatever it is worth, but if you go home and buy a duster and it doesn't work, don't look at me.

Chairman JENKS. What do you think of soluble oil as compared with lime-sulfur?

Professor WHETZELL. In the first place, soluble oils are used primarily to control insects, scale, and so forth. They are not used as fungicides to any extent. I have no information on it. I have carried on no experiments, and I do not know. The only thing I can imagine soluble oils used for in a fungicide is disinfecting peach trees for curl.

Chairman JENKS. The question is asked how about the sooty blotch on apples?

Professor WHETZELL. It can be controlled by any of the spray mixtures you use. You have got to put on a later

application. That means ordinary apple scab sprays won't catch.

Chairman JENKS. Sooty blotch is very bad with us in eastern Massachusetts.

Professor WHETZELL. Sooty blotch is a disease that comes on relatively late, and you have got to get a mixture on ahead of it, and probably a couple of them.

Chairman JENKS. The question is asked, why is it better to spray before rather than after rain?

Professor WHETZELL. Well, for exactly the same reason that it is better to get inoculated for typhoid before you get it than after.

Here is the situation. Take the apple scab. The first infections in the spring are produced in the old leaves of last season that lay on the ground, the scabby foliage of last year, that fell to the ground this year.

Those spores are shot from the old leaves, and then a breeze catches them and carries them to the foliage, but they are only shot out during rains, and they get on to the leaves only during rains, and they germinate, and they go into the leaves during that rainy period.

In other words, to get apple scab infection on your early foliage, you have to have about forty-eight hours of rainy weather, some rain for a period of about forty-eight hours, and you will get infection. The fungus will be inside the leaf. If you have no protection on the foliage, you can go if you want, after the rain is over, and put it on the outside, but the spray mixture does not operate to kill the fungus.

In other words, spraying is a protection.

Now, some of you labor under the delusion that you spray to kill something which is already there. You do not. You put the spray mixture on to protect it from something that is going to come, and that something comes during the rain. Almost all fungi are either put on the leaf in the rain or germinate only during a period when the surface is wet; therefore, you must put protection on ahead and not after.

Any other question?

Chairman JENKS. Is it the opinion, Professor, that it is

almost impossible to do as cheap a job with a spray gun as it is with a spray tower and two rods?

Professor WHETZELL. No, it is possible to do as good a job with the spray gun, in my opinion, but it ordinarily isn't done that way, for the reasons I pointed out. If you have a man on the ground and another one on the tower, on a 10 or 15 foot tower, with a good angle nozzle on the end, you apply so much spray per second, and you cover all parts of the tree, and you do not drench any part of it. If a man is out on the tower with a spray gun, and another man on the ground with a spray gun, and the trees were not so large but what you could shoot this mist into the middle of the tree, you can do just as good a job, and applying so much more mixture per second you have to be on the job constantly. That is what happens. The hired man turns on the gun, and the more stuff he can get out of it, the better it looks to him, and he drenches the trees in spots. I saw an orchard in Nova Scotia sprayed with a spray gun where the fellow shot the tree; he took all the leaves and apples off.

Chairman JENKS. If you were doing the job yourself, and of course wanted to save time and expense, would you be inclined to use the gun or the rod?

Professor WHETZELL. I never had any extensive experience with the gun on my own account, but my own opinion is that I would stick to the pole and get a big angle nozzle on the end of it. I think I would save enough material and do enough better job to warrant me using the pole and nozzle than I would with a spray gun. I have seen some men spraying with a spray gun, especially if the trees were small, and they were up on the wagon, do a pretty good job with it, but I have seen many more men, who opened it wide to get to the top of the tree, do a poor job on the top and drench the trees below. So that in the hands of the ordinary man, the average man, I believe that better work will be done with a pole and nozzle than with a spray gun. That is not saying you can't do good work with a gun.

Chairman JENKS. It is particularly applicable to high trees?

Professor WHETZELL. Particularly so, yes, sir, and particularly applicable to the man who isn't very much interested in

doing it exactly right. You see, you are shooting so much more stuff at a time, your chances of doing damage are much more than where you have a small amount.

Chairman JENKS. I think, friends, we will have to draw this discussion to a close, as the time is gone. I am sure that even though Professor Whetzell did not recommend anything to us, he gave us a whole lot to think about that we will try to put into practice somewhat on our own farms this year.



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FRUIT GROWING FOR PROFIT

CHARLES W. MANN



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FRUIT GROWING FOR PROFIT.

CHARLES W. MANN, METHUEN.

I do not intend to tell you what to do, or how to do it, in the business of growing fruit for profit as I do not wish to give particular advice without personally seeing the locations and conditions, as that savors too much of quackery, — prescribing without seeing the patient, — but I will try to tell you what I have been doing myself in fruit production.

You may remember that I have been a grower of strawberries to the amount of perhaps \$40,000 and perhaps half that value of tomatoes, but with the changing conditions of labor and markets, the increasing weediness of the soil and other reasons combining to make the business harder and less profitable, I began in 1910 to set apple trees in the ground previously used for strawberry and tomato growing, the most of which I had reclaimed from rough, rocky pasture and sprout land with some underdraining in the low parts.

Baldwin trees were set 40 feet apart, with early varieties or peaches and pears for fillers, leaving spaces of 20 feet when all set, some in cultivated land and others in grass. I have continued planting until the past season, when I put out one thousand apple trees in my large grass field, and now have growing on the farm several thousand healthy, vigorous trees rapidly coming into bearing. While I enjoyed picking the luscious big berries in the years gone by, I have more pleasure now in gathering the highly flavored, juicy fruit from the trees, and it is easier on knees and back.

In buying trees to plant an orchard, I should prefer well-grown two-year-old stock from reliable nurseries, and can see little to choose between northern and southern grown, though it does seem reasonable to suppose that the former would be more rugged and longer lived. It has been possible in some

years to buy whips, or one-year-old trees, of good stock at very low prices, at 10 cents or less, and I have set them in nursery rows in heavy soil for two or three years, until they are rather oversize, when they can be transplanted to the field with plenty of dirt on the roots, and hardly stop growing. This method saves work in caring for them.

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DEPARTMENT OF AGRICULTURE

ARTHUR W. GILBERT, COMMISSIONER

DEPARTMENT CIRCULAR No. 21

March, 1920

FRUIT GROWING FOR PROFIT

CHARLES W. MANN



BOSTON

WRIGHT & POTTER PRINTING CO., STATE PRINTERS

32 DERNE STREET

1920

PUBLICATION OF THIS DOCUMENT
APPROVED BY THE
SUPERVISOR OF ADMINISTRATION.

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CHARLES W. MANN, METHUEN.

I do not intend to tell you what to do, or how to do it, in the business of growing fruit for profit as I do not wish to give particular advice without personally seeing the locations and conditions, as that savors too much of quackery, — prescribing without seeing the patient, — but I will try to tell you what I have been doing myself in fruit production.

You may remember that I have been a grower of strawberries to the amount of perhaps \$40,000 and perhaps half that value of tomatoes, but with the changing conditions of labor and markets, the increasing weediness of the soil and other reasons combining to make the business harder and less profitable, I began in 1910 to set apple trees in the ground previously used for strawberry and tomato growing, the most of which I had reclaimed from rough, rocky pasture and sprout land with some underdraining in the low parts.

Baldwin trees were set 40 feet apart, with early varieties or peaches and pears for fillers, leaving spaces of 20 feet when all set, some in cultivated land and others in grass. I have continued planting until the past season, when I put out one thousand apple trees in my large grass field, and now have growing on the farm several thousand healthy, vigorous trees rapidly coming into bearing. While I enjoyed picking the luscious big berries in the years gone by, I have more pleasure now in gathering the highly flavored, juicy fruit from the trees, and it is easier on knees and back.

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ARTHUR W. GILBERT, COMMISSIONER

DEPARTMENT CIRCULAR No. 22

March, 1920

MODERN DEVELOPMENTS IN
PEACH GROWING

MAURICE A. BLAKE



BOSTON

WRIGHT & POTTER PRINTING CO., STATE PRINTERS

32 DERNE STREET

1920

PUBLICATION OF THIS DOCUMENT
APPROVED BY THE
SUPERVISOR OF ADMINISTRATION.

MODERN DEVELOPMENTS IN PEACH GROWING.

MAURICE A. BLAKE, NEW JERSEY EXPERIMENT STATION, NEW BRUNSWICK, NEW JERSEY.

Peach production has occupied an important place in eastern fruit growing since early colonial days. Orchards of hundreds and thousands of seedling trees were common before the Revolutionary War, and peach yellows, the great scourge of the peach industry, had even appeared by that time.

We are, then, discussing an industry as old as colonial America, and you have asked me to address you upon its modern developments. Some one has said, "There is nothing new under the sun," and while I do not subscribe to this, it is often difficult to tell where the old leaves off and the modern begins.

Before we become too deeply concerned with methods and details of practice, it may be well to have a word as to the character of the business, since I infer that it is commercial peach growing that you are principally interested in.

The fruit of the peach, with its attractive colorings, its aroma and luscious flavor, makes a strong appeal to the prospective grower. Its promptness in coming into bearing and the reports of big profits in a single season are the deciding factors that start many a one in the game.

Where the climate and soil are favorable, the peach will give profitable returns earlier than any other deciduous fruit, and may give consistent returns. However, in the east it cannot be depended upon to produce a profitable crop before the fourth season and seldom after the tenth or twelfth season in the orchard. This short life must, therefore, be a merry one if the grower is to be properly compensated, and it becomes doubly so in localities where Jack Frost takes heavy toll.

The peach must remain upon the tree until well matured before high quality is attained, and then it must be soon con-

sumed or preserved. It may be held for ten days in cold storage, but the luscious flavor generally suffers. The period of successful distribution from tree to consumer is commonly a matter of less than a week. A grower, therefore, with several thousand baskets of peaches ripening faster than his available labor force or the railroad will handle them, is certain of plenty of exercise for his mind.

Peach growing is an intensive business which calls for skill, energy and persistence. It is decidedly not a lazy man's game, but played right it is attractive and profitable.

In a discussion of modern developments in peach growing some items of status should perhaps receive first attention.

The severe winter of 1917-18 seriously injured and killed thousands of peach trees in eastern and middle western peach regions, only those in especially favored districts escaping. During the period of the war, labor was difficult and expensive to obtain, and orchards not producing full crops were frequently left uncultivated. These two factors have resulted in a marked reduction of the peach orchards that are now in condition to produce good crops.

The United States census for 1910 was taken when the peach industry was just recovering from the attacks of the San José scale, and that of 1920 will be taken just after heavy reduction due to the effects of war and freezing. The high point reached in 1915 will never be measured in figures.

Together with this reduction in the number of vigorous orchards, there is a marked shortage in the number of nursery trees ready for planting, and a correspondingly increased price upon those that are available, which all points toward good prices for peaches during the next year or two if the crop is properly distributed.

The acreage of bearing peaches can be reduced suddenly, and it can also "come back" quickly, and the present shortage in peach nursery stock will be overcome much more quickly than that of apples. Even now everything resembling a peach pit has been collected and has gone into the ground for the next year. In some districts we may look for a mad rush to get aboard the peach wagon.

When a building burns down and we have the opportunity to erect a new one we should make sure that we have a good foundation on the right site and that all old faults are eliminated in the new structure. The same situation presents itself whenever there is a marked reduction in peach orchards, and during the next few years many will have the opportunity to build wisely and well.

To my mind, peach growers may be classified into two groups, those who have extensive orchards and ship in carload lots to distant markets, and those who have much smaller orchards and supply a more local trade.

The appearance of the roadside market is, in my experience, a modern development that means much both to the large and small peach grower, and especially the latter if he takes advantage of it.

Hundreds of farm fruit and vegetable stands are seen in the summer along prominent auto routes in the east, especially those leading to shore resorts. I have seen automobile parties buying Greensborough peaches from farm stands when they could secure the finest southern Belle and Elberta in Atlantic City, New Jersey, a noted shore resort. I have seen these parties coming out into the country from the resort day after day to purchase such fruit. Why do they do it? Because they think they can get fresher and better fruit. Herein lies the opportunity of the local grower. So long as he offers well-ripened, attractive fruit at a fair price his business will prosper. If he grows and offers especially fine fruit and sells with an effort to please, he will need to hire a traffic "cop" to keep the crowd in line. A successful roadside trade demands especial attention, but it eliminates cartage, freight and commission. Poor quality and indifferent handling of the fruit, or deception and dishonesty in any form, will soon injure the roadside market. One may never expect to see a passing customer again, but people gather together and discuss their bargains and experiences, and automobile parties may be easily discouraged from buying while en route.

I believe there are many favorable sites for small peach orchards in the eastern States where one may develop a profit-

able orchard of a few acres, the fruit from which could largely be sold in a local way. A small orchard isolated several miles back from a main highway might, however, become a liability instead of an asset.

In all of the old peach regions it should not be difficult to obtain information as to what exact sites and areas are especially favorable to peaches. There is no more important point than the right "spot" for the orchard. Once it is planted, you have made a decision as to local climate, exposure and soil which cannot be changed during its lifetime.

CULTIVATION.

Cultivation is one of the requirements of a successful peach orchard that must not be overlooked. Young peach trees grow rapidly under good cultivation, but stop culture only for one season and they make but little growth and soon appear yellow and weak.

Spraying, cultivation and fertilization are often neglected following a winter when the fruit buds are killed by extreme cold. Then is the time when they need culture as never before in order that they may overcome the effects of the freezing. If, in addition to lack of culture, the injured trees are left exposed to attacks of leaf curl and borers, the end is in sight.

Where temperatures of 10 to 15 degrees or more below zero are likely to prevail in winter, the cultivation should stop early, but it is, nevertheless, essential that cultivation be practiced. In some situations in northern districts only a portion of the land between the trees is cultivated. This may be entirely satisfactory, provided that sufficient growth and vigor result.

FERTILIZATION.

Peach trees that are weak in vigor cannot be depended upon for either good or consistent crops. Cultivation of some soils which have been put in a state of high fertility may promote a sufficient growth of the trees for several years without further stimulation, but under average conditions some fertilization will be required annually.

It has been clearly shown in recent years that nitrogen is more often the limiting factor with peaches than either potash

or phosphoric acid. Nitrogen has a marked effect upon the vegetative growth, which is one of the determining factors in size, color and quality of fruit. We must have a certain amount of growth and vigor to secure crops.

Peach trees can be overfertilized with nitrogen, however, as the summer of 1919 emphatically demonstrated. When it rains frequently during the summer, trees make a much more rapid growth than under normal conditions, even when the fertility of the soil is the same. Fruit upon rapidly growing trees with vigorous foliage is more susceptible to attack from brown rot than fruit upon slow or moderately growing trees. Fruit heavily shaded by foliage does not develop as firm a texture and the skin lacks the protective qualities of that on fruit which develops in sunlight.

By employing a quickly available source of nitrogen, such as nitrate of soda, one may control the growth of his trees somewhat according to the character of the season. A smaller amount than is believed necessary should be applied just as growth begins in early spring to make sure the trees have vigor enough to set the crop. If a wet season follows, no additional nitrogen may be necessary. If, on the other hand, the trees show a need for the nitrogen, an additional application can be made. The effects of an application of nitrate of soda will often be seen within ten days, or, at most, two weeks' time, unless the weather is very dry. I am unable to say just how late it would be safe to make a second application in New England if the trees needed it, but probably June 15 to 20 is within bounds.

PRUNING.

Pruning is a topic for discussion in itself and I shall only mention one fact which may be a bit less well known than some others. It is generally understood that dormant pruning invigorates a tree, and this, in general, is true. The character of the pruning, however, largely determines whether any resultant effect will be noted. A light thinning out of the branches, especially near the base of the tree, may result in but little or no increase in annual twig development, while the same amount of wood removed in a cutting back of the tips of branches will do so.

Trees weakened by production or from winter injuries will require cutting back as well as thinning out in order to secure the desired vigor.

SPRAYING.

The San José scale no longer causes peach growers any worry, which in some instances results in more cases of peach leaf curl because of the failure of the growers to apply a dormant spray. Leaf curl weakens the trees by reducing the foliage in early spring and in severe cases causes the loss of the crop. It is true the trees put out a second crop of leaves, but damage has been done. Thorough spraying with winter strength lime-sulfur in early spring before the buds start into growth will completely control the disease. If applied after the leaf buds show the least bit of green, however, your time and material may be wasted for the year, since the disease will probably have entered the leaves and will develop in spite of any spray.

Dusting peaches for the control of scab, curculio and brown rot in summer is becoming a frequent practice in New Jersey and districts south. A dust comprised of sulfur and arsenate of lead powder without lime was tried out upon peaches as early as 1914 in New Jersey and caused severe defoliation. Experiments the same year in which a mixture of sulfur, arsenate of lead and air-slaked lime were used showed no burning and gave good control of peach scab. A more extensive experiment in 1916 showed that a mixture of 65 pounds sulfur, 25 pounds hydrated lime and 10 pounds dry arsenate of lead was safe to use, and gave good control of peach scab. Since then mixtures of 70-20-10 and 80-10-10 have been used with good results in the control of scab and brown rot. During the past season I have heard of serious injuries to peaches south of New Jersey by applications of dust containing no lime, and of growers who made an application of arsenate of lead without lime with the idea of slightly burning the foliage to gain color. Any one who attempts either of the above is "playing with fire." If you use sulfur and dry arsenate of lead on peaches, do not fail to use at least 10 per cent of lime. It is better to be safe than sorry.

BROWN ROT.

A discussion upon spraying of the peach would not be complete without a word as to the serious outbreak of brown rot which occurred in eastern and southern peach regions during the summer of 1919.

An attack upon the blossoms was followed by an extended period of wet weather at ripening time, and some growers suffered heavy losses in decayed fruit, especially of such varieties as Champion. In looking for the cause of the great volume of infection, Dr. M. T. Cook, plant pathologist of New Jersey, found that the disease not only carried over from one season to the next on the dried mummied peaches but also in cankers on the new wood. These cankers continue to develop spores during the early part of the summer, and infect the fruits unless they are protected by spray. Thorough summer spraying therefore protects not only the ripening fruit but keeps down the number of cankers upon the branches.

While brown rot was very severe during 1919, it is doubtful whether weather conditions will prove as favorable for its development in 1920, and a normal, thorough summer spraying should hold it in check. The severe outbreak of brown rot in 1919 served to point out the weakness of some varieties of peaches that are striving for popular favor.

VARIETIES.

Only a very few varieties of all that are introduced are able to secure a place upon a list of the best five, and still fewer are able to hold such a place for many years. It is of interest to note that Oldmixon Free originated previous to 1800 and held high commercial rank for a hundred years. Heath Cling apparently originated before Oldmixon and is still planted in a very limited way, but has never become as popular.

Elberta, Carman and Greensborough are, therefore, all youngsters who were almost unknown twenty-five years ago. Their introduction was a distinct advance in hardiness, especially the latter two. In the last few years no introduction has been able to win a place from the leading sorts, yet we need better varieties than any we now have that ripen before Elberta.

The New Jersey Experiment Station has more than 2,000 seedlings from known parents that are of fruiting age, several hundred of which fruited in 1919. We hope that at least one of these will be able to advance the standard of present-day varieties.

Although my subject is modern developments in peach growing, I am going to wander a bit in closing in order to bring out some facts which should interest you.

I said earlier that in some sections there was likely to be a mad rush to plant peaches. Some of these will be small farm orchards, some moderate-sized commercial plantings and some of a syndicate nature. History certainly repeats itself in the peach business. Many orchards are never cultivated after they are planted and still others are abandoned after the second or third year. Some plant their whole farm to peaches at the very start and find the burden too heavy for the capital available before a profitable crop is secured and fall by the wayside. I would not advise any one to put all his eggs in one basket, and this is especially true of peaches in regions where severe winter temperatures may cause severe damage. It is a good plan to combine peach growing with the culture of other fruits and vegetables or other lines of farming. In fact, this is good advice for any one starting to grow any tree fruit.

Another point worthy of our attention at this time is that there are always seasons when competition is so great that low prices prevail. It is then that the man with favorable location, who can produce peaches at low cost, wins out.

There is a tendency to-day toward the formation of so-called orchard companies or syndicates, who plant out thousands of trees, and they not infrequently limit their efforts to the production of a single tree fruit, so that before the orchard comes into bearing they have a tremendous overhead expense. High salaries to managers and foremen are also common in such enterprises. And while it is true that you can buy tools, spraying materials and fruit packages cheaper in large lots, it becomes increasingly difficult as the size of the orchard is increased to obtain the best results in the form of fine fruit.

To my mind the best results in peach growing are obtained in the long run where one who knows and likes the business

can give it his individual attention, and who stays in the game through the ups and downs that are almost certain to occur. And those who have the welfare of fruit growing at heart like to see a large number of individual owners actually engaged in the growing of fruit.

Mr. BLAKE. Perhaps I could interest you more if we could have a discussion of any of the questions which may come to your mind. The peach-growing industry in New Jersey is one in which all phases bring questions forward, and the modern developments at the present time seem to me largely those of the question of getting started right and the details of carrying on the work. Sometimes I think a certain fact or a certain principle is new, comparatively new. Then I will run across some old report of a State horticultural society or an old garden magazine and find that some man fifty or sixty or one hundred years ago said the same thing, so it is hard to tell where the old leaves off and the new begins.

Mr. PARSONS. On the foliage spray, does it pay to put it on in the years when the buds are frozen?

Mr. BLAKE. Why, if you have an orchard in good condition, I think it would certainly pay to protect that against leaf curl, if you are likely to have leaf curl.

Mr. PARSONS. That would be the dormant spray?

Mr. BLAKE. That would be the dormant spray. In the summer time, if there was no crop, I do not think that would be necessary ordinarily. You could save that. But some culture and fertilization to keep up the vigor would be desirable.

A MEMBER. The brown rot is apt to affect the foliage, I understand; and what spray would you spray for that? We find the small twigs dead, caused by brown rot.

Mr. BLAKE. Yes. I think if your orchard is without a crop, I do not think it would be necessary to go through a thorough system of summer spraying. Now, I suppose that some of the plant pathologists and others would disagree with me there, — the idea is to spray and keep spraying, but we carried on an orchard in a commercial way in connection with our work, and I also looked at it from the economical and money side; and if I had an orchard, even in New Jersey, where the rot is un-

doubtedly more severe than here, — it is more severe as you go south, — I would spray it for curl and cultivate it so as to keep it in good vigor. But I would not do very much summer spraying. That is my personal opinion. I think I could save money there. I do not fear the brown rot so very much. I think with thorough spraying in the season in which the crop is produced you can hold it down, unless you have some variety like our old friend Triumph, when it is almost a race to see whether you can get to the station with it before it rots, but I think with ordinary varieties it would not be necessary to summer spray very much in the season when there was no crop.

A MEMBER. The dormant spray which controls the leaf curl, I presume that is also good to control brown rot on those cankers. Would it hold that in check, to some extent?

Mr. BLAKE. Well, not very much, in our experience. It was found this past summer that those cankers putting up growths kept producing spores, and the winter spraying will not prevent that. But without a crop in the trees, and in this section, I do not think it would be serious.

Mr. PARSONS. Does brown rot ever kill the Champion trees?

Mr. BLAKE. I do not think so. Champion is going out with us very fast, and we won't have any for it to kill there in a few years. It is so uncertain as a shipper, it rots so easily; and I will always remember the season of 1915, when I went into New York one morning with the market already heavily supplied with yellow peaches and saw 16 carloads from West Virginia, where they had cold weather, and they were all clingstone. That 16 carloads of Champion broke the camel's back. That is, it was a lot of clingstones in there that were rotting, and it hurt the market.

Mr. PARSONS. Have you found anything to take the place of the Elberta peach?

Mr. BLAKE. No, and I do not think we will for a few years. I think very few of the fruit growers realize that in the Elberta peach you have a commercial variety that has a record that no other commercial variety tree fruit can match. It is either the first or second variety of importance from Connecticut to

Georgia, and east and west to California. It has a great range of adaptability, and the ability to come across better than any other commercial variety we have. Now, we are using Elberta in our crossing in New Jersey, to obtain new varieties, but I think it will be some time before we get varieties that will exceed that one in all its qualities. We have some of our most interesting seedlings that are crosses between either the Belle and Elberta and some other variety.

Dr. FOWLER. What is the best spray for brown rot, and how often do you use it? I have a small orchard, and it was nearly killed by brown rot last year.

Mr. BLAKE. In my experience, thorough spraying with any of the good summer sprays is the best recommendation to make. We find self-boiled lime-sulfur a little bit the most effective spray; but last summer our growers who dusted several times late in the season after that wet period got very good results; and some of our growers used the commercial mixture known as "atomic sulfur." I believe either of those materials applied thoroughly and at frequent intervals will hold it in check. Of course, this thing was true: some growers two years ago did not pick their orchards clean at ripening time, and they left some peaches on to get very ripe for the local trade, and those orchards gave the most trouble from brown rot last year. The orchards that were picked promptly and clean did not suffer as severely as the others, but I think it is in the thoroughness of the spray and increasing the number of sprays in a bad season that are the most important points in controlling the rot.

Dr. FOWLER. What is the name of the last spray?

Mr. BLAKE. Atomic sulfur is a commercial material that many of our growers use.

Mr. PARSONS. How many sprays would you recommend?

Mr. BLAKE. Well, with us we would use three or four summer sprays in a wet season like the last one, and I think some of the men put on more, but we have a fairly long season, and we have peach scab to contend with in southern New Jersey every year. That is a disease that causes little black spots to come on the fruit. We have that every year, and what our growers did last season was to apply an extra spray. We had that rainy weather after a period when we would ordinarily

stop. They dusted and sprayed again. The men that did that saved the crop. The ones that did not suffered severely from rot. We did the same thing with apples. The growers who put on a late spray on the apples in August, which they ordinarily do not apply, had fruit free from the sooty blotch and fungus. In other words, the spray schedule that any section might have should be a basis for guidance. That is all. You have to vary that somewhat according to the season, and our growers put on an extra spray.

Mr. DONALD MACRAE. Have you seen any orchards that have entirely controlled the different fungi and insects by the dusting method? In Massachusetts this last year, — what I mean to say, been controlled entirely without any wet spray? What has been the result?

Mr. BLAKE. The question is, whether dusting will control all of the insects and diseases? No, I do not think so. I think we have to depend upon our wet spray in the winter leaf curl. Personally, where the rot is serious and where we have peach scab as serious as we had in southern New Jersey and south, I think a wet spray, just as the fruit sets, before the shooks are off, is a good thing too. Then, I think you can dust with good results. Most of our growers thus far have put on one or two winter sprays and have then dusted, but I do not believe that you can depend upon dusting to control leaf curl.

Mr. VAN METER. What are your best controllers for curculio?

Mr. BLAKE. What are our best measures for control of curculio? First, a little as to our experience with curculio. We find that orchards that are surrounded by grass lands give us more trouble for curculio than where they are surrounded by cultivated area.

It is a common statement that curculio is more prevalent where orchards adjoin woodlands, and that is true to some extent, but they seem to be able to harbor very well in grass land.

In the second place, we believe that thorough summer spraying just at the time the fruit is setting and about ten days to two weeks after is the most effective means to control curculio with us.

Now, some of your station publications and schedules are a little weak on one point. They say, "Spray when the shooks are slipping, or when the shooks are well off," and until about two or three years ago our growers were about two or three days late on that spray.

With us, the curculio begins to attack the fruit just as soon as the calyx has slipped away from the stem. If it is only one-eighth of an inch, then the curculio starts in, and if you examine those peaches carefully, you can find the punctures and the egg laid, so we believe you must start just as soon as the calyx commences to slip. If you wait until half of them are off, a lot of curculio damage will have been done.

In our experience, the curculio question is not serious when you have a very heavy set of fruit. They take off 20 per cent. There is plenty left. It is serious when you have just enough to make a crop. Then you can't afford to give any away. Then it is important to put on that spray early enough.

The curculio last year got fooled somehow with the weather. It did not show up with us until the peaches were three-quarters of an inch in diameter, so we had very little dropping of the fruit as the result. But that is an exception to the rule.

Mr. ROACH. What winters, in your experience, would you say would be the most detrimental or the most favorable to the perpetuation of brown rot?

Mr. BLAKE. What kind of winter? The question is, what kind of winter would be the most favorable or detrimental to brown rot? I do not believe the winter would make very much difference. I believe the disease is able to stand cold as well as heat, but I doubt whether the winter would have very much effect. These cankers will produce spores the next spring if the weather is favorable. They will continue to produce them during the spring and summer, so it is summer spraying you must depend upon to hold it in check.

Mr. CHESSMAN. After a good winter freeze, I would like to ask a question as to whether you would advise light or moderate or severe pruning.

Mr. BLAKE. In my experience, that would depend on the age and condition of the tree. If the injury were slight and I

had two and three year old trees in good form, I would prune them about the same as I always would. If they were older, I would cut them back fairly well. If they were very much weakened in vigor and nearing the end of their bearing age, I would cut them back severely.

Mr. MAYO. I would like to ask what your idea is in putting in a new orchard where you have an old one.

Mr. BLAKE. Would you plant a new orchard on the site of an old one?

Mr. MAYO. Yes.

Mr. BLAKE. I would rather not do it for one or two years. I think it would pay to put that land to some other crop for a year or two and get it back into uniform shape. After the trees are planted, it is not as easy to improve the soil. However, it might be possible, if the land was in a high state of cultivation, to grow an orchard there immediately after one has been taken out, but I think it would be best to rotate it for a year or two.

Mr. KNOWLES. You spoke of dormant pruning giving vigor to the tree. Now, up in New England here so much of a peach tree will winterkill that we do not know which is going to live and which is going to die. We hardly know which branch is going to bear and which branch isn't going to bear until towards spring, and sometimes we are compelled to wait to ascertain those facts before we can do any pruning at all, or we may simply cut off the branches that are going to live and leave those that are going to die, or cut off the branches that are going to bear and leave those that are not going to bear, in dormant pruning.

Mr. BLAKE. Well, when you have winter injuries late in the season, it does disarrange your program some. You do not know in November or December what you are going to have left in March or April, and sometimes it is necessary to prune rather late in the spring. But by late winter and early spring, you should know something about what your trees are likely to do.

Mr. CAMPBELL. If a person has a roadside stand, what would you recommend planting to come in between main varieties of the Greensborough, Carman, Belle and Elberta?

MR. BLAKE. Varieties coming in between Greensborough and Belle?

MR. CAMPBELL. Between Greensborough, Carman and Elberta and Belle in the time those peaches are not in the market and you have a roadside market and want to continue.

MR. BLAKE. The question is, a man has a roadside stand, what varieties should he grow to fill in between Greensborough, Carman, Belle and Elberta?

Now, I haven't studied the roadside situation in New England. I do not pretend to know it as intimately as I do in New Jersey; for roadside stands our people start with Greensborough. Usually the next variety is Carman. Some follow that with Lola, which is practically a freestone Carman, ripening about a week later. Then the next most common variety is the Hiley. We find that variety has to receive special attention in pruning, after the first three or four years, if we want good size. It needs to be pruned back harder than some of the others; otherwise, the fruit runs a little small.

Then our people still have the Champion, but it is growing less popular every day because of its susceptibility to rot, and more of them are growing Belle and Elberta. With us, the Arp and Rochester have not been satisfactory. So that we still stand upon those older varieties.

Of course, you can vary the ripening of any variety a week by your method of culture. For example, Elberta upon light, sandy soil, not heavily fertilized, will ripen a week earlier than Elberta that is well fertilized, so that you can extend the ripening of a variety a little by the way you handle it, and the few varieties mentioned would practically cover the season as we have it now.

MR. PACKARD. I would like to ask in regard to spraying at the time of blossoming. I ask this question because in our section in Plymouth County they are now considering the killing of the bees, — as the bees are looking after their honey at that time, — as the spraying, the poisonous substance used, is killing off the bees.

MR. BLAKE. The question is as to my opinion of spraying the peach while in full bloom. I do not think it is desirable, and I do not think it is of any use. I heard it suggested at a

meeting two weeks ago that it would help to control blossom blight caused by the brown rot in early spring, but I do not believe it would help at all. It won't help in the control of curculio, and if it doesn't help in the case of brown rot, why do it? No, I can't see any advantage in spraying at full bloom, and I wouldn't advise it.

Chairman MUNSON. We generally go to New York State to get an authority on apple-grading laws. We have done it in this case, and the subject is a very important one to Massachusetts growers, and I thought we ought to have some one here who had had a little experience in demonstrating apple-grading laws, so we have Mr. B. D. Van Buren, assistant director, Bureau of Plant Industry, Department of Agriculture of New York, to discuss this important subject with us.

Mr. VAN BUREN. Just before I start my paper, I would like to say a word in regard to the question of pruning, which was raised in Mr. Blake's talk. I think that where you have peach trees eight to twelve years old, which have been very badly injured by the winters, — I believe that severe pruning would seriously injure the tree and might kill it, and that really moderately heavy pruning would give better results than the severe pruning along dehorning lines.

Mr. BLAKE. I tried to make it clear that we did not believe in dehorning trees in good bearing condition, and that we did not alter our pruning very much on young trees, but when an orchard gets to the point that it is very, very weak, and is about ready to go out, our idea is if it isn't pruned back, you might as well pull it out, whether it is winter injured or not, but that would mean orchards that are about ten years old. On those orchards you would either try to renew them or take them out if they were severely injured.

Mr. VAN BUREN. If they were severely winter injured, and I calculated to pull through, instead of giving severe pruning, give them a moderately heavy pruning and give moderate thinning out.

Mr. BLAKE. It is one of the points that might interest you. We believe it is a mistake to let an orchard go in pruning until about the tenth, or any renewal pruning until about the tenth year, so that if you want to renew it you have to dehorn it.

The suggestion is that the part be pruned out in the center, so that the year before you would cut back severely, you would get a lot of new suckers and new growth inside, and then by cutting back you have a new top without heavy pruning. I did not intend to convey the idea that we would approve of heavy dehorning of orchards of trees that were in good condition, — six or seven years of age, — but only after they were very, very weak and ready to go out.

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APPLE GRADING LAWS

B. D. VAN BUREN



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APPLE GRADING LAWS.

B. D. VAN BUREN, ASSISTANT DIRECTOR, BUREAU OF PLANT INDUSTRY,
DEPARTMENT OF AGRICULTURE, ALBANY, NEW YORK.

WHY AN APPLE GRADING LAW?

Because all commodities that are in general trade are handled to a much better advantage in a large way if standardized, and such standardization cannot be generally obtained in food products except by some compulsory standard defined by law and some body with authorized power to enforce such standardization.

The apple trade of many of the States is now one of the large items of their agricultural income.

The United States total apple production in 1918-19 was as follows: in 1919, 49,152,000 barrels valued at \$275,463,000; in 1918, 56,697,000 barrels valued at \$225,562,000; approximately 7,535,000 barrels less in 1919, valued at \$25,000,000 more.

The commercial crop was estimated as follows: in 1919, 26,174,000 barrels valued at \$154,950,000; in 1918, 24,743,000 barrels valued at \$126,684,000.

The difference between the commercial and total crop as given by government statistics would indicate that 23,000,000 barrels of apples in the United States have been used for home consumption or sold locally or used in by-products. It is estimated that 9,830,000 barrels have gone into by-products, principally cider, vinegar and dried apples.

We, apple growers of the barreled apple States, are face to face with a keen competition, which is cutting into *our* markets for our best grades of apples to such an extent that we must wake up and that quickly.

I refer to the western box apple trade, — one of the great reasons why we should have an apple grading law. Western

box apples are standardized to such a degree that, opened top, side or bottom, what you see represents the entire contents of the package. How about the barrel that was packed before any apple grading law was enacted? Could you tell from looking at the top or bottom what was contained therein except apples? How about the barrel that is now packed under the present apple grading laws of the various States? Better? Yes. Possibly you do not all agree with me, but handlers, commission merchants, retailers and all that I have talked with agree that it is much better than a few years ago. But all agree that there is yet room for much improvement, and if you growers will go down with me to the wholesale markets and compare the average box with the average barrel of apples found there and being offered for sale, you could not help coming away with a feeling of discouragement and even disgust with the poor showing that many of our eastern barreled apples are making compared to the western box apple.

Relative to western box apple competition I would like to submit the following data relative to New York City markets, and I believe that to some extent at least the same general condition exists here in Boston:—

From August 1 to December 31, 1919, there were received in New York City 5,578 cars of apples of which 2,973 carloads were barreled apples, 1,791 of which originated in New York State, and 2,605 cars were box apples from the western box States.

During the same time, in 1918, there were received in New York City a total of 6,056 cars of apples of which 4,701 carloads were barreled apples, 2,788 of which originated in New York State, and 1,355 cars were box apples.

During the whole season of 1918-19 there were received in New York City a total of 10,627 cars of apples of which 7,772 cars were barreled apples, of which 5,201 came from New York State, that is two-thirds of the barreled apples sold in New York City, season of 1918-19, came from New York State, and during the same season there were received 2,855 cars of box apples.

The car lots of barreled apples received in New York City, season of 1919-20, up to December 31, 1919, originated as follows:—

West Virginia,	131	New Hampshire,	8
Delaware,	37	Connecticut,	12
Nebraska,	1	New York,	1,783
Massachusetts,	180	Pennsylvania,	27
Arkansas,	5	Maryland,	46
Nova Scotia,	9	New Jersey,	232
Missouri,	3	Wisconsin,	2
Unknown,	2	Indiana,	1
Virginia,	263	Vermont,	95
Rhode Island,	3	Illinois,	1
Maine,	121		
Long Island,	8	Total,	2,973
Michigan,	3		

Many of our apple grading laws are not drastic enough. They go only part way, and the reason why they have gone only part way is largely because of the opposition of growers who yet believe that they have the right to put over a raw deal upon the consumer.

I can talk a little stronger here, possibly, than I would dare to do in New York State. You have a better law here than we have, and I might say that in New York City it has been recognized, during the past few months, that Massachusetts A grade usually stands for good packs and some of the best Baldwins on the New York City market have been Massachusetts Baldwins. But some growers want to put in as many poor apples as possible. Then the person who buys the barrel, which opens up beautifully at the face end, and maybe is good to look upon at the press end, while two-thirds of the apples in the barrel are so much poorer than the face end, feels sore. Even if he bought them at cider apple prices, he, at heart, feels he has been stung.

Trade in a commodity is bound to lag if there is no standardized grade and one does not know what he is buying until he sees the pack.

A STATE OR NATIONAL APPLE GRADING LAW?

I believe, and many growers and dealers in New York are of similar belief, that we should have a national apple grading law, supplemented by State laws similar in nature, and eventually we will all have to come to this view. Some, at least,

of the best authorities on agricultural law and interstate trade feel that we, in New York, are treading on dangerous ground when we insist that apples grown and packed in New York State, or any State, must be branded and packed in accordance with the State apple grading law, when, as a matter of fact, the goods are for export to other States or foreign countries. Good lawyers doubt if the law will hold water when the apples are going outside the State in so-called interstate trade. A Federal law would obviate all doubt upon the subject, and we would be able to catch easily the fellow who now ships out "unclassified" and after getting them outside the State shaves off the "unclassified" and labels them "A Grade," or else ships out cartons unmarked as to grade and so poor as to be unclassified and marks them a standard grade after getting them outside of the State. I think you, in Massachusetts, have the same difficulty but to a smaller degree than we in New York. We feel the need of such a Federal law and will give such a law our hearty support. About the only opposition will be from those that want no apple grading law of any kind. Optional laws have been tried out, both Federal and State, and from their influence upon the trade are not worth the time it takes to pass them or the paper they are printed upon.

SOME ESSENTIALS OF ANY GOOD APPLE GRADING LAW.

The face must be a true representation of the contents of the package. We have got to come to it in New York State. All of the barreled apple States have got to come to it. Uniformity of grade — you see top, you see all — sells western box apples, sold Hales' Georgia peaches, and will sell barreled apples from barreled apple States. Buyers have reached the point of no patience with the snide pack, package or packer.

Canada had to require that the face should truly represent the pack.

The West Virginia law states, "the facing shall fairly represent the contents as to size, color and quality."

Delaware has gone further and requires that the face "shall be truly representative of the size, color and quality of the apples in the package."

Pennsylvania requires that "face or exposed surface shall

fairly represent the average of the apples in the package," and goes on to state that "it shall be considered a fair representation if the face does not excel the average of the apples in the package by more than 15 per centum in the matter of size and freedom from defects." But the Pennsylvania law establishes no grades.

Maine states, "the pack should be uniform throughout except in barrels, the facing should be made of apples of uniform size, color and shape. The apples used in facing should be a part of the grade in the package; they should not be taken from a higher grade." "Should be" is not a term positive enough to put in any apple grading law.

The Vermont law not being compulsory, it is probable that most of the apples packed in Vermont which have complied with the law as to packing and branding, have been so packed because these grades were generally recognized in the markets of the east where their fruit is marketed.

Massachusetts requires that the packages shall not be overfaced.

The tolerance allowance for standard grades should be small, and the poor, indefinable term, now used in many of the laws "practically free," should be defined in the laws to read: "Practically free means free from all defects except for tolerance allowance." Such terms as "should be," "fairly represent," "materially deform or discolor," etc., are too indefinite and make the prosecution of violations difficult.

The following barreled apple States have apple grading laws: Maine, New Hampshire, Connecticut, Massachusetts, Vermont, Delaware, New York, West Virginia, Michigan, Pennsylvania, and possibly one or two other States.

Provisions for Educational Work among Growers and Packers.
— Certainly an attempt should be made through Farm Bureau organizations and local fruit growers' associations to fully inform growers and dealers as to the requirements of the law and how they can best obey its mandates. The requirements must not be so high that it is impossible to obey them if reasonable care is taken, and should not greatly hinder the speed of packing operations.

HOW ENFORCED.

And, lastly, it must have teeth. A compulsory law will soon fall into disuse and disfavor if adequate penalties are not provided and action is not brought against violators promptly and carried through to completion.

Under our New York law it seems almost impossible for us to get prompt action. By that I mean it is impossible to get the defendant into court before several months or a year after the violation. I know that the effect would be much better if we could reduce the time to ten days or two weeks. However, even with this delay and a comparatively few men inspecting for the enforcement of the law, a great change has been made.

In looking over the New York markets to-day we find but few shipments in which the packer has not tried to obey the law. This is also true in shipments from those other States that have compulsory grading laws.

In New York we employ from four to twelve men from September to May on this work, largely making the inspections at shipping points, storage houses and the large city markets. From two to four men are kept busy in New York City, and the fruit is largely inspected there when unloaded from car to boat. This is comparatively easy as 95 per cent or more of the New York apples going to New York City arrive there at two railroad stations and three Hudson River steamboat docks; probably two-thirds of the New York apples that go to New York City are unloaded at Pier 17, North River.

This year up to January 15, 2,300 inspections have been made, 40 cases have been referred as violations, and 213 people have violated the law in some minor manner, which has been taken up with the violator by correspondence.

I have spoken of western box apple competition, and you should realize that this year in particular it has made great inroads upon the barreled apple trade. As seen on our markets, they excel our apples in color, finish and uniformity of both size and grade in the package. Those are their selling points.

Eastern barreled apples have a reputation for better flavor, texture and keeping quality than the western boxed fruit. Is there any reason why we cannot equal the West on uniformity

of size and grade, and then put our flavor, texture and keeping quality against their color and finish? And with our best colored varieties we can come pretty close on the color and finish proposition. So close, indeed, that if we, in other respects, equal them, we shall find our apples retaining their part of the best dessert trade, which, as a matter of fact, is to-day drifting rapidly to the box. It costs now \$2.30 in freight and tax to bring a barrel of box apples to our eastern markets. This will certainly be a great handicap in years of plenty and low prices.

When we have packed and have on sale apples described above, we can go into the advertising game in a State-wide way and not before.

Mr. HOUSTON. I live in New York. I would like to know what becomes of the good apples in New York State or anywhere else. I belong to eight or ten horticultural societies, and I have been chasing good local-grown apples all the way from Kansas and Minnesota down to here for the last sixteen years, and I have attended most of the horticultural meetings in the Central West and the Eastern States, and I have always made it a practice to go around town and see if I could find a respectable apple, a sound, local-grown apple in the town, and the only town east of the Rocky Mountains in which I have ever found a local-grown, — by that I mean grown in the same State where the town is, — the only town I ever found a respectable local-grown apple in is the little village of Dover in Delaware. There they were just the Delaware apples, good, nice and sound apples grown in Delaware, at retail; and I have been over to Rochester a good deal. I have never been able to find a good local-grown apple in Rochester. They are always hollering there about the apple market being good. It is the same way in Maine when I go there. I can't find anything but culls; I never saw anything but culls around this town of local-grown apples. There may be some. I wish, Mr. Van Buren, some time you would come to Washington Heights and see if you cannot find a respectable New York apple in the four or five miles of local markets that are run by the Italians and the Greeks up there. I fail to find it.

You see barreled apples sometimes, but you dig into those

apples and there isn't a sound apple in the whole barrel. I don't know whether they sell the face of the apples separately or not, but what is the result on the retail trade? Why, they don't buy any apples. That is all there is to it. I was raised on a New England farm where we had apples fit to eat. What is the final result of the operation? We all buy citrous fruit. Simply got to buy it. Simply got to buy it in New York City to get any fruit fit to eat, unless you buy western boxed apples, and you may consider western boxed apples cost you 10 cents apiece. I can get three very good grape fruit for a quarter. What do I buy? I buy the grape fruit, of course, as everybody else has to do. It seems to me the apple grading law is good, and it rather arouses interest in seeing if anything can be done to get into the market a respectable local apple where the people that live in the State can get some of the apples that grow in that State and get them in good condition. I wish somebody would get busy about it.

Mr. VAN BUREN. Well, the gentleman certainly brings a point out about the city of Rochester. I am quite well acquainted with it. The good apples they ship away, and they sell the culls there. That is just about the size of it. You can't find in a fruit store good local-grown apples. Rochester has got one large grower. Syracuse has got one large grower.

There are several stores there that handle Hitchings apples, which are brought in there by crates and in crates and sold there, local-grown apples, but a lot of us really get away from that local market, particularly here in New England. Isn't it so? And in, possibly, your State they get away from that good local market that we have right at our doors, — people that would like to buy good apples and pay good prices for them.

Now, there are a lot of good barreled apples grown in about New York City. I do not know who buys them. I do not know to whom they go. It is a mighty big place. At the same time, the proportion of good apples may be very small to the total proportion of poor ones, but this buyer for Butler's stores, — of course, they are grocery stores and supply the general housewife, — he said, "why, we buy Baldwins and Greenings, almost exclusively." By the way, if you here in New England are going to grow apples for the New York

market, I would ask you to keep an eye on Rhode Island Greenings. There isn't an apple selling better in New York City than Rhode Island Greenings. It pretty nearly tops the market.

One thing you can get good money for is good Northern Spy and McIntosh. They wanted good apples. He said they very rarely bought anything below A grade. He said, "We have bought some marks of B grade, when the mark was exceptionally good and was a good pack." But who handles those good barreled apples, I don't know. I do not know where they go to. If we are going to get that trade, we have got to put our apples up better. There is no question about it, or else a large part of our eastern barreled trade goes for pies and bakers' stuff and for household use.

And certainly they can't grow anything in the West which can exceed, and I think will hardly equal, our best Spies or McIntosh, or some of our better varieties.

In fact, I do not know anything they can grow in the West which is any better than a well-grown, well-colored Baldwin, which isn't too ripe, from Hudson valley or East. I tell you, the Baldwin is pretty good dessert fruit if it is properly grown, and it is a good cooking apple, besides.

Dr. TWITCHELL. Recognizing, as we all do with our interest in growing apples, the need of stringent legislation, it seems to me that we never will get results satisfactorily until we get back to some of the underlying facts or principles.

Enforcement of any law is always dominated by public opinion, and public opinion is simply the opinion of the individual in the aggregate. Therefore, we must deal with individuals if we are going to secure the public opinion necessary to insure the enforcement of any law which has teeth in it. The need of law is necessary. It seems to me that there was necessary more thorough work by the inspectors, more general work along educative lines.

I know that our Commissioner has recognized that fact, but hasn't had the appropriation necessary to do the work which he wanted to do. That is, we must secure, if possible, funds by which and through which men may train men, and they may be sent into all the sections during the apple packing

time, there to work with the packers. There, I believe, is where we must do more missionary work than we have done in the past, and that it may lead up to more uniform packing.

I have in mind one buyer who has had twenty-six to thirty men in my State during the past season, the past year, and he sent out good men, faithful men, to pack, but there must have been an inevitable variation in the standards of packing by the different men in charge of the group; and I think our inspectors at the cars should be more careful, because the cars are loaded from half a dozen or more orchards, and only one or two barrels opened for inspection, and no idea of the actual condition of the car.

It seems to me we ought to get back to the primitive work, if you may call it so, educative work in packing sheds at the time of packing the apples that the owners and growers may receive the benefit of training as well as the packer and avoid the friction which grows out of any drastic enforcement of stringent legislation.

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WINTER INJURY TO FRUIT TREES

W. H. CHANDLER



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WINTER INJURY TO FRUIT TREES.

PROFESSOR W. H. CHANDLER, POMOLOGIST, NEW YORK STATE COLLEGE OF
AGRICULTURE, ITHACA, NEW YORK.

In preparing this paper I am assuming that the growers are interested primarily in the losses due to the killing of the wood of the trees during such winters as that of 1917-18. So while the killing of buds or blossoms is more common, particularly in case of peaches, cherries, some of the plums and apricots, I shall confine myself largely to killing of the wood.

Before describing the injuries that were to be observed following the winter of 1917-18, it seems well to review briefly the knowledge gained before that time through experimental studies as to how plant tissues are killed by low temperature. Some of the things that we knew were, first, that, unlike animals, plants possess no ability to maintain a temperature above that of the air, that is, the temperature of the wood or buds of the tree follows very closely that of the air temperature. There are a few exceptions to this rule. Thus, in the case of the trunks of very large trees, on account of the slowness with which the heat is conducted through the tissues, the temperature may remain several degrees above the air temperature. This may be of considerable importance; thus it is well known that the lowest temperature is likely to be just before sunrise. The temperatures then begin to rise somewhat rapidly. If at that time the temperature of the tree trunk should be several degrees above the air temperature, it may thus be saved from reaching a killing temperature. Small tree trunks on this account may sometimes reach temperatures lower than the large ones and may therefore be killed when the larger trunk, whose tissues are no more resistant, may survive.

The plant tissue may have a temperature different from the air temperature when the sun is shining brightly because the dark color of the tissue absorbs the sunlight. We have thus known the trunk of a tree on the side next to the sun to show a temperature of more than 20 degrees above that of the other side, and the dark twigs may on this account show a temperature of 15 or 20 degrees above the air temperature. When the sun is not shining, however, we are generally safe in assuming that the tree tissue, except in case of very large trunks, is at a temperature very near to that of the air. At a few degrees below the freezing point, therefore, we will generally find ice throughout the tissue.

We also knew that in some way this ice formation is associated with the killing of the tissue; at least, tissues that kill at rather high temperature will not be killed unless ice is formed. Thus it is known that water may reach a temperature several degrees below freezing without ice formation. The juices in the plant may sometimes do the same thing. If, when the plant tissue is thus supercooled, it can be warmed back up to above the freezing point without ice formation, no injury results, even when the temperature to which it had fallen was low enough to kill it if ice had formed. This, of course, does not mean that ice formation always kills. More of the water must be in the form of ice to kill some plants than others. In case of the wood of our trees, nearly all the water is frozen out before killing takes place. We, of course, do not know whether the killing results from the taking of the water away from the protoplasm in ice formation or whether it is the extent of the ice mass crushing or otherwise injuring the protoplasm.

It has often been said that if the tissue thaws slowly it may be uninjured, when it might be killed by rapid thawing. This is true in the case of ripe apples and pears, provided the temperature has not been too low. With these fruits in storage, if it becomes cold enough to kill them partially, the injury may sometimes be avoided by keeping them where they will thaw very slowly. This does not seem to be true of any other tissues; thus, in case of the wood of our trees and certainly in

the buds of our peaches, if they reach a given temperature, they kill regardless of how they thaw.

The rate at which the temperature falls, however, has much to do with the amount of killing; thus I have been able to kill peach buds at a temperature above zero F. by freezing them very rapidly, and I have been able to kill the tissues of fruit trees in winter at a temperature but 7 degrees below freezing, when with slow freezing they would have stood very much lower temperature. This is of practical importance in several ways. Thus, generally, peach buds will be killed at a temperature of 12 to 15 degrees below zero, if the temperature fall is rather rapid, let us say if the buds have been thawed within twenty-four to forty-eight hours of the time they reach this temperature. A few winters I have had occasion to observe the killing of peach buds when the killing temperature came at the end of a long, cold period. While there had been fluctuations in the temperature, the fall had in reality been rather gradual. On such occasions I have known a considerable crop of peaches to be borne on a summer following a temperature of -24 degrees F. The greater injury following rapid temperature fall is also to be observed in case of sun scald. It is not uncommon to see the southwest side of the tree killed. From our studies the explanation of this killing seems to be that on a clear day in winter the temperature on the southwest side may be high enough to thaw the tissue even when the air temperature is nearly zero. As soon as the direct sunlight goes off of that tissue it drops almost instantly to that of the other side of the tree. Then, if the night following is very cold, it is more liable to be killed than if the temperature fall had been more gradual.

The killing seems to occur on a single cold night rather than as the result of long-continued freezing. This is known to be true in case of buds, for we can thaw them and examine them the next day and find them dead. In case of the wood, if we freeze it artificially, we find that it is killed by temperatures about the same as those reached on the extremely cold nights. This may explain why trees are often killed worse in one little section than in another that seems to have about the

same temperature. Thus, during the winter of 1917-18, there was much less injury toward the western end of Lake Ontario than in the counties farther east, but still on the lake that should have the same lake protection. Probably, except for the cold night of December 30, the temperatures ran about the same, but on that night there was a cloud hanging over the western end of the lake and the temperature did not go nearly so low. It seems probable, then, that it was on that night that the killing was done farther east.

Of course, in case of wood, the amount of injury suffered at any temperature is influenced much more largely by the ripeness of the wood than by anything else. This does not mean that the weakest trees that cease growing earlier are necessarily the ones that suffer the least injury. We shall see from experience in 1917-18 that proper maturity depends upon the presence of a large healthy leaf surface. Then, too, the recovery of the tree does not depend entirely upon the amount of tissue killed. Thus, if two trees of unequal vigor have an equal proportion of their wood killed, the more vigorous tree will generally make the better recovery.

During the summer of 1918 I had an opportunity to study the effects of the preceding severe winter in nearly all sections of New York and in some sections of Canada, Vermont, Massachusetts and Indiana. There were many different kinds of injury to be observed, and it seems wise to describe some of the more general ones.

If a bearing tree were injured but little, what injury there was would generally show by the browning in the sapwood of the spurs. If the injury were greater, this browning was likely to be found in the sapwood in any portion of the tree above the snow line. In the case of Baldwin and Greening, there was often browning in the twigs when the amount of injury back in the branches was not great enough to cause serious harm. On the other hand, with Ben Davis there was often very little browning in the twigs and very much near the base of the branches. When the browning was in the twigs and smaller portion of the branches, the growth in the following spring was very weak, the leaves being much smaller than normal. On the other hand, when the twigs were but slightly injured and the

browning was severe toward the base of the branches, as in the case of Ben Davis, the early summer growth would often be nearly normal, but as hotter weather approached the leaves would suddenly wilt. Of course it is well known that the water moves up to the leaves through the sapwood. Naturally, if the sapwood were largely killed, the movement of water would be interfered with. In the case of Ben Davis, it seems that in early spring, before the weather was hot enough to cause great loss of water from the leaves, they could secure a sufficient amount through the injured sapwood, but, when the evaporation became greater, they naturally wilted. In the case of Baldwin and Greening and some other varieties, where conditions were favorable there was marked improvement during the summer and particularly during the summer of 1919. This was to be expected, since the cambium was not killed and a new layer of sapwood was soon formed. Where the soil has been kept in good condition, the tendency has been for the recovery to be more rapid toward the base of the branches, so there are very many water sprouts formed. The recovery from this sapwood injury has been much better where the nitrogen supply was abundant; thus, in case of some peach trees in our own orchard, trees fertilized in the spring of 1918 with about 3 pounds of nitrate of soda to a mature peach tree recovered very much better than alternate trees not so fertilized. It is now known that when plowing is delayed until late in the season the nitrogen supply in the soil is very much reduced. Our apple orchard at Ithaca was plowed in the fall of 1917 and again in the fall of 1918, so there should have been a maximum of nitrates in the soil during early summer when growth is most rapid in case of both seasons. In addition to this, we applied 3 pounds of nitrate of soda to the tree early in the spring of 1918 and 4 pounds early in the spring of 1919. We had careful records as to the amount of winter injury suffered by each tree as indicated by the growth at the beginning of 1918. Every one of our Baldwin, Greening and Tompkins King trees started with a very weak growth, yet now they have reached a normal state of vigor and have practically recovered in so far as sapwood injury is concerned. Many orchards out in the State, where the injury as indicated by the

growth at the beginning of the season of 1918 was less than that in our orchard, have not shown anything like such good recovery. In all cases these orchards were not plowed during the summer of 1918 or the plowing was delayed until June. The only orchards, except very young ones, that have shown marked recovery were either plowed in the fall of 1917 or in the very early spring of 1918. Severe pruning of such trees by reducing the initial summer leaf surface should tend to hasten the recovery of the trees, but whether it actually has such an effect or not we cannot say with reference to any fruit except the peach. In case of that fruit, in some years rather severe pruning has seemed to favor better recovery, but in other years it has resulted in the death of the tree. So far as I have observed no harm has ever come from light pruning, such as would be given the trees in an average year, but very severe pruning (dehorning) in spite of its apparent benefits in some years is to be avoided.

The bark is generally more resistant to low temperature than the sapwood; however, bark killing was often found following this severe winter. It is found most commonly at the base of the trunk or at the base of the branches on the inner side. It seems that the bark ripens more slowly in early winter at these points. The injury on the trunk is serious only when it is large enough to go, let us say, one-third of the way around the tree. That at the base of the branches is the more serious because it heals so slowly. Young Northern Spy trees are particularly susceptible to this branch injury, though any trees that grow so upright that the secondary growth is largely on the other side of the branches are susceptible. It seems probable that the reason for the killing is the same as for the slow healing, that is, the slow movement of the material from the leaves, there being fewer leaves on that side of the branch. In fact, I have had a chance to observe Ben Davis and Northwestern trees where the branches had been so caused to droop by the crops borne that the secondary branches were only on the upper side. In that case the bark injury was on the under side of the branch at the base, thus the injury always seems to be greatest on the opposite side of the branch from that containing the most foliage. It is often recommended that this dead bark

be removed very early in order to avoid the danger from heart rot fungus. It should be remembered, however, that the cambium is even more resistant than the bark and may remain alive when both bark and sapwood have been badly killed. In that case a new layer of bark will be formed under this old dead bark if it is not removed. If it is removed, the cambium is likely to be dried out and to die. In our observation in a large percentage of cases the cambium was alive and new bark did form if the old bark was not removed. In practically all cases the cambium was alive at least around the edges of the wound under the dead bark, so leaving the dead bark in practically all cases markedly reduced the size of the wound. When it is considered how slowly these wounds heal and how important it is for the strength of the branch that they be healed, the benefit from leaving this old bark for one summer will be appreciated. It would seem best, then, to delay removing this old bark until the second summer after the trees have been injured, and if there is an area left where the sapwood is exposed to paint that. It seems best, also, to do the same with the dead bark on the trunk.

So far as sapwood killing or complete killing was concerned the most tender variety of apples was the Baldwin. Tompkins King, Rhode Island Greening, Gravenstein, bearing Hubbardston, Stayman Winesap and Esopus were nearly as tender. Ben Davis was more resistant, but it suffered great injury. No injury was found in New York State to either McIntosh or Oldenburg, and Delicious seemed very resistant. Both Fameuse and Wealthy proved less resistant than McIntosh, and Northern Spy was decidedly less resistant.

It should be borne in mind that the killing during the winter of 1917-18 was not determined entirely by the winter. The previous summer was exceedingly short and the wood was not well ripened for winter. Anything that reduced the foliage during the previous summer generally increased the amount of injury; thus, in an average year, the loss of foliage of late summer due to the red hump apple worm has not been considered serious. However, I do not know of a single case where a tree or branch was not killed where the foliage had been removed in this way during the summer of 1917. I saw instances

where heavy pruning by reducing the foliage had increased the injury and where the bark was killed around a wound made by the removal of a branch in the spring of 1917. An excellent example of the effect of severe pruning was seen in an orchard at Pultneyville, New York. Some high-headed Northern Spy trees had been top-worked to Hubbardston. With some of the trees all of the Spy wood had been removed during the summer of 1917, while with others it had not. Of course the removal of the Spy wood reduced the size of the top and the amount of foliage for that year. In all cases where this had been done the bark and sapwood of the trunk were badly killed, the injury being greater the farther away from the foliage on the trunk the tissue was located. In case of the trees where the Spy wood was not removed, there was little such injury. All over the State of New York during that winter lower branches that had lower secondary branches shaded off by upper ones were badly killed. The foliage on these branches of course was very small in proportion to the branch. It seems, then, that something moves downward from the foliage to ripen the wood. An interesting observation was the effect of a heavy crop in the summer of 1917 on the resistance of the wood during the following winter. Trees bearing a heavy crop in nearly all cases were killed much worse than others. It would seem possible, then, that the material from the leaves that would ripen the wood goes instead to the fruit. The crotch injury and trunk injury that we have mentioned above seem to be explained in this way. They are farthest from the foliage and it takes longer for the material to reach them, and in case of the crotch injury there is less foliage on the inner side of the branch from which the material may move.

Killing in the pear was very much like that of the apple except that the pears average more tender. Particularly is the wood more tender in the spurs, thus in most winters in Ithaca we have serious killing of this wood in the spurs. The Bartlett, Angouleme, Bosc, Clairgeau and, generally, Kieffer were among the more tender, while Clapp's Favorite, Anjou, Lawrence and Flemish Beauty were among the more resistant, Flemish Beauty and Anjou being markedly resistant.

Since injury to the peach is quite common and there was nothing peculiar brought out by the year 1917-18, I shall omit any discussion of that here.

One is not able to make recommendations for avoiding or overcoming injury from severe cold as he would be in case of insect or fungous injury. As we have seen, the most important method of enabling the trees to overcome rather severe injury of the wood is good cultivation, that is, either plowing the trees in the fall or very early spring, and where the soil is not very fertile using nitrate of soda. Of course the trees may be so injured that nothing can cause them to recover. In that case the money for the nitrate of soda and for the plowing would be wasted. There is not much advice to be given as to means of avoiding injury through increasing resistance of the trees. If such cold winters always followed short seasons, like that of 1917, then one might be inclined to advise against encouraging too much growth in the case of young trees. However, if the previous summer should be dry in early summer and wet in late summer, then a tree in sod might be in more danger than one receiving good cultivation, for it might receive a check during early summer when it was dry and start a second growth during the wet period following. In that case it might be killed by a rather mild winter. So far as our experience indicates, a tree growing under good cultivation will have its wood in better condition to resist the average winter than one that is not well cultivated, and we have seen that good cultivation will greatly improve its chance to recover even when the injury has been rather severe.

Much has been said about the effect of the killing of so many trees during that winter on the outlook for fruit growing. The number of trees killed was very large, but in so far as the apple is concerned it is probably small compared with the number of trees that will soon be coming into bearing in portions of New York, Virginia, West Virginia, Maryland and other sections. It seems very doubtful if the effect of the number of trees killed during that year in the total crop of the country could ever be measured, since the fluctuations due to other causes was so large.

