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MASSACHUSETTS
FRUIT GROWERS'
ASSOCIATION

(ORGANIZED MARCH 21, 1895)

REPORTS OF THE
12th to 16th Annual Meetings

HELD IN

Horticultural Hall, Worcester

1906-1910

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POMOLOGY

OFFICERS OF THE
MASSACHUSETTS FRUIT GROWERS'
ASSOCIATION

1910

S. T. MAYNARD, President,	Northboro
H. L. FROST, Vice-President,	Arlington
F. HOWARD BROWN, Secretary-Treasurer,	Marlboro
J. LEWIS ELLSWORTH, Auditor,	Worcester

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BERKSHIRE COUNTY: George G. Walker, Williamstown; R. H. Race, North Egremont.

FRANKLIN COUNTY: E. F. Copeland, Colrain; M. H. Vincent, Conway.

WORCESTER COUNTY: G. C. Rice, Worcester; W. D. Ross, Worcester; A. A. Hixon, Worcester; Elliott Moore, Worcester; S. J. Emerson, Lunenburg; E. A. Hersey, Westboro.

PREFACE

In view of the increased interest being manifested in the essentials for which this Association stands it was deemed wise to print these past reports at this time, as what funds are in the treasury are really the result of promises of printing our reports. Of course there was an immense amount of extra labor involved but your Secretary had the cheerful and able assistance of former secretaries and we trust the result will be satisfactory to the members.

The scope of this Association includes the owner of a few trees or small fruit garden as well as the Commercial Fruit Grower, and the study of our reports and the attendance at our meetings will invariably contribute to the advantage and enthusiasm of all.

Let members wear the annual button at all meetings and let each work for increased membership.

F. HOWARD BROWN, Secretary.

Marlboro, Mass., Jan. 2, 1911.

PROCEEDINGS
OF THE
MASSACHUSETTS FRUIT GROWERS'
ASSOCIATION

March 14th and 15th, 1906

Horticultural Hall, Worcester, Mass.

The twelfth annual meeting was called to order by Pres. Eames at 10.30 a. m., Mar. 14th with a large number of members present. Pres. O. B. Hadwen of Worcester Co. Horticultural Society welcomed the association to their commodious hall and wished them an enjoyable and profitable meeting, to which Pres. Eames responded, thanking the Society through its president for the great assistance afforded the fruit growers of Massachusetts.

The annual address of Pres. Eames was next read followed by the reports of the Secretary and Treasurer. The Auditor reported the books correct and all money expended properly vouched for. Reports accepted.

A FIELD MEETING

A Field Meeting was called for June 28th in connection with the Rose and Strawberry show of the Worcester County Society. About 25 members gathered in the Library room and listened to an interesting and instructive lecture upon "What is done with the Apple Crop in N. Y. State," by Mr. Edward Van Alstyne, of Kinderbrook, N. Y.

After some discussion and questions, Capt. M. P. Palmer told how he handled his apple crop in 1905, for one shipment of which he received a check for over \$3000.

The program included a discussion on small fruits, but so much time was spent in discussing the apple crop, that the meeting was adjourned before this subject was reached and the party took the trolley for "Hadwen Park" where a dinner had been prepared. After dinner Mayor J. T. Duggan, and several other speakers entertained the company until it was time to take the trolley for a return to Horticultural Hall. After inspecting the exhibits of strawberries, roses and other flowers, the company went to the store of Ross Bros., to inspect spraying appliances, and from there to the Cold Storage plant of the Worcester Ice and Cold Storage Company. Here the process of cooling rooms from a temperature of 32° to 0° was shown and explained by Mr. W. H. Blodget. At the store of W. H. Blodget & Co., the handling of fruit and other products was explained, as was also the storing and ripening of bananas, etc.

There being no committees to report, the first lecture was called about eleven o'clock.

**"RECENT WORK IN THE SUPPRESSION OF THE
GYPSY MOTH, BROWN-TAIL MOTH AND OTHER
INSECTS IN MASSACHUSETTS."**

BY C. W. MINOTT; in place of Prof. Kirkland

Illustrated by Stereopticon

"I wish to explain the reason for the change in the speaker who appears before you this morning. Prof. Kirkland expected to be with you until the last moment. I had planned to be here and attend the meeting and when Prof. Kirkland found he could not come he wished me to take his place. This I did not know until I stepped aboard the train at Boston.

"The question that at the present time is uppermost in many minds is in regard to the law under which we are now working in trying to suppress our insect pests in Massachusetts. By the law passed last winter by the legislature an appropriation of \$300,000 was made to be expended by May 1, 1907.

“In addition to that an assessment was made upon the towns and cities of the State and I have here a copy of the law which I will read to you.

“Starting on the 8th of May Prof. Kirkland gathered men who had had previous experience and has gradually been working up a force so that we now have about 32 employees. About the 1st of June we started on the inspection of the territory outside of that previously inspected.

“That work was continued during the fall and in some cases up to the present time. It is hard to get good men who are qualified for the work, while in 1900, when we sprayed, we had a good force of men but these have all found new situations and are not willing to leave while it is uncertain what will be done by the State.”

Mr. Minott showed about 30 slides exhibiting the gypsy and brown tail moths in all stages of development, also showing what the State is doing in different towns in the Commonwealth and the methods used to exterminate these pests.

After some discussion the next lecture was called, Pres. Eames introducing Dr. E. Porter Felt, State Entomologist of New York, who spoke on

INSECTS AND SCALE PESTS COMMON TO NEW ENGLAND AND BEST REMEDY FOR EACH

“It affords me peculiar pleasure to appear before you this morning because I consider myself very much at home in Worcester.

“In the first place I wish to congratulate this Society upon giving a prominent place to the lecture which has just been concluded because it seems to me that this question of the gypsy and brown tail moth is one that concerns all New England because it is only a question of time before you will have your own experiences with these insects, and while this morning we may laugh at the man carrying an umbrella over his head to protect himself from the moths, it would not appear so funny when we had to do it ourselves.

“I want to say that I know of no man better fitted by training and experience to cope with this work of extermination than Prof. Kirkland.

“I am going to turn aside from caterpillars and talk

more about insects that affect our fruit trees. I was interested in the remarks made by our President especially his remarks upon continuous spraying. Some make but a half hearted trial or worse still, send the hired man out with an antiquated apparatus to do the work.

"When I talk about spraying I mean thorough work not only this year but the next year and the year after because I believe that is the only way to control the insects and other fungous diseases. Spraying is really another kind of insurance and just as you keep up your policy, in the same way keep on spraying and the man who does is the one who gets good fruit, gets high prices and makes a success of fruit growing.

The control of insect pests and fungous diseases affecting our various fruit trees, is a problem of great importance and no argument is necessary to demonstrate the economic advantages resulting therefrom. We all know what it is to happen upon a wormy apple, and there is always a wide divergence between the price paid for barrels of sound fruit and that which can be obtained for a second quality product. More than this, our markets are beginning to recognize the beneficial results following spraying and as a consequence some buyers are obliged, on account of market demands, to make a difference of 25c per barrel between fruit from sprayed and that from untreated orchards, even though both be carefully graded and apparently of the same quality. This difference in price will more than cover the cost of the necessary spraying from year to year, not to mention the additional amount of marketable fruit resulting from the adoption of this practice.

There are a number of insects which demand attention on the part of the orchardist in early spring. The apple borers are common and occasionally very destructive pests. This is particularly true of the round-headed apple borer, which is sometimes very injurious to young orchards, and older trees are by no means exempt from its operations. Our attention was called recently to a young apple orchard owned by an Irishman. He stated that, in his opinion, the soil was not adapted to fruit trees. An examination resulted in finding 11 borers at the base of a young tree with a trunk diameter of less than 1 1-2 in.

The situation was obviously "unhealthy," though the trouble was due to insect depredations rather than soil deficiency. There is no better method of controlling this apple

borer than by careful inspection and digging out the borers or killing them with a hooked wire. This work should be done in early fall and again in the spring. The presence of these pests is indicated by fresh reddish borings so familiar to most fruit growers. Something can also be accomplished by putting protective bands of tarred paper, newspaper or other material around the trunks and keeping them in place from the latter part of May through August. These bands, in order to be effective, should be moderately tight so that the insects can not get between them and the base of the trunk. The other apple borer, known as the flat-headed borer because of the peculiar, broad, flattened anterior part of the grub, works by preference at the base of the larger limbs and ordinarily causes much less damage than the preceding form. There is no better method of checking this species than digging out and destroying the pests as described above.

Our fruit trees are subject to attack by several early spring leaf feeders, and whenever they are at all abundant in an orchard, an early spring spraying with some arsenical poison is extremely important. Among these pests are the well known bud moth or bud worm, the latter a small, naked, brownish caterpillar with a darker brown head, frequently seen in blossoms and clusters of young leaves. This winters in a very inconspicuous brownish, nearly invisible cocoon, spun beside a bud or other rough part of the bark. The young caterpillars emerge therefrom in very early spring and are ready to feed upon the leaves as soon as they burst from the bud, thus causing a maximum amount of damage.

The two case-bearers, known as the pistol case-bearer and the cigar case-bearer on account of the characteristic shape of their protective shelters, also winter upon the twigs and, like the bud worm mentioned above, are ready for business very early in the spring. These three pests, together with the extremely common and more easily controlled tent caterpillars, are readily destroyed by an early application of an arsenical poison, and wherever these insects are at all abundant, the orchardist should plan to spray with a poison just as soon as the leaves begin to appear in order to catch these pests before any appreciable damage is inflicted.

Canker worms are early spring feeders and likewise amenable to poisoned applications. There are two species.

known as the fall and the spring canker worm. The females of the former ascend the trees in late fall and early winter, while those of the latter do not climb the trees till late winter or early spring. The adults of both are wingless and they may be checked by applying sticky bands such as tar, so as to prevent their ascending the trees and depositing eggs where the young caterpillars, hatching in early spring, can get at the foliage. Ordinarily this procedure is unnecessary in the case of the man who resorts to spraying, and owing to the fact that this latter method is not only of value in checking canker worms but is also very effective in destroying the other leaf feeders mentioned above, we much prefer to indorse the use of poisons.

There are three important scale insects liable to be found in our orchards at the present time; namely, the oyster scale, the scurfy scale and the San Jose scale. The oyster scale, easily recognized on account of its brown color and oyster-shaped shell, is nearly 1-8 of an inch long and winters in the egg state. The scurfy scale has a whitish, irregular covering as large as that of the oyster scale, and when abundant forms a very characteristic, whitish scurfy-like mass on the bark of infested trees. This, like the preceding form, winters in the egg; those of both species hatching in this latitude the latter part of May or very early in June. They may be controlled by thorough spraying with either a kerosene emulsion (the standard formula diluted with 6 parts of water,) or a whale oil soap solution (1 lb. to 6 or 7 gallons of water.) An effort should be made to make the application just after the majority of the young have appeared and before they have covered themselves to any extent with the downy, cottony-like secretion which appears within a few days after they escape from under the protecting scale of the mother.

The San Jose scale is entirely different. It is much smaller, being only about 1-10 to 1-12 of an inch in diameter. The protective scale is circular or nearly so and presents a marked contrast to that of the two native species described above. It winters under a half grown scale about the size of a pin head. This latter may be dark gray or almost black, each individual scale having a distinct nipple. Any rough, abnormal appearance on rapidly growing twigs should arouse suspicion. A pinkish discoloration of leaf, green fruit or green twigs, is evidence that this scale may be present. A further test is to place the finger nail or a

knife blade obliquely against the infested bark, and pressing firmly, draw it a short distance over the suspected area. Should scale insects be beneath, a yellowish fluid will be crushed from their bodies. Such twigs should be sent to some entomologist for examination, as that is the only certain way of establishing the identity of the trouble. The San Jose scale breeds almost continuously in this latitude from about the 20th of June till into October, November or even into December, depending largely upon the weather. It is enormously prolific and, under favorable conditions, may multiply to such a great extent as to nearly ruin trees within two or three years. The extended breeding season has made it necessary to resort to what are known as winter washes for the control of this pest, and it is gratifying to state that in the case of the lime-sulfur wash we have a material which may be applied to dormant trees and not only destroy this insect but also prove of considerable value in checking the destructive pear psylla and certain fungous troubles. All things considered, there is no better method of controlling San Jose scale in this latitude, than by thorough and timely spraying with a lime-sulfur wash. This material is one of the cheapest and most effective insecticides we have and possesses in addition, valuable fungicidal properties. Researches conducted by our State Experiment Station have shown that an early spring application of a lime-sulfur wash followed by two or three sprayings with a poisoned bordeaux mixture, gives almost ideal protection from both insect pests and fungous diseases.

The present seems a most fitting time to urge a moderate conservatism on the part of our fruit growers. The past decade has seen a wonderful increase in the demand for various insecticides and fungicides, and experience has demonstrated beyond question what certain standard preparations will accomplish. Naturally we are all interested in securing the best insecticide or fungicide and wish to use the same at once. There has been in recent years a most urgent demand for better methods of controlling scale insects in particular. This stimulus has lead many experiment stations and private individuals to make various tests, and a number of commercial firms have put on the market, preparations of one kind or another, some possessing considerable merit. The true value of an insecticide can not be demonstrated beyond question till it has been subjected to the tests of several years.

Just at present there is a strong tendency on the part of some to use the newer materials before they have been thoroughly tested. The scientific man must not allow enthusiasm to outrun judgment, lest his reputation is gone and his usefulness at end. The same is doubly true of the orchardist who, by following such a course, may not only lose standing but imperil the existence of valuable and perhaps expensive orchards. Therefore, we urge all fruit growers to stand firmly by the well tried insecticides, experimenting in a small way with the newer compounds. Let us make haste slowly and if we wish to make tests, confine the trials to a moderate number of trees, and even then make no sweeping change till the experience of several years has amply demonstrated the value of the new material. This is slower than some other method, but in our judgment is infinitely more satisfactory than the rash adoption of measures which have not passed the experimental stage.

Discussion followed this paper and it was then moved and voted that a committee be appointed by the chair to nominate a list of officers for the ensuing year. The committee was appointed and the meeting adjourned to 1 P. M.

AFTERNOON SESSION

The meeting was called to order and the nominating committee reported as follows:

C. A. WHITNEY, President,	Upton
JOHN W. CLARK, Vice-President,	North Hadley
S. T. MAYNARD, Secretary,	Northboro
S. T. MAYNARD, Treasurer,	Northboro
J. LEWIS ELLSWORTH, Auditor,	Worcester

DIRECTORS

ESSEX COUNTY:	E. A. Emerson, Haverhill; J. J. H. Gregory, Marblehead.
SUFFOLK COUNTY:	George Cruickshanks, Chelsea.
NORFOLK COUNTY:	A. F. Stevens, Wellesley; Monroe Morse, Medway.
PLYMOUTH COUNTY:	Augustus Pratt, North Middleboro; Walton Hall, Marshfield.

- MIDDLESEX COUNTY:** C. F. Hayward, Ashby; M. P. Palmer, Groton; George F. Wheeler, Concord; C. S. Pratt, Reading; E. R. Farrar, South Lincoln.
- HAMPSHIRE COUNTY:** John W. Clark, North Hadley; E. Cyrus Miller, Haydenville.
- HAMPDEN COUNTY:** Ethelbert Bliss, Wilbraham; L. W. Rice, Wilbraham.
- BERKSHIRE COUNTY:** George G. Walker, Williamstown; R. H. Race, North Egremont.
- FRANKLIN COUNTY:** M. H. Vincent, Conway; E. F. Cope-land, Colrain.
- WORCESTER COUNTY:** S. J. Emerson, Lunenburg; O. B. Hadwen, Worcester; C. E. Parker, Holden; James Draper, Worcester; E. A. Hersey, Westboro; Elliott Moore, Worcester.

It was moved that the Secretary cast one ballot for this list of candidates. This was done and they were declared elected.

It was moved and voted that the salary of the Secretary-Treasurer be made \$50 per year.

At 1.30 P. M., Mr. A. W. Fulton, Managing Editor New England Homestead, read the following interesting and instructive lecture on

CO-OPERATION IN SELLING FRUIT IN MASSACHUSETTS

The preacher chooses his own text; the politician intermingles, sometimes without discrimination, fact and fancy; but your secretary, our honored Prof. Maynard, issues his instructions to say something on a specific subject. To me his orders are: "Tell the fruit growers something about the co-operative marketing of apples in Massachusetts." As has been said by a staunch supporter of the day we are to celebrate next Saturday, there are no snakes in Ireland. So I might also have the temerity to say in spite of Prof. Maynard's mandate, there is no co-operative marketing of apples in Massachusetts, nor for that matter any of consequence in any part of New England. Our apples are mostly

grown in small orchards, often miles apart; and in practical operation, up to this time, every grower seems to prefer to be his own agent. A prominent apple dealer in Boston touching upon this subject the other day said off hand, to illustrate his point, that the state of Maine has 5000 apple-shippers. This of course is drawing the long bow, but the general fact remains that New England orchardists as a rule have not yet taken up in earnest the subject of co-operative selling.

The practical difficulties in getting all the market will stand are experienced chiefly by the small grower of 50 to 100 barrels, who is unable to secure the benefit of the brisk competitive bidding enjoyed by the larger grower. If our Massachusetts orchardists consider it impractical, the dealers in the large markets, such as Boston, go further, and are a unit claiming it both impossible and unnecessary. Inquiry among the very largest handlers of our apples, both for domestic and export trade, elicits the opinion that there is little probability of growers getting together and marketing their fruit on the co-operative plan. They say orchardists for one thing would not hold together in any scheme formulated; that the independent New England spirit prompts every man to operate and control his own business. Another drawback given for the slow growth of co-operative enterprise is the lack of uniformity in packing fruit, and the uneven quality; this would tend to increase the difficulty in marketing it at satisfactory figures, and would reduce the average price, etc.

While the movement lags here, much has been accomplished elsewhere, and the proposition as a whole has great promise, subject to modifications according to environment. In Europe, as perhaps most of you know, wonderful strides have been made along co-operative lines in distributing farm produce. This is true not only in the United Kingdom, France and Germany, but also in countries as distant as Italy, Austria and Scandinavia. Out of the abundance of testimony available, one brief instance of the situation across the water will suffice.

A couple of seasons ago agricultural co-operation in Ireland celebrated its 10th anniversary with 703 co-operative societies, having a total membership of 71,000 farmers and an aggregate trade in one year of \$5,900,000. The dairy interests were by far the largest, particularly because the co-operative movement started there. The success of the co-

operative movement in dairying led to the formation of the Irish agricultural organization, and the work has taken shape in bringing other farm commodities under the co-operative system, as poultry, fruits, garden products, etc. Those identified with the management insist on packing farm products along modern lines, this counting for much in the final disposition of the goods. Each society has found it necessary to give special prominence to the instruction of its members. This ranges from a mere acquaintance with the crude methods of growing, packing, etc., to technical work along the different lines of agriculture.

Co-operative enterprises in handling fruits and vegetables have made much more progress west and southwest than here in New England. In order to inform you relative to the movement in other fruit and truck sections I will cite briefly a number of instances. Fact is always better than fancy, and practice more conclusive than theory. A rapid glance at what is being accomplished in other sections should afford thought for practical application, though of course in modified form, right here in Massachusetts.

In the Western apple producing sections the movement for co-operative marketing is in somewhat the same condition as here in the east; fairly successful organizations here and there, but in the main apples handled independently. Yet our investigations disclose some successful and encouraging work of this character, largely through the medium of local organization. In the west, as in New England, important fruit growing areas may be seen where there is no special organization for the purpose of directing best methods of marketing. Each fruit grower in his own way follows an independent line of action, aiming to get the most the market affords along the lines of his own experience.

The occasional fruit marketing organizations of local character, which are really succeeding, form an object lesson worth our attention here in the east. For example: At Cobden, Ill., which is a great center for fruits and truck, there is a regularly incorporated shipping association. The manager of this makes it his business to make contracts with the transportation companies, and to secure the number and kind of cars required by shippers, and at the time required. In cold weather, for shipping sweet potatoes, the cars required in the daily supply are placed on side tracks ready to receive the barrels. In summer, when iced cars are needed for shipping such perishable stuff as strawberries,

the manager procures the cars, and has them properly supplied with ice, ready for immediate use. He collects information daily about markets and prices, receives fruit at the cars, receipting to the owner for same, sees to it that the fruit is placed properly in the car, makes a manifest for each owner, and bills the car to the proper person at its destination. In this way the best rates and service are secured. The cars are shipped from one person in the producing section to one person in the distributing market, and takes away entirely from the railroad the important work of loading and unloading. During the fruit season 15 to 20 cars are shipped daily from Cobden, representing of course many thousands of packages, and securing to the individual grower a degree of uniformity in handling which in the long run proves profitable to him.

The Ozark Fruit Growers' association of Springfield, Missouri, a section given over largely to both tree fruits and small fruits, shipped last year 525 cars of strawberries. This fruit was loaded at two or three points in southwestern Missouri and northwestern Arkansas. The active officers, manager and secretary, are paid salaries and the association has agents in the principal distributing markets during the shipping season. A large proportion of the cars are sold on track. Providing there is an average crop, it is expected that 1000 cars of peaches will be handled by the association the coming year. The manager uses the telegraph and long distance telephone very freely, and with the careful system followed in packing and shipping, the carloads of fruit can be handled just as readily as if the cars were immediately before the manager and the prospective buyer.

Something has been accomplished in Wisconsin. In that state there is no general organization for the purpose of co-operative marketing of fruits and vegetables, yet local societies have been organized here and there, and carry on the work with encouraging success, particularly in relation to small fruits. One of these is known as the Fruit Growers' association of Sparta, now ten years old. Among its objects is to induce buyers from city markets within reach of that small but important distributing center to be present during the fruit season; to provide for the careful, systematic loading of fruit; to secure good service from transportation companies, and to protect the grower from fraudulent commission houses. During the ten years this local association has been doing business, a large part of the

fruit produced in that territory has been sold on the streets of Sparta to buyers from large cities in that vicinity. The grower is allowed to make his own bargain with the buyer. The association takes charge of the loading on the car, giving the grower a receipt for the fruit he delivers at the car. At the same time it guarantees to the buyer that his purchase has been duly delivered to the transportation company. To pay the cost of this supervision it is agreed that the city purchaser pays 1 1-2c. for each 16-quart case of strawberries, and the grower 1 cent. The association keeps in touch with all markets within reach, and frequently has a personal representative in some of the leading markets, particularly at the height of the season. His business is to keep the members of the association informed as to prices and market conditions. In this way the grower is enabled to judge as to the advisability of selling for cash on the street market as just indicated, or consigning. This association handles annually 60 to 100 cars of strawberries.

Association work in the far west, while still comparatively young, is making progress. But there, in such states as Oregon and Washington, where everything is handled on an enormous scale, conditions differ materially from Massachusetts. The Hood River Apple Growers' union of Hood River, Oregon, is a live affair, and believes in binding growers to market their fruit through the association. The manager urges that a regular contract be signed by each grower and officer of the union. The next work to be undertaken there is the education of the people to grow good fruit, and particularly to insist that they furnish first class fruit, leaving out culls.

Now let us note briefly what is being done in the middle south. About 125 farmers and fruit growers at Laurel, Del., organized a fruit and produce union and shipped strawberries very largely, last season 12,000 crates, to commission merchants. The cost to the union of handling these berries last year was three cents a crate. The commission merchants in the cities pay to the union 3% commission as agents. This money is to defray the expense of handling the fruit and office work, as all accounts of sales of individuals center at the general office. The various growers deliver their produce to the manager who exercises the right to either ship on consignment or sell outright in earload lots. Net earnings of the union are distributed annually in the way of dividends, based upon the gross sales of mem-

bers. Fruit and produce from non-members are also handled, the union acting as agent and getting 3% commission on gross sales, this likewise going into the earnings of the union. This business has been going on for six years quite successfully. The members are obliged to turn over all of their fruit to the union. A fine of 25 cents is imposed for any package of fruit disposed of outside the union.

A tangible effort toward the co-operative marketing of Massachusetts fruit is the organization this winter of the Apple Growers' association of Hampshire and Franklin counties. Of course no definite work can be undertaken until next season, when some of the large fruit growers in the western part of the state hope to benefit through certain economies, such as the purchasing of barrels in large quantities, arranging for freight cars, when and where needed for prompt service, and possibly some concessions in freight and express rates to Boston or New York markets. This young organization, in line with the experience of shippers generally, is keenly alive to the necessity of a good salesman in the distributing markets.

I have presented to your attention a number of specific instances of encouraging and successful co-operative enterprise. It will be well to note in the briefest manner possible some of the deductions, the crystallized opinions and the records of experience of fruit growers elsewhere.

Personal observation and much correspondence brings out the fact that both west and east there is a very strong drift among successful orchardists to sell their apples on the trees or barreled, as the case may be, at home, rather than consigning. This is not necessarily a reflection on commission merchants as a whole, but reveals the opinion of many people who have had wide experience in marketing apples. A prominently and eminently successful grower in central Illinois, bearing on this subject says: "I have tried to find out how to get the best market results; I have consigned to various commission houses, and this method cost me thousands of dollars, owing to unsatisfactory returns. I have sold apples to be paid for on arrival, and this is bad, as the commission house is liable to turn down the car of fruit on arrival, providing the market is a little off, and wire that the car has arrived out of condition and subject to my order. The rejected car is then turned over to some other house which of course has a good excuse for slaughtering this rejected fruit, and then I may be called up to

pay freight, and other incidental expenses. I consider the most satisfactory way for the producer is to sell at home either in bulk, in orchard or by the barrel, packed and settled for on the spot."

Right here comes in the absolute necessity of fruit growers keeping posted on crop prospects, and on market conditions, in order that they may sell the fruit intelligently and get for it all the market will stand. Growers who are not in favor of consigning, claim that the man who consigns his fruit is practically obliged to hold the bag all the time; he takes all the risk and worry and also stands the cost of growing, picking, packing and shipping, with the result that if anybody gets hurt in the deal, it is in this instance the producer.

One difficulty always experienced in marketing apples from small orchards, and any other than great orchard sections, is in attracting buyers in sufficient numbers to secure brisk competition in bidding for the fruit. This is the general experience among Massachusetts apple growers. Fruit growing sections are isolated; a fair showing of apples around Fitchburg, for example; again, in the Worcester territory; another apple pocket in Greenfield and Shelburne Falls; a group of sizable orchards in the Northampton territory, and scattered commercial orchards in the section north and east of Boston. While Massachusetts in a favorable year turns off a good many apples, the fruit is not massed in such a way as to attract a small army of buyers from the big wholesale markets east and west, as is the case, for example, in western New York. In a recent September I visited the commercial orchard belt of Niagara county, and the apple towns were full of buyers, not only from the east, but from Michigan, Chicago and the southwest. I saw entire orchards of only one variety, the Baldwin, crops sold on the trees at a straight price, and buyers bidding against one another because they could secure just what they wanted in variety and quality.

Co-operate marketing of fruit was regarded a very live topic at the February meeting of the New York state Fruit Growers' association at Poughkeepsie. The point was there emphasized that too little care is taken, especially by growers of small fruits, in grading and packing, and a co-operative packing house was advocated to put them on a par with the larger growers. The orchardist as a rule, according to the sentiment there expressed, is too much at the mercy of

the comparatively few buyers of fruit represented by men with plenty of capital, insisting on "bearing" the market in every way possible, at times throwing dust in the eyes of apple growers relative to prospects, hoping to get the market down to a dollar basis for fine eastern Baldwins or Greenings at time of harvest. One way in which the individual grower can protect himself is through keeping thoroughly posted regarding the crop prospects, particularly in midsummer and early fall. He is then fortified against the wiles of the would-be buyer who talks bumper crop, should the facts as brought out in these crop reports not warrant such assumption.

The testimony here presented suggests that some such local associations may have their place here in Massachusetts. This takes it for granted that the orchardist packs good fruit, and it is reasonably apparent that good results in making sales in neighborhoods not exactly convenient to market might be secured from the formation of local selling associations. Bearing on this subject of selling fruit, though foreign to the co-operative method, James Handy, secretary of the Mississippi Valley Apple Growers' association says: "Where the apple grower does not care to assume the labor of sorting his fruit, it seems to me better for him to sell his orchard in a lump to the buyer, the latter to do his own sorting. On the other hand, if the grower understands all conditions, and is willing to meet all requirements, the buyer nine times out of ten would be willing to pay the extra price for the fruit if the grower would do the sorting and packing." This suggestion of Mr. Handy of course applies more particularly to sections where there are large commercial orchards. A problem for the Massachusetts apple growers is to shape things, perhaps partly through the good work of local organizations, as to induce buyers to come to them for the fruit as it appears in the orchards.

The barrel is of course the standard package for apples. I have at one time and another personally visited many wholesale markets in leading cities east and west, and also in London and Liverpool. At home and abroad I have been told that dealers, except in a restricted way, do not want anything but the barrel. I do not need to tell you that all in all a barrel of regulation size is best, the flour barrel or its equivalent. (Diameter of head 17 1-8 inches, length of stave 28 1-2 inches, outside measurement not less than 64 inches circumference.) The secretary of the Inter-

national Apple Shippers' association is authority for the statement that apples packed in a good flour barrel, or second hand regulation size barrel will bring as much money in any market in the world as if in an absolutely new barrel.

Many co-operative enterprises, at one time prosperous and full of promise, have fallen by the wayside through bad management. This includes lack of a strong man at the head of the business in distributing and selling products, a lack of a thorough understanding of market conditions in the big trade centers, and sometimes a lack of firmness in maintaining a high standard of excellence in quality of fruit and in packing. Long credits proved, among other things, the death of one very successful co-operative fruit shipping association located in New Jersey.

This brief outline of the work of several co-operative shipping associations points to the possibilities in this direction here in New England, perhaps in some modified form. If not practicable for Massachusetts apple growers, owing to the scattered location of the orchards, there are at least hints of the good things to be accomplished in one way and another by producers working together. In these associations in the middle south two or three things stand out prominently. Thorough organization, loyalty of members, wise management, absolute control of the business by the man or men delegated to represent the growers, and generous support to the principles of the unions.

Summing up the situation the problem before every fruit grower as each fall rolls around is to sell his apples in the most advantageous manner, either single handed, or co-operatively. Some of the thoughts outlined in this paper may be summarized in a few concluding paragraphs.

Study thoroughly the co-operative movement as it has been developed and reasonably perfected in other sections, and see what can be done, or what applications can be made in your own locality.

For the large commercial orchardist, equipped with adequate storage facilities at home so that he can hold the fruit, it may not be unwise to reserve a part of his crop for a time if bids are ridiculously low in October. This especially applies to certain varieties of winter apples which may not be in favor early in the fall, but may be at Christmas, or in February or later. If a number of growers in

one town would work together this way, they might combine in shipping, and thus give co-operative marketing a practical test.

But right here comes in the necessity to know the market conditions; not only at your own town and shipping station, but in the big distributing centers at home and abroad; something of the export trade, etc. One essential along this line is to know the market to which you should ship, when and how to ship. Boston will take with avidity certain apples which New York never wants; the tastes of consumers in these big markets may be profitably learned in advance. It will pay the grower to personally visit the large markets and study conditions. If you are to choose a commission merchant, select one who not only has a safe bank account, but also shows up strong in other essentials, a good salesman, and a person of integrity, making him in fact your representative in handling your goods. Such fruit grower will then come home better prepared than ever to get all the trade will stand.

Put special emphasis on the grading, packing and branding of your fruit. Appearance often sells it. Mark a No. 1 apple, No. 1, with your name, and make it stand for something. If you must barrel inferior fruit, have the courage to pack No. 2s as No. 2 and so brand it. Remember in this connection that it costs just as much to pack and ship seconds as firsts. You will not make a fortune the first year, not perhaps the second. But persistence in some such course will eventually count for much to your permanent profit, whether you sell independently or co-operatively. It has been truly said that such apples are half sold before arrival in market.

After some discussion, at 2.30 the Editor of "Farm and Home," Edwin C. Powell of Springfield, Mass., gave the following lecture on

HOW SHALL WE DISPOSE OF OUR NO. 2 APPLES AND OTHER SECOND-CLASS FRUIT?

The speaker before me has referred to taking care of the best fruit and also the seconds. The aim of the grower should be to so handle the orchard as to produce as much as possible fruit of the finest quality. The dealers claim that second quality fruit predominates in the market. I don't like to say it but I don't believe that the farmer

knows how to grow apples. The farmer means to be honest but he is going to put in every apple that will possibly pass for a No. 1 apple. I saw a man yesterday who had paid 75 cents a dozen for apples from a fruit stand in New York.

A man who had about 5 acres of land in Bernada tried growing strawberries for the market. He has been so successful that he began shipping to New York and gradually the whole place was given over to strawberries. These are very carefully grown, crated, packed and shipped to New York where he has a standing order for berries at \$1.50 per quart and in one year their strawberries netted them \$3000.

With the best methods of culture there is bound to be a small proportion of No. 2 fruit; with no culture at all it is mostly seconds and culls. The aim of all growers should be to so handle their orchards as to produce as much as possible of the finest quality. This question covers very broad ground. Growers feel that they have the right to sell whatever they can find a market for. Dealers claim that the second quality breaks the market and takes the place of a better grade. The speculators insist that this part of the apple crop cannot be estimated, and therefore gives them trouble. A large body of consumers say they must have this fruit because it is cheap and they are compelled to buy it or none.

There are four ways to dispose of No. 2 fruit—sell it as such, evaporate it, can it, or make it into cider vinegar. Let us first consider what No. 2 fruit really is. The common practice of many is to make two grades—No. 1 and culls. Anything that is too good for cider is called No. 1. This is not honest grading. Look at the way in which California fruit, not only apples, but peaches, pears, plums and cherries, have come into eastern markets in recent years. It is not due to quality, for with the exception of grapes and Bartlett pears, California fruit does not compare in quality and flavor with that raised in New England. It has pushed its way forward solely because of appearance and packing, and packing includes grading. Orange boxes are practically all the same size—yet half a dozen grades are made of oranges solely on size. Because of this uniform grading both as to size and quality, a box of oranges brings as much as a barrel of apples. Side by side on the fruit stand, and side by side in commercial markets the best apples bring as much, or more, than the best oranges.

No. 1 fruit should consist only of those specimens which are normal in shape, color, quality, perfectly sound, and free from blemishes of all sorts, including evidences of codling moth. No. 2 fruit should be that which is likewise sound, of good color and shape, and free from bruises and many evidences of codling moth. An apple with a worm hole as big as a lead pencil should never leave the grower's place, yet go into any market and you will find plenty of such in barrels marked No. 1.

If fruit is graded as indicated and packed in clean, attractive packages, the No. 2 fruit can easily be sold at a profit. No. 2 apples will keep for a reasonable time in storage. There is a demand, and generally at a fair price, for such fruit if it is honestly packed, but it should be packed as carefully as the best grade. It is in seasons of large crops or when the market is temporarily glutted that we should look to some other means of disposing of our No. 2 fruit. It is better at such times to let it waste or feed it to stock, rather than ship it to market and then send the dealer a check to cover freight and cartage. Where cider can be sold at 10c. or more per gallon, it will sometimes pay to work up the apples in this way, for they will net close to 30c. per bushel.

There is a growing demand for canned goods of all kinds, and for canning the No. 2 stock can be used to advantage. Apples are packed in three-pound and gallon cans, and packers pay from 25c. to 50c. per bushel delivered. In general, any good cooking apple is a good canning apple. The process of canning is simple. The apples are pared and cored, and placed at once into water to keep them from discoloring. They are then trimmed and quartered, the cans filled full of fruit and placed in water. Then they are boiled fifteen minutes in an open kettle, or three minutes under pressure.

An easy method within the reach of all fruit growers is to evaporate or dry the No. 2 fruit, as well as the culls. There are various styles and sizes of evaporators, ranging from those which will handle a bushel a day and set on top of the kitchen range, to the commercial plants which will handle 100 bushels or more in twenty-four hours. Practically all fruit can be evaporated to advantage and with profit. The greatest demand is for apples, and hundreds of thousands of bushels are annually evaporated on the fruit farms of western New York, where this industry is largely

centralized. I believe that a small evaporator can be used to advantage and profit on every farm, even if it is only to dry the supply of fruits and vegetables for family use. Evaporators with a capacity of 6 to 10 bushels per day will take care of the No. 2 and surplus fruit on most farms. The expense of operating is not large, and there is usually a good return. Apples usually dry out from 6 to 8 pounds to the bushel, depending on the variety, Roxbury russet going as high as 8 1-2 to 9 pounds, and Seek-no-further as few as 4 to 5 pounds. Much depends on the state of maturity, the quality of the fruit, and the care used in paring. Pears will average about 7 pounds to the bushel; unpared and pitted peaches 9 to 10 pounds; pitted plums 8 to 9 pounds to the bushel; blackberries 9 to 11 pounds; black raspberries 11 to 12 pounds, and cherries 8 to 10 pounds to the bushel. Boston quotations last week were 11 to 12c. per pound for fancy evaporated apples. 10 to 10 1-2c. for choice, and 9 1-2c. for prime, while sun-dried apples are quoted at 6 to 7c. Chops, which are culls chopped up, are worth \$2.60 to \$2.70 per 100 pounds; cores and skins bring about \$2. Raspberries are quoted at 28c. per pound, and cherries at 14 to 15c.

I have in mind a large and successful fruit grower, who has spoken before this body in the past, who evaporates most of his seconds and all the cull stock. He has an evaporator with a capacity of 100 bushels per day, which cost complete somewhat less than \$1000. He averages 650 pounds evaporated apples from 100 bushels of green stock and 200 pounds of skins and cores. There are two kilns, the apples being spread out upon the floor and occasionally turned. It requires two boys to run the paring machines, six women to trim, whose wages are \$1 per day, one man who looks after the fires and sulphuring and the slicing, who gets \$1.50. Another man who works from noon to mid-night tending the fires gets \$1.25. It takes three tons of coal per week to run the evaporator. Last year he ran through 800 bushels, which gave 4750 pounds of white apples, which sold for 9c. per pound in New York. There were 5100 pounds of waste, which sold at 2c., and 1500 pounds of chops at 2 3-4. They netted back \$540. From this came out \$54 for coal, \$120 for labor and \$13 for boxes, which meant a net return of 44c. per bushel.

Discussion followed the above paper, and the meeting adjourned to 10 o'clock Thursday morning.

THURSDAY, MARCH 15, 1906
10 O'CLOCK

This session opened with a lecture on

FRUIT GROWING IN NEW ENGLAND

By PROF. F. W. CARD

Rhode Island Agricultural College

Commercial fruit growing is the product of modern conditions. It, therefore, demands modern business methods. The old time self-centered farm which aimed to supply nearly all its needs has given place to the specialized farm of today in which the farmer becomes a business man.

All agricultural production demands the co-operation of land, labor and capital, though land forms one phase of the capital. Farm capital may be classified as follows:

A. Fixed or invested. 1. Land. Natural value. Land Improvement. Drains, roads, orchards, etc. 2. Buildings. Dwelling, Farm Buildings, Building Equipment. 3. Equipment. Teams. Implements. Live Stock, etc.

B. Circulating or working. 1. Seed, feed, fertilizer, supplies. 2. Market crops and market live-stock. 3. Money for labor, etc.

Unlike manufacturing, fruit-growing offers the opportunity of a gradual investment. The natural value of much fruit land is low, and the introductory cost of planting moderate. It affords the further advantage of an appreciating investment. The value of a factory or a dairy barn begins to decrease the moment it is completed. The value of an orchard goes on increasing for years after it is planted. This increase in value is difficult to estimate but none the less real. Fruit growing offers unusual opportunities for combination in investment and returns. Orchard trees may be interset with small fruits. The small fruits may be again interspersed with vegetables, so that a return may be had from the beginning, while the permanent investment in the larger fruits is developing.

Against buildings there must be an annual charge for depreciation, repairs and insurance. The fruit farm demands a very moderate outlay along this line, hence this charge is small. In the ownership of implements, several items go to make up the cost; these include interest on the

investment, depreciation, repairs, storage, and risk. The ultimate cost of labor performed is largely dependent upon the amount of service rendered, since the cost per unit of production is apportioned to the amount produced. Here again, fruit growing is fortunate in that it demands only a moderate investment.

Under the head, circulating capital, the fruit grower must offset fertilizer against feed in comparing his business with that of the dairyman. Nitrogen, the most expensive element in plant fertility, he is able to obtain at small cost by the use of cover-crops.

The cash capital which he must maintain is doubtless larger than with some other lines of farming.

Labor

Fruit growing is a fairly intensive branch of agriculture, hence, the proportion of labor to capital invested is relatively large. The proportionate interest charge is, therefore, relatively small. Unequal division of labor affords the greatest disadvantage to the fruit-grower, yet the winter season is short, and with spraying, pruning, the manufacture of barrels, crates, etc., there need be little lost time. The picking problem is the most serious one and must be carefully considered by every prospective grower. A farm woodlot may aid in equalizing the demand for regular work in winter and in summer. To the fruit-grower, himself, the winter lull is advantageous; it affords him the chance for a vacation. He should improve it to the full.

The items of cost in team labor are made up of feed, care, bedding, shoeing, stable rental and depreciation. The cost per hour depends upon the amount of work done. The per cent. of efficiency in fruit growing is likely to be low, with consequent high cost of team work.

The Marketing Problem

The price is all-important in marketing. When an article which costs the grower 40c. sells for 50c., his profit is 25 per cent. If the price be 60c. this means an increase of 20 per cent. to the purchaser. To the grower it means a very different thing; it means an increase of 100 per cent. in his profits. One acre in the latter case being equivalent to two in the former.

In transportation, the New England grower is fortunate, both owing to good highways, nearby markets and

ample public conveyance, both by train and trolley.

Whether to sell at retail or wholesale should be carefully considered. The cost of retailing may more than equal the difference in price. Retail sales involve more waste. The retail method also limits the size of the business.

Advertising

Advertising in many ways can be done with little cost. The appearance of the man himself, the outfit which he drives, and the farm which he occupies, may do much to advertise his business. Well-designed letter-heads, printed envelopes, shipping cards and labels cost little but carry an advertisement to all through whose hands they pass. A well chosen farm name may excite added interest. A farm bulletin board may catch many a passer-by. Fair exhibits, if systematic, along one line year after year, will make the producer well-known in the locality. Printed circulars will carry full details to any party whose name is available. Advertising columns in regular publications will reach unknown consumers but is the most expensive method and the last to be considered.

Co-operation

Co-operation may take the form of co-operative manufacture, as in making barrels, crates or drying fruit, co-operative buying as in the purchase of fertilizers, spraying materials and fruit packages, or co-operative marketing.

The Advantage of a Specialty

Fruit-growing is a specialty, its pursuit secures the following advantages:

1. Economy of capital. The farm is equipped for but one line.
2. Economy of labor. Labor directed in definite lines accomplishes more.
3. It leads to greater skill.
4. There is less danger of neglect.
5. The marketing opportunities are better.
6. In fruit-growing the specialty is less confining.

Comparison With Other Lines of Business

Fruit growing may be begun with a comparatively small investment. Mercantile and manufacturing lines of business are today conducted on an immense scale; large capital is demanded to embark in them. The fruit grower's

investment is comparatively safe. He seldom loses his money. The business offers him a continued livelihood. In mercantile and manufacturing lines this is untrue in a larger percentage of cases.

Fruit-growing presents no dead-line. In business occupations men are shelved early in these days of keen competition. The fruit grower is sure of a business and an occupation so long as he is able to conduct them.

The financial returns from the business compare favorably with those from any other line demanding equal capital and intelligence. The average fruit-grower's salary probably exceeds that of the average teacher or college graduate.

The business offers the best of opportunity for independence and for service to the community and to one's fellowmen. It enables the owner to live amid pleasant surroundings and to build a home in conjunction with a business, an opportunity which many a man without a home can appreciate better than the fruit grower himself.

At 11.30 Mr. Geo. F. Wheeler of Concord read the following paper on

STRAWBERRY GROWING

Mr. President, Ladies and Gentlemen:

This subject has a wider range than I have been able to give to it in so short a paper, so I can only bring to it a few observations as a grower of this fruit in the town in which I live. I wish I could bring statistics to show what the production of this fruit is now compared to twenty years ago; my observation leads me to say the crop has fallen off largely. So I am glad to have the subject brought up yearly to show there is an interest taken in it. Our population is increasing and wants native strawberries. I know our markets are sometimes crowded with southern berries so this competition cuts our prices down at times but my experience has been that there is money to be made in this crop and I think it will continue to hold its own with the other fruit crops we grow.

The introduction of the Hovey's Seedling gave a great impetus to strawberry growing. During the time of its popularity I was led to purchase some of the plants together with the Brighton Pine. Growing strawberries first for home use, afterwards for market and at the time I obtained

these plants, I was considering what occupation I should devote myself to, my strawberry bed awoke within me a love for the soil, for the marvelous things it is able to bring forth. So my strawberry bed has continued to be a source of unfailing delight to me, my recreation which I could always return to from the other work on the farm with a feeling of rest and contentment.

I would advise all young men who are starting out in agriculture, to study one line of work that they may take exceptional interest in; make a hobby of it; the spirit of investigation and research it will lead into will be of great interest. You will not be troubled in the growing season for lack of work, your whole time can be filled up by having a specialty to take up when other work slackens. The choice of the situation and soil to be used is a matter of importance. If one was free to choose the right place he would first consider a near market, then for soil he would select a rich loamy one inclined to hold moisture so the land would be able to withstand a drought of ten days in fruiting season. This condition is not always met with so I would not have any farmer or owner of a garden kept from growing this fruit at least for his family, if he has many adverse conditions to contend with. On a warm, moist, elevated sloping situation the plants will grow better, berries will be firmer and sweeter, less care is needed to keep down weeds that generally abound in a strawberry bed. The best preparation is necessary; if the land chosen is wet it must be drained to the depth of two to three feet. If a piece of pasture or grass land is selected it must be cultivated two years with some clean hoed crop.

The destruction of beds by the white grub shows us the importance of this preliminary work. If stable manure can be obtained I should apply eight cords per acre to these crops so to have it incorporated in the soil. The fall before setting I should apply eight cords manure and have the land thoroughly ploughed. Any process which leaves the land in a deep rich and mellow condition insures success as far as the soil is concerned. The spring is the best time to set for field culture; have the land ploughed again. One of the reasons of poor success is not having the ground half worked. Where stable manure is not used, ground bone or high grade tankage with wood ashes I have applied at the rate of one ton of bone or tankage with one

to two tons of ashes. I have also used with good results, some of the fertilizers that have a good per cent. of potash. This I applied on the surface after ploughing, working it into the soil. Have the surface of the soil reduced by harrowing to the conditions of a fine seed bed. Set your bed according to the method you intend to use. If matted rows set four to five feet. This plan allows the grower of plants to take up the surplus plants between the rows for his own use or sale and also retain a bed about two feet wide for re-fruiting. If narrow rows, set plants three to three and a half feet, plant 15 to 20 inches apart according to the variety. If large salable fruit is the object, the runners must be placed so the plants will have six inches of ground. I mark out the rows by using a garden line for the first row then use a marker that marks out the required distance. Always run the rows north and south when possible.

Success in transplanting the strawberry depends first on the quality of the plants and second on the manner of doing the work.

Plants with small crowns and an abundance of fibrous roots are the most desirable. If the plants have large leaves, cut them off so that the roots will not have to support this unnecessary foliage before the plants are well established also shorten the roots if long 1-3 to 1-2. I use a strong garden trowel in setting; make a wide deep hole that will receive the roots without doubling them up; press the ground against the roots sideways. Use care not to set too deep; have the crown of the plant above the level of the ground. If set too deep the plant will not grow. Cultivation should follow soon after setting by using a scuffle hoe on either side of the row. Do not wait until the weeds start to do this; cultivation means more than the destruction of weeds so I would repeat this every week by using a cultivator so as to establish a loose soil to prevent the evaporation of the soil moisture and keep it for the good of the growing plants. Varieties is a question more difficult to answer; this is more true of strawberries than any other cultivated fruit. Many varieties are of local adaptation. A new sort must have an examination in each locality before its fitness can be determined. The best of the varieties are short lived and their popularity soon gives way to a more promising new rival.

The varieties to be of commercial importance should combine in a large degree fair size, productiveness, firm texture,

attractive color, symmetrical form, good flavor and an adaptability to a wide range of climatic conditions.

Summer care of ground:—Keep all blossoms cut on new set plants as they appear and all runners cut until the plant has become established to send out strong runners. For your fruiting beds where you wish to grow good fruit, have the runners placed around the plant; plant six inches apart, after they become established cut out the old plant; this does not give good berries if allowed to remain to fruit; you also get rid of a plant that will annoy you by sending out runners in a place where they are not wanted. Where plants are grown in matted rows little is done in setting runners. In cultivating, always run the cultivator in the same direction so the runners will all be turned the same way. Spraying is of benefit to many varieties having a tendency to rust as this holds it in check.

The winter protection is a very important one. We are liable to have the ground uncovered so it is always best to cover. This can be done by using meadow hay or other coarse material. I have also used coarse horse manure. I think it best the following spring to let this remain as long as you can without injury to the plants. You prevent the plant from starting early by holding them in check a few days longer, the plant will escape the late spring frosts.

Marketing the crop. It is of great importance to locate where there are pickers to be had; one should not grow more berries than he can find help to do the work at the right time. If I have good berries that will admit of sorting I have the pickers use two baskets as they can be sorted better and with less handling at this time. The best are picked in quart baskets and placed in shallow trays only one layer; picked in this way they are carried to Boston on teams which do the work more acceptably than the railroad. I think in time our best strawberries will be marketed in packages similar to what are now used in California for our home or nearby market.

After the crop is gathered I usually plough the ground, turning in all plants, weeds and mulching. Sow the land at once to buckwheat, or cow peas to be ploughed under when grown. By manuring the land again in the fall I have it ready to set plants again or in in the best condition to grow other crops. Where the strawberry beds have been kept clear of weeds, no chickweed or sorrel, the beds can be

kept for fruiting two years, at little expense for weeding, and satisfactory results obtained. But you are liable to get your land infected with white grubs, as the May Beetle lays her eggs on the plants in June. So you have this to consider in carrying over an old bed.

I have been growing berries for nearly fifty years; the obstacles to be overcome have not yet occurred to make me dissatisfied; I see new points of interest and, a more ardent desire to continue in this most important branch of fruit cultivation as long as I have the strength to do so.

Is this fruit culture profitable? I unhesitatingly answer "Yes." Profitable in more ways than one; profitable in the income we receive from it in dollars and cents; profitable as it tends to develop our better natures. Then shall we not make our homes attractive and pleasant, that when our children go from us to the great battlefield of life they may think of the old homestead with all the pleasant things among which will be not the least, the strawberry bed. So I will close with this quotation from one who held an honored position in the agriculture of this State:

"Then cultivate fruit for yourself. Plant for your children, plant for your neighbors away off in distant cities; plant for the stranger that may come among you; plant for all and let all enjoy earth's richest fruits without stint or measure."

Following discussion it was voted that the sincere thanks of the Association be extended to the Worcester County Horticultural Society for the free use of their hall and the aid in preparing for this meeting, and to the speakers who so ably helped to make the meeting a success and to the officers of the Association.

The afternoon was a joint meeting with the Worcester Society presided over by Pres. O. B. Hadwen. Prof. F. A. Waugh lectured on "Pruning Fruit Trees."*

*Printed in proceedings of Worcester County Horticultural Society.

MASSACHUSETTS FRUIT GROWERS' ASSOCIATION

Thirteenth Annual Meeting, March 13-14,
1907

WEDNESDAY, MARCH 13, 10.30 A. M.

The first session of the thirteenth annual meeting was called to order by President Whitney with a larger number of members present than usual for the first day. Mayor J. T. Duggan extended a cordial welcome to the members of the Association to the beautiful city of Worcester and wished them an interesting and profitable meeting. President Whitney replied with well chosen words and then gave the

PRESIDENT'S ANNUAL ADDRESS

Ladies and Gentlemen and members of the Massachusetts Fruit Growers' Association:

It is not my purpose to weary you with any extended remarks at this time. It is a custom among you, as well as among other organizations of this kind, to have the presiding officer break the ice with a few words by way of introduction. We as an organization meet chiefly for the exchange of ideas and the recital of our experiences while engaged in horticultural pursuits. For leaders we have with us men of recognized ability and prominence in different lines of work; their lectures and the discussion, which is sure to follow, will be valuable to all and worthy to be printed in full in our annual report. Our ability to do this depends upon the funds in the treasury and I hope that all who have interests of our Association at heart will make an earnest effort to increase our funds by increasing the membership thus adding to our financial strength and extending our beneficial influence. We have had many names on our lists, some men prominent in other lines of business and some who have passed on to the more perfect life. During the past year the great Destroyer has entered our ranks and left many vacant places and even now, as I speak to you, one of

the founders of our Association, our first president lies at the point of death in this city. It would seem fitting and proper that some action be taken at this meeting to show our appreciation of his help and our sorrow at his absence from our midst.

While Massachusetts is preeminently a manufacturing and commercial state yet her agriculture and horticulture are by no means insignificant. Our Society should have 500 members and could, if each member would bring one new member with him at our next meeting. Consider yourself a committee of one to increase the membership; go forth into the highways and the byways like a good evangelist and compel your neighbor farmer and fruit grower to join us. It has been suggested that we ask aid from the State and that we deserve it as much as many of the incorporated agricultural societies. It would seem that our age and activity would warrant recognition by State authorities, surely the horticultural interests of Massachusetts are of great importance and fruit growing should be encouraged within her borders. Could we receive such substantial aid as does our sister state of wooden nutmeg fame, the land of steady habits, then our future would be assured. The past year has been one of profit and success to most fruit growers in this state so far as I can learn yet we have our troubles and to some it would seem that they are increasing rather than diminishing. The insects and fungus diseases continue to thrive and multiply, much to our annoyance. Gypsy and brown tail moth, San Jose scale, plum rot, peach yellows and pear psylla, apple scab and the smallpox of our Baldwin keep us guessing as to the size of our probable profit or loss on our venture. The severity of the past winter has doubtless killed nearly, if not quite, all the peach buds in Massachusetts, still the few we do have this year will very likely bring much higher prices than usual. And then another trouble, some may not consider it a trouble, but a help. I refer to the proposed legislation in regard to grading, packing and marking our fruit, particularly apples. While I do not mean to say that all who raise fruit are absolutely honest in the way they pack and mark it yet I maintain that there are fewer dishonest men among the farmers and fruit growers than in almost any other kind of business. The matter will be discussed here to-morrow morning and I will not anticipate. The meeting is yours to

make as pleasant and profitable as you can and I am at your service to the extent of my ability.

I hope and trust that aside from the work accomplished and the information gathered at these sessions you will all consider the most pleasant memory to be that of acquaintance made and friendships renewed.

The reports of the Secretary and Treasurer and the Auditor were next read and approved.

Dr. E. Porter Felt of Albany, N. Y., then discussed the question

THE INCREASE AND CONTROL OF SAN JOSE SCALE*

There is no denying the fact that the San Jose' scale has extended its range greatly in recent years and that it has become very abundant and destructive in many sections. A knowledge of the life history and habits of the scale is of greatest importance. The crawling young in this latitude are abroad from about the 20th of June till late fall, and during this period it is very easy for an animal or a man working in an infested orchard, to carry therefrom to clean trees, enough young scales to infest a neighboring orchard. The unrestricted breeding of this pest upon trees is also very favorable to its spread, because the large numbers of crawling young increase immeasurably the chances of some finding their way either upon other insects or by being carried by other agencies, to adjacent trees. Such conditions should be avoided wherever possible and usually this is more practical than is commonly supposed. We would, therefore, emphasize first of all the necessity of recognizing the insect, and secondly the advisability of avoiding the combat as long as possible.

It is immensely cheaper to fight this enemy on some other man's land, than to let it go and in a few years be obliged to fight it throughout your own orchards.

Once an orchard is infested there is no way out of the difficulty except to fight the pest, and this can be done satisfactorily only by the adoption of most thoroughgoing methods. There is nothing which has so repeatedly demonstrated its value in the East as an insecticidal spray for the

*Abridged because of later information in Dr. Felt's other papers.

San Jose' scale, than the lime-sulfur wash, a mixture which may be prepared in a variety of ways and yet give most satisfactory results provided the essentials of thoroughness and timeliness are observed. We really believe that these last two factors are, in many instances, of more importance than the way the wash is prepared. The boiled lime-sulfur wash is, generally speaking, the one that can be used to best advantage. We have been advising the employment of 20 lbs. of lime and 15 lbs. of flowers or flour of sulfur to 50 gallons of water, boiling the same actively at least 30 minutes. Our method has been to put a few pails of water in a kettle over a fire, bring it nearly to a boil, add the lime followed at once by the sulfur, stir thoroughly and repeat occasionally to prevent the material from caking on the bottom of the kettle. Thirty minutes of active boiling should produce a deep brick color in the clear liquid. The preparation may then be removed from the fire and strained through burlap or ordinary wire mosquito netting. The latter, we have found, sufficed very well provided a fair amount of care was exercised to keep the apparatus clean. The strained mixture is placed in a spray barrel and enough cold water added to bring the amount up to 50 gallons. We believe it essential, in preparing this or any other lime-sulfur wash, to secure a good grade of stone lime; that is, one that will slake vigorously and, when treated as indicated above, leave comparatively little sediment in the kettle.

It is not always convenient to secure a kettle for boiling purposes, and we have found that a wash calling for the same amounts of lime and sulfur and, in addition, 10 lbs. of sal soda, would give practically as good results as the boiled wash provided it was properly made. The procedure is as follows: Put five or six pails of hot water in a wooden barrel or other vessel, add the lime quickly following with the sulfur and sal soda, in the order named, and stir vigorously till slaking is completed, being careful at the outset to stir enough so as to promote a vigorous reaction. It may be necessary to add a little cold water to keep this compound from boiling over the top of the barrel. After the more violent boiling is completed, cover the top of the barrel with burlap and allow it to stand 30 minutes or more. There should result an excellent compound of deep red or even pea green color with very little sediment. Strain and dilute with cold water to 50 gallons. This wash has been

used several years in succession with very satisfactory results. Another wash can be prepared in practically the same manner as described above, except that four to six pounds of caustic soda is substituted for the sal soda. Some have found it possible to produce, without boiling, a very satisfactory lime-sulfur wash by simply using a larger percentage of good rock lime, depending upon the heat produced by its slaking to effect the chemical combination. The lime-sulfur washes, in addition to their effect on the scale, are also exceedingly valuable as fungicides, being practically a specific for the leaf curl and of considerable service in the case of other fungous diseases. It is shown above that this mixture can be prepared without excessive labor and, while it possesses caustic properties, we believe that a moderate amount of care and energy will reduce these troubles to a minimum. We are of the opinion that the making of this preparation has been a sort of bugbear to many fruit growers, whereas, as a matter of fact, it is really a very simple operation and there is no reason why its caustic properties should occasion more than a slight annoyance.

The above mentioned factors have led to a considerable demand for something more easily prepared and, as a result, many experiments have been made with oils of one kind or another.

Experience in New York State has indicated almost invariably that these proprietary oil preparations must be used stronger than recommended by the manufacturer; namely, at about the rate of one of miscible oil to ten or fifteen parts of water. These substances are more costly than the lime-sulfur wash, but on the other hand they are easier to apply and spread more readily on the twigs. This is particularly important on the somewhat hairy or pubescent twigs of the apple, which are not easily covered by the lime-sulfur wash, though it can not be claimed that these preparations have any marked fungicidal properties.

A word in this connection relative to apparatus may not be out of place, as it is impossible to do good work without satisfactory equipment. We can not throw a fine spray any distance and it is therefore necessary to have a nozzle extension or some means so that we can get to the limbs to be treated. Even with the best of nozzle extensions and towers or other apparatus to stand upon, it is extremely laborious to spray the tops of tall trees and, on this account,

we advise judicious pruning with the definite purpose of lowering tall trees. Trimming, if done carefully can reduce the height of large trees by some 10 feet in the course of two or three years without material injury, and where scale is abundant it is very probable that this trimming will have to be done in the near future if not attended to early, in order to remove dead or dying branches. Plenty of power is another essential to good work, as a weak spray always drifts with the wind. It makes little difference whether this power be supplied by engine or hand, provided, in the latter case, that the man at the pump is equal to the task assigned. We can hardly expect a man to maintain an adequate pressure if he has an old-fashioned, hard-working pump to contend with, but if it be a modern affair, easy of operation, there should be no difficulty, though where a large number of trees are to be sprayed it is probable that, in the long run, an engine of some kind will prove most efficient.

In closing, we would summarize as follows: The San Jose scale has attained a wide distribution in our fruit growing sections. It has demonstrated its destructive ability beyond all question, and greater losses are bound to occur in infested orchards unless remedial measures are adopted. Despite the general distribution of this pest, it is by all means advisable to avoid infestation so long as possible. Finally, when the enemy appears, secure good apparatus, not necessarily expensive, and give the most thorough treatment possible with any one of the several insecticides known to be effective in checking this pest.

Question. "In spraying high trees, how reach with fine spray?"

Dr. Felt. "I should reduce the height of the trees."

Question. "Are not the soluble oils injurious to the trees?"

Dr. Felt. "We can tell better in five or six years. My impression is that successive annual applications will after a few years, injure trees. On several trees in New York city treated with these oils, I have seen what appeared to me to be oil injury. This does not develop itself the first year and you think your trees are benefited. So, I say, go a little slow with oils. We want something that we can use from year to year without injuring the trees."

Question. "How late in the season can we spray in

Massachusetts without injuring the trees?"

"The time in New York would be Apr. 11-15. You can put on the lime sulfur wash or oil preparation up to the time your buds become swollen and the leaves are about one-half inch long."

Mr. Race: "What would you call high trees?"

"About twenty feet high."

Mr. Race: "Will you send formulae to any one?"

"Yes, to anyone who sends us a postal card."

Mr. Miller: "Is it advisable to use the lime sulfur wash if trees are not infested with San Jose Scale?"

"I am inclined to think you would get your money back. Mr. E. L. Morrill of Kinderhook sprays his pear trees with lime sulfur wash because this application gives him better fruit."

Mr. Hutchins. "Suppose there is an orchard without any of these scale, how does the scale reach it?"

"It can be carried in many ways. Let a man drive into an infested orchard and then drive to one of your trees and hitch there and there is a chance that the scale will get on the tree; it is also blown from one tree to another but only for a short distance. The principal distribution is from men and animals and more particularly from birds. Take a city like this,—Prof. Hodge estimates that about 90 per cent of the trees in Worcester are infested by scale. This I presume is true and the scale carried by the English Sparrow."

Mr. Moore: "As regards the distribution of the scale being almost invariably from the English sparrow, the farmer's don't have one English sparrow where they have one thousand robins. They are a nuisance."

Question. "Can this formula be used after the tree is more advanced? Is it a good idea to use it in June?"

"Yes, it is a good idea to use it then, but it is much better to use it earlier. You must spray many times if you try to spray during the summer. I believe it would pay to go over a badly infested orchard two or three times before the leaves appear rather than to take the chance of getting rid of them later."

A committee of five was appointed to bring in list of officers at afternoon session.

Pres. Whitney then introduced the Hope Farm man:

Herbert W. Collingwood, Editor Rural New Yorker, who spoke on

CULTIVATION VS. TURF CULTURE

“I am reminded at this time of the congregation that was asked whether they would rather have their minister read his sermon or talk without notes. They finally decided that it would be better for him to read it for then he would know when he got through.

“I am going to take some positions that possibly your experienced growers will not back up. I want to make a fair statement of the difference between the two systems of culture and would present as fairly as I can both methods. I do not think we can say that either one is not a sensible method of fruit growing. I want to make it just as clear as I can that what I am talking about is this method of keeping a thick mulch on the soil all the time. The trouble with many of our sod orchards is that people actually expect three times as much from the soil as they have any right to. They expect to get dead wood, hay, then to turn in stock, and last of all to get a good crop of fruit. Most of the arguments against the sod method are based upon such conditions. I do not want to be understood as saying that you can raise a high grade of apples if you take everything out of the soil and put nothing back. It cannot be done. You must leave the hay and everything in the orchard so that it will go back into the soil. People will say that we don't want the small sized fruit. I think we do. I think the demand in the family trade is for average sized fruit and to my mind the best trade is that of the family.

“Now, what do we mean by ‘cultivation’ and ‘turf.’ By cultivation I mean an orchard that is ploughed and cultivated several times each season with some shallow working tool. By turf I mean a good orchard seeded to grass sod, where the grass is left in the orchard, either pastured or cut, and left on the ground.

“There is a fair place for each method. It will not do to say that you cannot grow fruit without cultivation, because a good many of us are doing so. I know that some of the cultivators say that in time we will be forced to turn up our sod and cultivate, but it doesn't look so now. I would not recommend mulching for all situations, because I know that on some soils and in some situations cultivation is better.

Unless you can provide a large amount of mulch material at a low price, it would be folly to try mulching young trees from the beginning. It would be far better to cultivate them or not plant them at all.

"After trees get into bearing the ground can be well seeded and if the grass is left around them, I am very sure they will make a satisfactory growth and produce fair crops of medium sized, high-colored fruit.

"I can use leaves from the woods. I think the mulched trees will be more permanent than the cultivated, being grown in a natural way.

"Another thing that claims our attention right away is the effect upon fruit growing that the San Jose Scale is to have. If you are not convinced that it is a terrible thing coming into our part of the country, I can assure you that it is. I would not attempt to go into an old-fashioned, high orchard and try to keep the scale off. In the first place it is almost impossible to spray, and I consider it not worth the while to try. The idea is that this attack of the scale is going to force us to raise a new kind of tree, both apple and peach. I believe that we must get our trees down nearer to the ground. I am planting my peach trees fourteen and fifteen feet apart because I believe that it pays me to get the tree down close to the ground. They are easier to spray and to handle. I am trying a similar experiment with apple tree stock. Planting about 16 to 18 feet apart in hope of getting low-down trees. I am planting apples sixteen feet apart each way. I think it will pay me to raise these trees up to seven or eight years and at the end of that time transplant them. I would not suggest this as a plan for everybody but in many cases it is the best thing to do. No man today can sit down and say, 'I am going to do just as grandfather did because grandfather did it.' Things are developing. A man can no longer be tied down by cast-iron rules. Each man must find out for himself what is best for his own land.

"The mulched trees seem to be at work all the time. There is a slow growth of wood all through the season. Then we do not have to prune the tree so often. You can let the tree grow until it comes to development. I believe that is the kind of tree that we are trying to grow.

"I do not believe this system is so well adapted to the peach or pear as to the apple tree. There seems to be some-

thing in the peach that demands sunshine in the soil, so I would not advise this system for the peach.

“I run my mowing machine in my orchard four or five times during the season.

“All I ask is a fair test between the two systems. As to where I think this mulching system can be used to advantage—If I had a level rich farm, I do not think I should attempt the mulching culture, unless I had a very low, damp piece of ground. I have noticed on this kind of soil where rough, low grasses grow that the soil dries quickly when the ground is left bare. In a very dry season that soil bakes up hard like a brick. If I had a wet piece of ground, hard to drain, I should want to put that into the mulch system. If you let the grass grow a long time it will help out the ground.”

“If I were so situated that I could not do heavy work I should put in a fair-sized orchard and cultivate it by the mulch system. By the use of leaves, sods and other things for mulch you can develop a good orchard with only your own labor.”

Meeting adjourned to 1.30.

AFTERNOON SESSION, 1.30

ELECTION OF OFFICERS FOR 1908

The committee on nominations reported and it was voted that one ballot be cast for the list as reported and they were declared elected:

C. A. WHITNEY, President,	Upton
JOHN W. CLARK, Vice-President,	North Hadley
S. T. MAYNARD, Secretary,	Northboro
S. T. MAYNARD, Treasurer,	Northboro
J. LEWIS ELLSWORTH, Auditor,	Worcester

DIRECTORS

ESSEX COUNTY:	E. A. Emerson, Haverhill; J. J. H. Gregory, Marblehead.
SUFFOLK COUNTY:	George Cruickshanks, Chelsea.
NORFOLK COUNTY:	A. F. Stevens, Wellesley; Monroe Morse, Medway..

- PLYMOUTH COUNTY: Augustus Pratt, North Middleboro; Walton Hall, Marshfield.
- MIDDLESEX COUNTY: C. F. Hayward, Ashby; M. P. Palmer, Groton; George F. Wheeler, Concord; C. S. Pratt, Reading; E. F. Farrar, South Lincoln.
- HAMPSHIRE COUNTY: John W. Clark, North Hadley; E. Cyrus Miller, Haydenville.
- HAMPDEN COUNTY: Ethelbert Bliss, Wilbraham; L. W. Rice, Wilbraham.
- BERKSHIRE COUNTY: George G. Walker, Williamstown; R. H. Race, North Egremont.
- FRANKLIN COUNTY: M. H. Vincent, Conway; E. F. Copeland, Colrain.
- WORCESTER COUNTY: O. B. Hadwen, Worcester; S. J. Emerson, Lunenburg; E. A. Hersey, Westboro; Elliott Moore, Worcester; W. D. Ross, Worcester.

Then followed an address by E. Cyrus Miller, Haydenville.

POSSIBILITIES OF THE APPLE IN NEW ENGLAND

“I consider it a great honor to be present here today, and an especial honor considering the other speakers on the program. I have had some experience in apple culture but do not come down here today to give you any hot air but to give you the results of my experience in apple culture and its possibilities in New England. You know about the man who went about telling what he knew about farming who could give a very interesting and instructive address but who had no farm. I do not propose to pose as that kind of a speaker. I would like you to visit our orchards in Hampden County and see what has been accomplished there and you will admit that we have solved in a measure the possibilities of apple culture here in New England.

“It would seem that one need but affirm that the apple is our national fruit to have it immediately accepted by everyone as a self-evident fact. It has been well said that the apple is the most perfect union of the useful and the beautiful which the earth knows, and surely no fruit in the north temperate zone can take the place of the apple as a

food product. Most of our cultivated fruits rank as luxuries, but the apple in most parts of our country is one of the leading staple products of the farm. It is a commodity of trade, in the handling of which, after leaving the growers' hands, large numbers of people are employed. Due to its numerous varieties, its season of maturity extends throughout the year, and, in late years, the natural keeping tendency of the apple has been supplemented by artificial means of preservation until we have them sometimes two years from the time when they were gathered from the tree, in a perfect state of preservation, as far as their physical appearance is concerned, but, of course, with a somewhat impaired condition as to their natural flavor.

“Apples have probably been grown longer in New England than in any other section of our country, but as the early settlements gradually extended back from the Atlantic coast regions the pioneers who overspread the interior of New York, hewing farms out of the forests, planted orchards around their new homes and finding the apple so naturally adapted to that location, soon wrested the supremacy from the New England apple grower. Whether we are ever to attain the remarkable success of our New York apple growers may be a matter of opinion, but it is surely the consensus of opinion among those who have made an exhaustive study of the adaptability of the apple to our soils and climate, and to the economics involved in all phases of the industry, that there are great possibilities in apple culture right here in New England.

“Although we have many types of soil, the apple so marvelously adapts itself to such a variety that there are few hill farms but what some portion of it will support and develop an orchard if properly planted and cared for. As soil fertility is an important factor in all lines of crop production, it is especially so in regard to the production of the apple. This crop is not produced in a year, but is the culmination of a series of years' growth; hence it can be readily seen that the richer the soil in plant food, the quicker will be the development of the tree, and other things being equal, the sooner the tree will bear profitable crops of fruit. It is in our soil that we have one of our richest assets, particularly the soils of newly cleared forest lands, where the accumulation of leaves, branches, etc., for years have produced a rich leafy mold; especially suited for the rapid growth of

the tree, and at a later period for the development of fruit of the highest degree of quality and color. Our own orchards occupy lands that were but a comparatively few years ago forest tracts, and much of the success of our efforts in orcharding is directly traceable to the choice of such sites for orchard purposes.

“If much of the land that is being denuded of its forest growth by our industrious lumbermen could be transformed into profitable orchards we would more readily pardon the ruthless abandon with which he performs his work, and far greater wealth would be added to valuation in localities suffering such a change. As altitude and perfect drainage play an important part in perfecting the apple, it can readily be seen how desirable our hilltops and sunny slopes are for the cultivation of the apple.

“Our climate, together with the proper feeding of the tree, produces a fruit of unexcelled quality. The other day I bought a large, well colored Colorado apple, but two bites of it was enough. I afterwards made a hearty lunch upon some of our native apples. With such varieties as the Baldwin, Greening, Russet, Northern Spy, Mackintosh, Gravenstein, Porter, Astrachan, when well grown, we can well hold the supremacy as to quality over any other section of our country, and these are the varieties, as a whole, which are recognized abroad as of the greatest excellence.”

Mr. Harold L. Frost of Arlington then lectured on

THE BEST OUTFIT FOR SPRAYING FRUIT TREES

“In the early days of fruit growing, the farmer with his virgin soil, isolated position and hardy stock, had only to dig a hole in the ground and plant his tree. No necessity for spraying apparatus. If there was a crop of fruit, which usually occurred every other year, he harvested the same, marketed it, and considered that all the returns were profit, as it had caused him no expense.

“As he commenced to import new varieties, as he was brought into closer touch with other sections of the country, and even with foreign countries, he noticed that his trees were not as hardy, although he was producing much better fruit. In many cases, he not only lost some of his fruit, but he also lost the tree itself. This he was unable to prevent, and had to change his crop perhaps after enormous expense, as in the eastern part of the state pear trees which

were just coming in bearing, were entirely exterminated by the pear blight. It was like a pestilence of the early days.

“Among the enemies of the fruit tree or shrub we have the insects, which I consider of the greatest importance. Then fungus diseases, which are a plant growth working mainly on the outside of the tissues, and which may be comparatively easily handled by means of spraying.

“And last, the bacterial diseases which work in the interior of the plant cells are more difficult to combat.

“The insects affecting the fruit grower may be divided into two general classes, the leaf-eating and sucking. It is necessary to know which one we must handle in order to determine the best apparatus for spraying the orchard, as one insecticide may demand one form of apparatus, and another another form.

“For leaf-eating insects, we use, as a rule, some arsenical poison which is applied to the foliage.

The insect eats both the plant tissue and the poison, which taken into the digestive organs kills the insect in this way.

“The sucking insects, such as the San Jose scale, scurvy bark louse, aphid and others sucking the sap from the tree, must necessarily be destroyed by something either closing the pores or killing by penetration. This in the past, has required a different form of apparatus for applying than the arsenical poisons.

“The first spraying carried on in this country was about 30 years ago, when the potato beetle made its appearance in quantity.

“There is no one apparatus adapted for all conditions, and it is absolutely necessary for the grower to study the work which he has to do, and then buy the pump and other equipment which will suit his purpose to the greatest advantage.

“No man should use a power sprayer unless he has a large number of trees, as he is simply making the apparatus too expensive, there being many hand pumps which are capable of doing an enormous amount of work in a very short time. There are a large number of barrel pumps on the market, all of which are good, and with care can be made to last a number of years.

“For the smaller fruits, such as currants and gooseberries, the poison may be applied for the leaf-eating in-

sects as a dry powder. For this purpose there are makes of powder cans and pails which are very effectual.

“For the leaf-eating insects, we have, first arsenate of lead, paris green and london purple. For the sucking insects, the soluble oils and lime sulfur. For the fungus diseases, the Bordeaux mixture, ammonical solution of copper.”

President: “We expected to have Prof. Kirkland, Supt., of the Gypsy Moth Commission but he is unable to be present. He has sent to take his place Mr. Charles W. Minot of Winchester who will now address you.

WORK OF GYPSY MOTH COMMISSION IN 1906

It gives me great pleasure to meet you today. Last year it was because of business and this year it is sickness that prevents Prof. Kirkland from meeting you.

The time is so short I will read a few statements although I prefer to speak from my own knowledge of the progress of the work during the past year.

During the season of 1907 we have added 5 towns to our territory. The diagrams show the territory infested from 1900 to the present time.

There are 144 cities and towns infested with the gypsy moth and 67 more that are infested with the brown tail making a total of 211 infested cities and towns in the state. This infested territory covers an area of 2500 square miles or 75 per cent. of the taxable property of the state. \$315,000 has been expended by the state, cities and towns during the past year and about the same amount by individuals, making about \$750,000 expended in the state of Massachusetts during the past year in killing these two pests.

Last year an effort was made to introduce European parasites of the moth, which cost about \$10,000.

The policy of the year's work was to check the spreading of the moth by killing along the roadsides, burlapping and spraying the trees. 1200 men were employed and 8000 miles of streets cared for. The same body of men was employed in freeing the thickly settled portions of the infested districts. 90 per cent. of the thickly settled residential districts were so thoroughly cared for that there was very little trouble from the moths.

The work has been hindered by the failure of certain

important towns and cities to make appropriations and also by inefficient workmen.

The plan for 1907 is, if legislature appropriates funds, first to hold all that has been gained in the residential districts and on the highways and second to work back to the woodland property. For this work we have at the present time an efficient force organized. We can make a better showing now than we have in the past because of the good organization of forces.

The work of the National government has been of great aid to the state works.

On the lands controlled by the metropolitan water and sewerage board and by the metropolitan park commission great gain has been made which helps materially in the care of the infested district.

The assistance of the press of the state has been continuous and cordial and has probably been the most helpful single factor in the educational campaign. Outside of the infested area it is a matter of education.

On the parasite question the superintendents takes conservative ground. Laboratory experiments and those conducted on properly enclosed trees show that the European parasites have bred in a normal manner upon the gypsy and brown tail moths.

The residential sections can be handled, the roadsides can be handled but the orchard sections and the woodlands cannot be handled for a number of years.

We have done the best we could with this problem; have inspected and located the infestations; have induced the owners to cut or have cut the hollow trees wherever possible; have endeavored to have the trees properly burlapped and tended and sprayed; but it is only honest to say that we have succeeded in making but a beginning and that in most towns the orchards are in a worse condition now than a year ago. More money will be needed for this work if we are to hold our own. Much money will be needed if we are to make a gain.'

At 4 P. M., the session was adjourned to 10 A. M. Thursday.

THURSDAY, MARCH 9, 1907

10.00 A. M.

The morning session was called to order by President Whitney and the Committee on Memorials consisting of R. H. Race, H. Ward Moore and the Secretary reported as follows:

PAST PRESIDENT JAMES DRAPER

Died at his home 287 Plantation St., Worcester, at 9 o'clock yesterday morning after a lingering illness. He was born in this city Aug. 31, 1842 and spent his whole life here.

During all these more than three score years he has been an important factor in the upbuilding of the city in many ways. He was one of the originators and first President of this Association and has ever been a most active worker for the growth and development of everything pertaining to Horticulture. He loved his calling and gloried in its advancement.

Through his death we feel that we have met with an irreparable loss and it is now our duty to pause a few moments in our work to testify to the sterling worth, upright character, and ennobling influence of our departed brother. Of no man can it be more truly said that "to know is but to love him."

CALVIN L. HARTSHORN

In September Mr. Calvin L. Hartshorn was called to cease his labors in the vineyard and cross the borderland into the great unknown Beyond.

Quiet and unassuming in his bearing, yet active and efficient in labors, an honest helpful friend, he will be missed by all.

CHARLES E. PARKER

Again another call came and Mr. Charles E. Parker of Holden was the one to answer. A man strong in his convictions and a fearless champion of the right, a zealous worker for our Association, and a lover of nature, he will be missed.

ELIJAH W. WOOD

Once more the summons came and Mr. E. W. Wood of West Newton heard it and his life work was ended. As treasurer of this Association we trusted in his integrity, as a member we received his council and advice, as a man we loved and respected him.

A committee consisting of A. F. Stevens, R. H. Race and E. R. Farrar appointed at the 12th annual meeting reported as follows:

ALBERT G. SHARP

He was born in Berkshire Co., Sept. 21, 1850 and died Dec. 25 1905. He was educated in New England and early began the cultivation of small fruits in which he was eminently successful devoting his entire time to it. His strict integrity, honesty and fidelity soon won for him a most enviable reputation as a fruit grower. His interest in this Association was ever alert. He served as president from 1901 to 1903 with dignity and honor. Brother Sharp always seemed to be glad of life because it gave him the chance to love and work for mankind. He was a most earnest believer in that bulwark of American liberties the Christian home and the highest type of good citizenship.

SAMUEL H. HARTWELL

The first vice-president of this Association was born Jan. 4, 1834 and died Feb. 21, 1906. Brother Hartwell was respected and honored by all who knew him. Honored alike by church, town and county, his genial nature and kindly heart made him beloved by young and old. We know him best as a most successful fruit grower and as an exhibitor of Gravenstein apple and Concord grapes, having produced in one year six thousand barrels of apples and selling one annual crop on the trees for \$2,000 after retiring from active labor. In his death our Association, his town and the state have lost a most valued member.

BENJAMIN P. WARE

Brother Ware was born in Salem April 9, 1822 and a practical education in the public schools of Salem. From early youth and during his long life he was always interested in agricultural and horticultural pursuits. He became a member of the Mass. Horticultural Society in 1865 and

was vice-president from 1896-1903—A pioneer in advocating the establishing of a state experiment station and for ten years a trustee of the Mass. Agricultural College, he was a charter member and trustee of the New England Agricultural Society for forty-two years and was president of the Essex County Agricultural Society sixteen years, past-master of the Mass. State Grange and a member of the Mass. Fruit Growers' Association from its organization. His courteous manners and genial spirit attracted all who came in contact with him.

The Resolutions were adopted and then the President introduced, Prof. John Craig, Cornell University, Ithaca, N. Y., who spoke on

IS LEGISLATION NEEDED FOR GRADING AND MARKING OUR FRUIT?

“I esteem it a special privilege to appear again before this body of fruit-growing men.

“I have been impressed during the last few minutes as I have heard the resolutions just read. I want to say a word on that subject. We have noted the passing away of many eminent men. The last time I was here I happened to speak about the large number of mature men and men of middle age who were in attendance. Now if the fruit growing institutes and conventions are to prosper, we must have young men to take the places of those who are passing away and it seems to me a work that this society might interest itself in, the work of getting young men interested in fruit growing, men who are going to take up practical scientific work and carry it on.”

Prof. Craig advocated co-operation on the part of fruit growers of the state and country at large, bringing before the convention the big success which has been achieved by combined effort in the West. Through a uniform grading and packing the fruit bearing association labels has become recognized as strictly what it is sold for, and through concerted action these co-operating farmers have been able to control the market and demand good prices for good products.

Regarding legislation, Prof. Craig cited the Canadian “fruit mark” act of 1901, which specifies the grades into which fruit shall be separated and specifies the label which

must be put on each crate. The law provides that all fruit cases must bear the full name of the packer and a label in the case of a closed package which does not allow the fruit to be seen, which correctly represents the quality of the fruit contained. The Canadian act allows four grades, known as fancy, No. 1, No. 2 and No. 3. Penalties are imposed of from 25 cents to \$1 for each case wrongly marked, and provisions are made for inspectors to watch the fruit packages and brand any which are not packed according to law.

The packer who labels a crate of fruit with a stamp which in any way overrates the quality of the fruit is liable, and the packer in an open case where the fruit is seen is equally liable if the top layer is of better quality, size, color and general condition than 85 per cent. of the fruit underneath.

Prof. Craig read a number of letters from leading English market houses, all of which asserted that the Canadian fruit packed in accord with the strict legislation was far more desirable and brought a higher price than American product in the British markets. The American crop was considered uncertain and cases from this country were looked upon as somewhat suspicious, while the quality of the Canadian fruit was guaranteed. Prof. Craig argued that while all farmers are not dishonest, the temptations under present conditions are strong and offer ample opportunity to cheat the purchaser. Unless this is prevented by legislation which makes false packers and markers liable, the honest fruit growers must suffer for the misdeeds of the few.

Discussion opened by Dr. George M. Twitchell, Auburn, Me.

“I want to say that I am deeply interested in this subject and the one thing I fear most is legislation, I mean legislation before we are ready for it. The first thing we want is education. We want to feel that there is a better way for us to handle our fruit products than singly and alone. We want to feel that we must co-operate: that there is a way for us to handle our fruit products so that we may secure more than we have in the past and that way is through education and a knowledge of what good fruit is, what the demands of the market are and how we can best meet those demands.

“In Maine our packing is mostly a commercial packing. We leave it entirely to the packers and they pack as they think the market will take it. They usually do it from a commercial standpoint entirely.

“It seems to me that we might come together here in New England and bring about results that as single states we could not accomplish. Our interests are identical and were we united in work, results could be secured that otherwise would be impossible.

In 1905-6, large shipments of apples were made from this country to England but our apples did not bring as much as Canadian apples. Are we satisfied to take that stand in the market? How shall we get away from it? We shall get away from it, I believe, by one of the two plans outlined today.

“It seems to me that this may be done through something like Fruit Act legislation, but we must withhold all efforts toward legislation until we have so educated growers’ that there will be willingness to accede to the demands of the law.

“The question as to whether the packers in Canada are living up to the law is answered by the educational effect of the Fruit Act legislation at the end of four years.

“Is it worth while for us in New England to attempt any movement looking to the matter of legislation in the future with the hope that we may secure uniform grading, packing and branding of our apples, and then comes the next question as to how we shall proceed and how far we shall go.

“I want to see this convention, representative of New England, take a more definite stand than has yet been taken so that we can say that New England is being organized under some plan of work.

“I would like to see a resolution passed looking toward legislation when we have been educated for it. If we are united upon the legislation that is passed for this country and go to Congress with a solid front having behind us the desire to co-operate on the part of all growers, we shall have accomplished all we desire. This will be of great advantage to New England. The state of Maine is making great strides in fruit growing and we feel that something must be done to check growers.”

Ex-President H. O. Mead, Lunenburg:

"I wish to say that the man who succeeds in this world fits the conditions around him and the man who doesn't fit those conditions will make a failure.

"I know that the fruit growers of California are at the mercy of the packers but the conditions there do not correspond to ours. The man three or four hundred miles from a market has not the same conditions as we have here where the market is right at home. The average man can take care of his products better than it can be done by anyone else.

"I wish to say that I don't believe in any legislation to regulate the grading or packing of our fruits either for the home or the foreign market. I look upon such laws as class legislation for the benefit of the buyers and shippers of apples. From the best information obtainable regarding the practical working of the Fruit Marks Act its enforcement has resulted in putting the packing and shipping of apples into the hands of the large dealers and shippers in that fruit and driven from the export business the small grower who formerly shipped directly to the foreign market. Such laws almost always help the few at the expense of the many. Each grower must accept not the price he asks but the price some one is ready to give him. This matter has been referred to as similar to the pure food act and its effect on canned meats, as a reason why the government should inspect fruits. Would the government be willing to furnish free inspection of fruits, as in the case of meats, to add to the profits of dealers and growers of fruit. The average business man will do his business better than some crank legislature will do it for him.

"The foreign buyer does not need government inspection of apples for they are now sold on their own merits in the foreign markets and receive a satisfactory and fair inspection. Every market demands a share of cheap goods and business methods will regulate such matters better than legislation. I do not believe that any man who will put up square goods will fail to receive what those goods are worth. I believe that the fruit growers of this section should stand up for their rights that they now have so far as the packing of their own goods is concerned, and we have the right to pack them as we choose.

"I would be in favor of certain laws, viz: To prevent

the branding of the fruit of one state as the fruit of another state; To prevent the marking of one variety as being another variety; To compel every man who ships his own apples to put his name on them, and if a shipper, to put his name on.

"What would it amount to with a law drawn as loosely as the one read to us where the inspector can pass fruit or not and a man shipping 1000 barrels of apples can induce the inspector to pass them while the small shipper cannot.

"I believe in honestly packed and marked goods and these methods will be the most profitable for any grower or dealer to adopt.

Dr. Twitchell: "Mr. Mead wants so much more legislation than the rest of us that I should want time before agreeing with him.

Mr. D. H. Knowlton, Secretary of Pomological Society of Maine:

"I have enjoyed very much the presentation of Prof. Craig's paper and I know that on account of its value it will have widespread circulation.

"At the Buffalo exposition my attention was called to the Fruit Marks Act. In the autumn of that year I was in Halifax and called upon one of the inspectors there and found out how they were enforcing the law. I have watched the operation of that law ever since and I am convinced that the price of Canada apples has advanced beyond that of Maine apples. It was only at the time this act was passed that Maine Baldwins were selling for more money than Canadian fruit was selling for and I have known instances where Canadians did just what our friend here

"At our annual meeting this matter of legislation along

At our annual meeting this matter of legislation along the lines of the Fruit Marks Act was called up for our consideration and Dr. Twitchell was chosen as agent of our society to bring about the better packing and marking and grading of our fruits.

"I am very proud to stand before you here as a delegate of our society with delegates from all over New England for whenever there is difficulty in anything there is wisdom in counsel.

"I have in mind that once a year when our annual meetings are held a delegate could be sent from each society and an annual meeting of representatives of the different

societies be held. Then they could go back to their own societies and tell what they had learned by consultation. I hope at this meeting that something of this kind may be done. I assume in that each society would be willing to meet the expenses of the delegates. In my own society we have not much money to work with but I think our society would consent to pay the expenses of one delegate every year.

“We want each society in New England to be invited to send at least one delegate annually to a meeting for the discussion of matters of common interest to fruit growers’ and then present to their respective societies the different conclusions they may reach.”

Among others who discussed the subject were T. L. Kinney, and William Stewart of Vermont; President J. H. Putnam of the Connecticut Pomological Society; Ex-Mayor Blodgett and John W. Clark.

It was voted that a committee be appointed by the chair to write our state congressman, urging reciprocal arrangements with the German Government, whereby our fruit may be received in the German markets with only a nominal tax.

The following resolution was then adopted. Resolved, That this Fruit Growers’ Association hereby invites all fruit growers’ association of New England to unite with it in sending a representative to other like associations once a year for conference and discussion of all problems vital to the industry and for bringing about more uniform conditions in growing, spraying, cultivating, and selection of varieties as well as such action as may be deemed best to insure more uniform sorting, packing and branding fruits for market.

Upon motion of Ethan Brooks a vote of thanks was extended to the Worcester County Horticultural Society for its valuable assistance, to the delegates from other states who had been with us and to the officers of the Association.

The meeting then adjourned.

The afternoon session was a joint meeting with the Worcester Society. State Forester F. William Rane spoke on “Horticulture in Rural Economies” and the proceedings were printed in that Society’s report.

MASSACHUSETTS FRUIT GROWERS' ASSOCIATION

Fourteenth Annual Meeting, March 11-12,
1908

WEDNESDAY, MARCH 11, 10 A. M.:

The fourteenth annual meeting opened in Horticultural Hall under the most favorable conditions and with the usual number of members present.

President C. A. Whitney called the meeting to order.

"We are very fortunate in meeting here to-day to be favored with the chief executive of the City of Worcester, his Honor, Mayor Logan."

Address of welcome by Mayor Logan:

"Ladies and Gentlemen: As mayor of the city of Worcester, I am very glad to welcome to our city the members of the Fruit Growers' Association of Massachusetts.

Now the business in which you gentlemen are engaged is one of the oldest of which we have any knowledge as it was begun in the Garden of Eden, and, if the record is true, the growing of fruit got us into considerable trouble then which has lasted ever since.

As I understand it one of the objects of this association is to improve the quality of fruit and incidentally to put the price up to the rest of us. I have one or two things to say on this question. It seems to me that there has been a great deterioration in the quality of fruit since I was a boy but I am glad that you men are trying to do your best to improve it. While optimistic in most things, in the matter of fruit I am pessimistic and I sigh for the fruit that we had when I was a boy. The fruit we used to get (not buy, mind you, used to taste so good. I can almost taste those peaches, pears, plums and apples that our neighbors used to raise. That was before the day of barbed-wire fences.

I trust your convention here will be successful and

that you will do the best you can for us who consume the finished product."

President Whitney: "We appreciate the honor that you confer upon us and to show our appreciation we meet here every year. While we hold other meetings elsewhere, we never hold our annual meeting anywhere but here."

PRESIDENT'S ADDRESS

We meet here to renew our fellowship, to receive fresh enthusiasm for our work, to encourage and instruct each other in the art of beautifying and improving the heritage our Heavenly Father has given us. One of the most profitable as well as pleasant features of meetings of this kind is that we get acquainted with each other. There is nothing like personal contact with men to take the conceit out of us. We learn that we don't know quite everything that is of value in the real human knowledge and experience. Narrow views of a subject are likely to be broadened when measured with the views of other men who are thinking on the same subject, or engaged in the same line of investigation. Crude ideas cannot but be polished a little when rubbed against the ideas of our fellow-workers. More can be accomplished by meeting and exchanging ideas than could be by each one hermit-like working out his theories alone; hence these meetings ought to be largely attended. The benefits cannot be measured by dollars and cents that it takes to get here. Every impetus given to the growing of fruit, flowers and garden products will bless our state for generations yet unborn.

We are glad at this time to be able to meet so many delegates from our sister states and hope that our coming together will be mutually beneficial and that you, one and all, will be able to take back with you some thought, or have learned some lesson from our mistakes, that will be of value to you in your work. We give you a cordial welcome and invite you to join with us in our discussions. We assure you that we feel honored by your presence. We are glad to meet the new members who have recently joined this Society and hope they will find it to their interest to become permanent members. We not only gather at these annual meetings to greet old friends and talk over our season's ex-

periences but to form new acquaintances to broaden our views, to extend our field of usefulness by imparting to others any knowledge we may have gained during the year. The aims and objects to such an organization as this are manifold but the principal ones are that in these meetings we become better acquainted with each other, get a clearer conception of life and have a better understanding of our special lines of work by an interchange of views.

We come here laden with the fruits only of our personal experience but after our meeting is ended we return to our homes enriched by the experience of all. He is a dull scholar indeed who is not amply repaid by the useful lessons here brought to his mind.

Some one has said "Horticulture pursued as a science is a most useful industry, enlarging the number and improving the quality of the fruits of the earth that add so much to the comfort of human life; as an art it cultivates the taste, refines the sensibilities and educates the spirit to a higher grace and beauty. It is a higher department of agriculture requiring the same primary study but a more careful training. Horticulture, the science and art, we pursue, like music, like painting, indicates in its advancement the march of civilization."

A generation ago people jumped into horticulture in the belief that all that was required was to plant seeds, plants and trees, of our different fruits, both tree and vine, and let nature do the rest. The masses did not consider it necessary to have any special knowledge or even to use great care and judgment to insure success and the result has been that their work records more failures than successes.

In the last few years horticulture has been studied as an art, the slovenly fruit grower and would be horticulturist are going back to the growing of corn and potatoes leaving the field open to the legitimate horticulturist who has intelligence and energy to devote to his calling. One of the great elements of success with the fruit grower is a resolute, determined and persevering industry in one and the same direction. The success of a man is only limited by the amount of persevering thought and determined resolution he possesses; to the persevering there is no doubting or waiting; he knows no to-morrow or next week and it is one determination and one resolute "now." To him mountains

are mole hills, while ant hills are mountains to the vacillating and fearful. Mature your plans, work with a calculation beforehand, have a fixed object in view at the beginning of the year and bend all efforts toward that object. He who has an object in view at the beginning of the year, will have an object to view at the end of the year. The first records we have of a fruit tree is one that grew on the banks of a river Euphrates. This was a peculiar tree, it was an apple tree. I have often wondered what kind of an apple tree it was, but judging from the mischief it caused I believe it must have been a Ben Davis apple tree. We read that a garden was the primitive paradise and even now a tastefully planned, judiciously planted and well kept garden has still lingering about it many of the charms we like to attribute to the original Eden. To the true lover of rural life it seems in the fullness of its summer beauty to be indeed almost a paradise regained.

This Society is an educational gathering where theories are discussed, where methods and experiences are given, where varieties are talked about and their adaptation to our conditions of soil and climate made the test of value to us. Horticultural science as well as other sciences is born of human necessity. As population increases smaller areas are compelled to supply our wants and better systems of cultivation must be devised and varieties more suited to our immediate vicinity must be produced.

It is true that the successful fruit grower and experimenter has a multitude of obstacles to overcome, much of his labor must of necessity be in vain, and does not have the promise of a sure reward. The cold blasts of winter, the searching rays of summer sun, the extremes of dry and wet, the untimely frosts, the feathered creation and the ever alert tree agent all come in for a share of his labor.

As we meet once more in this hall of our birth one familiar face is absent, since last we gathered here he has passed into the Great Beyond, but he went "Not like the quarry slave scourged to his dungeon but sustained and soothed by an unfaltering trust in that Divine Being that smooths the pillow for such as he." One of the founders of this organization, a President of the Worcester County Horticultural Society and also of the Massachusetts Horticultural Society, a Trustee of the State College, one of the Park Commissioners of your beautiful City of Worcester

and for more than half a century a leading figure in all horticultural work Obadiah B. Hadwen lived a life of usefulness and grandeur, a kindly, courteous gentleman of the old school, his very presence lent dignity to our meetings and his words gave us inspiration. As the donor of the Park that bears his name and by his bequest to the University of this City his name will be cherished and honored by the generations coming after us. We are fortunate that it was our lot know him and to love him and while we drop a silent tear to his memory let us with renewed energy take up the work he did so much to advance. By the unalterable laws of nature men must come and men must go but the work we are here to represent must go on forever.

And now at the close of this meeting I return to your hands the trust you confided in me two years ago. I thank you for the honor you conferred upon me but more than all I am glad of that friendly appreciation which prompted your action and I assure you that my association with the genial, earnest and intelligent men of the Massachusetts Fruit Growers' Association will afford me many pleasant and cherished memories while I live.

Following this the reports of the Secretary, Treasurer and Auditor were read and accepted.

President Whitney then introduced Prof. H. T. Fernald, Entomologist of Massachusetts Agricultural College, who gave a practical talk on Problems in Fruit Growing that have interested me in the last 10 years. (Lecture he was to give "Insects injurious to our Fruits and how to control them," could not be given on account of stereopticon outfit not being in readiness).

Prof. Fernald:

"Mr. Whitney indicated in some degree the position in which I am placed but has not indicated the fact that the lecture which I had prepared was wholly in connection with the slides. I am sorry because I know that the slides were excellent as they were made by the man who is the most expert in making colored slides of any one in this country. I cannot give you at all the lecture that I intended to. I will try to give you an informal talk.

I am going to speak on some of the problems that have interested me in this state during the last 10 years.

Now the first thing I noticed when I moved into this state was that the fruit was not what it ought to be. I can appreciate the mayor's statement that he would like to have some of the fruit such as he used to have when he was a boy. The fruit today is not what it ought to be. And now I am not speaking of all, but, with the exception of specialties, it is a fact that about one-third of the fruit produced today in Massachusetts should be placed in the swill barrel, and I think the time has come when the Massachusetts fruit growers should stop growing cider apples, and get into line with the Western growers who are getting 10 cents apiece for apples. This state certainly can produce fruits of the best sort and there is not one man in 100 in this state today who is taking any particular pains to raise good fruit. Perhaps this is a matter of inheritance. The problem of the early settlers was the problem of raising not the luxuries but the necessities of life. People could get along without fruit in those days better than they could without corn, and so fruit was neglected. Thus it became a tradition that the only thing needed was to plant a tree and let it alone for a series of years. This has resulted in an enormous crop of cider apples. Now people have become more particular about the quality of fruit and, unfortunately for the people here, it was the West that first saw the need for first-class fruit. Some of the largest shippers to Boston are men who are not farmers today and who never were, but are men who have seen the business opportunity, have bought land and raised fruit for the purpose of making money more rapidly than they can make it in other lines. In other words, there are business men who have seen the opportunity which the farmers and fruit growers themselves have neglected and they are now reaping the profits. We can compete with these men. There are men, a good many in this state today, who are doing it. It is not a question of men, it is a question of ability and will. It is not an easy matter to take up a new line and carry it out to success, but it can be done, and if Massachusetts proposes to get the trade, she can do it. Indeed, in the West, the people are under many disadvantages. They have to pay freight rates much higher than ours, those a short distance west of the Mississippi being from 60 to 75 cents per 100 pounds for apples shipped in carload lots, while the highest rates in Massachusetts are 15 and 16 cents.

We should plan for novelty and attractiveness. How many pick out a few firsts from a pile and leave the most of the pile for seconds. There are many ways in which we must change if we are to be successful. We have our insect foes here, fungus diseases, while our foes are not always the same as those of the West, they are all alike injurious. There are over 500 kinds of different insect pests known to attack the apple.

When we meet the requirements of the market fruit growing in Massachusetts will be a different proposition from what it is to-day, and the Western men will find that there is no market for them in Massachusetts."

DISCUSSION

What is the very best method of combating the railroad worm or apple maggot?

It is a very difficult insect to control. One of the most difficult because of the peculiarities in its life. It is a thoroughly protected insect. We find it under different conditions at different times. At some points it is very vulnerable but it has very few vulnerable points. There are but one or two suggestions that I can make. There is a period when the maggot is leaving the apples and going into the ground and while it is in the ground, when it is less protected from attack than at any other time. The maggot is in the fallen fruit and by allowing hogs and fowls, or both, to run through under the trees that they may pick up the fallen fruit, thus getting the maggots, you will be able to kill the next brood to a large degree. A little light cultivation under the trees would cause no injury to the trees while it would aid in getting out the railroad worms just below the surface, but it is a very hard insect to combat.

How soon after the fruit falls before the maggot emerges from it?

It may be five minutes or it may be five days.

Mr. Fisk of Grafton. Some varieties of apples used to grow fine but of late years are so full of nubs, that they are not fit for anything. It seems to be in certain varieties, have seen it in the Northern Spy.

Dr. Fernald. In the past five years I have had many apples sent in which have slight holes here and there. I cut the apple right through the center and have discovered what

I believe is the cause in most cases. That is, we are not raising plums enough and the plum curculio is passing in large numbers to the apple and while as a rule, I do not know that the curculio can live in the apple, it injures it. There are certain cases which appear to be due to the fruit being touched just a bit by the frost. I do not feel certain that I have the explanation for all cases and I presume certain varieties of fruit are more acceptable to the plum curculio than others.

Have you anything to offer by way of preventive?

The plum curculio is claimed by many to be responsible for the loss of over 90 per cent. of the plums which set in the first place. They attack the plum first, then the peach, and the apple is coming in for its share of attention; but I think if we keep the curculio down on the plums it will not appear so much on the other fruits.

The plum curculio appears in the spring before the fruit has developed sufficiently for it to lay its eggs and it occasionally develops an appetite and gets hungry. It then nibbles on the tender leaves while it is waiting for a chance to deposit its eggs. One of the best times to spray for many things is just before the blossoms open; then a repetition of this spraying just after the blossoms fall and you will be most certain to reach some of the curculio. Don't wait for the curculio to go to the apple but attack them on the plum before they leave.

Is there not an apple curculio as well as a plum.

There is. Collections have been made at the Massachusetts Agricultural College every year since 1886. We get curculio brought in every year and we keep tabs as to how abundant they are; in that way we keep watch on the insects and during these 21 years I believe eight specimens of the apple curculio have been sent in. The apple curculio is a negligible quality as compared with the plum curculio.

Is there a pear curculio?

No, possibly the plum curculio may attach to pear.

Messrs. Eames and Morse then spoke upon the subject, "What Fungus Pests have been seriously injurious to our Fruits, the past season." E. T. Dow of Michigan spoke on methods of exterminating pests. A nominating committee was appointed by Pres. Whitney to bring in a list of officers and the meeting adjourned for dinner.

WEDNESDAY, MARCH 11, 1908

1.30 P. M.

The first business of the afternoon session was listening to the report of the nominating committee. It was:

JOHN W. CLARK, President,	North Hadley
S. T. MAYNARD, Vice-President,	Northboro
C. A. WHITNEY, Secretary-Treasurer,	Upton
J. LEWIS ELLSWORTH, Auditor,	Worcester

DIRECTORS

ESSEX COUNTY:	E. A. Emerson, J. J. H. Gregory.
SUFFOLK COUNTY:	George Cruickshank.
NORFOLK COUNTY:	Abel F. Stevens.
PLYMOUTH COUNTY:	Augustus Pratt, Walton Hall.
MIDDLESEX COUNTY:	C. F. Haywood, George F. Wheeler, E. R. Farrar, M. P. Palmer, C. S. Pratt.
HAMPSHIRE COUNTY:	J. Maxwell Clark.
HAMPDEN COUNTY:	E. Bliss, L. W. Rice.
BERKSHIRE COUNTY:	George F. Walker, R. H. Race.
FRANKLIN COUNTY:	M. H. Vincent, E. F. Copeland.
WORCESTER COUNTY:	George C. Rice, S. J. Emerson, Elliott Moore, Walter D. Ross, E. A. Hersey, Adin A. Hixon.

This report was unanimously accepted, and it was voted that the Secretary cast one ballot for the list who were then declared elected.

President Whitney then introduced J. H. Hale, of Connecticut and Georgia.

PEACH GROWING IN NEW ENGLAND AS COMPARED WITH OTHER SECTIONS OF THE COUNTRY

Peaches have been grown in Massachusetts for considerably more than a century and in different parts of America the same length of time, but up to 25 or 30 years ago it was believed that favored portions like Deleware, and along the lakes, were the places where peaches could and were to

be grown successfully. There was only a limited demand for peaches then, and they were used mostly for canning.

The consumption of fruit has grown apace because it is an easy way to feed better, and people appreciate the easy ways of living. The consolidation of railway lines has made it possible to carry fruits farther, quicker and better, and tended to create an enormous demand for fruit.

Various sections have their troubles in peach growing. In Massachusetts the danger is in the winter freezing of buds, in Georgia, frost, while in the South beside troubles in growing, the distance of the market makes shipping a great expense. There are hundreds and thousands of acres of peaches in the South and West, that the fruit is shipped to New York and New England markets. There are crops that can be raised in Massachusetts that will pay well. For instance, Rhode Island greenings, can be raised and sold at a greater profit than California oranges, for they bring a larger price per bushel than the oranges, and the grower of oranges has freight to pay.

What is the matter with us here in New England that we don't wake up to this opportunity? We have been talking about these things here for 15 years, and yet all the time every once in a while some of the young men and middle-aged men are packing up and going West and South to an opportunity not as good as here. I believe there is no place in America, nowhere on earth, where there is a better opportunity for the doing good and having a good time than in this northeast corner where we live.

The Massachusetts peach grower has got too good an opportunity. It is too easy to reach the people. I don't think you have faith enough in Massachusetts, in yourselves, because if you had you would bring your boys and girls along with you, I see more young fellows here than ever before, but more of them are under 25.

No peach orchard was ever grown in the United States which was not first in the heart of the man who planted it.

There are a greater number of disadvantages to most states than here. The opportunities are greater, and I know I make more money from my Connecticut orchard than in Georgia.

Of the varieties suitable to this climate Massachusetts has borne as many as any other state. The danger of freezing is not so great, as new varieties are being grown

that are carrying the safe planting line farther and farther North. It is up to the experiment stations in various states to experiment with seedlings and find what varieties can be grown. I believe in specialties and while the average farmer can grow the peaches he wants for his family supply, he doubted whether he could make money growing peaches and running the farm, too.

I haven't any doubt but what there are suitable lands in Massachusetts to plant 20,000,000 peach trees. There might not be a market for these when they all matured, but I don't believe so many will ever be planted. You have the market here, the soil here, the climate here.

Massachusetts, certain portions of it, has just as fine peach growing climate and soil on the average, as any other state, and it has the market.

DISCUSSION

What are the best varieties for Massachusetts?

The more hardy are the white peaches. People know whether or not they like to eat a yellow or white-fleshed peach. As people become greater purchasers of high-grade products the more they want the white-fleshed peaches. New England is the section where they will pay more for white-fleshed peaches. The Greensboro is hardy and early and would ripen about the first of August; Waddell, a low, broad-spreading tree; the Carman, hardy, large in size, a money-maker; Champion, will grow to pretty good size, if not thinned at all; should be picked before it is fully ripened because it is so tender; Belle of Georgia ripens before Elberta, sweet and rich; Elberta is not as hardy, far more tender when growing, it is a money maker; Crosby is a peach of great value, as a rule the average fruit grower will tell you that the Crosby is too small, yet as a matter of fact the biggest peach I ever grew in my life was a Crosby. It has a very small pit, a very rich, delicious flavor; Hills Chili, a weak grower, needs excessive stimulation, tremendous thinning. Very dry, can be kept two weeks after being taken from the tree.

What proportion would you set out?

It depends entirely upon your market, your labor conditions, etc.

For planting peaches in Massachusetts, should much attention be given to slope of the land?

On a good elevation, should not care much which way the land sloped.

How far apart should peach trees be planted?

All the way from 11 1-2 feet up to 22 feet; plant 20x20, then inter-plant.

What time do the pruning?

After the severe weather of winter is over. Better prune when you can but if you have but a few to prune, do it as early as you can.

I suppose you have been in the business 20 years. Will you thus prognosticate for the next 20 years?

Twenty-five years ago orange culture in California was not known, now, they will this year ship 30,000 ear loads of oranges. Within the last ten or fifteen years prior to two years ago, there was a steady decrease in prices. The crop two years ago sold for higher prices than it has at any time in twenty years. I believe that with the growth of our population, the greater appreciation of fine fruit, there will never be at a time when good peaches or good fruit of any kind will not sell here at good prices, because we have no freight tariff to pay. Labor does not cost any more here than in other parts of the country, and I do not think that peaches will sell for less than they have for the last twenty years.

What causes the peach trees cracking?

A rapidly growing tree filled with water freezes, but that tree will live and grow twenty years if kept up in other ways.

What is your opinion of the conditions that will be brought about by the setting out of orchards in the South and West?

That will not make any difference. They cannot grow as good apples as we can here. In regard to spraying, I want to ask you how many times you spray, How many of you spray 5 times, how many 4 times, how many 3 times,

Mr. Fisk. It seems as if we ought to spray from six to ten times and it puzzles me as to the most practical way to do it.

My laborers are Italians from the north of Italy. They love growing things for they have worked among them all their lives. It was the first country to spray intelligently. I am not up-to-date. I use a single barrel pump on a truck and a horse can get around everywhere with it. Last year one of my Italian workmen was over in Italy and he brought

back a knapsack sprayer and one day he said, "I spray with knapsack sprayer, cheaper than the other one." He sprayed one large block with the knapsack sprayer. The minute this spray pump went onto those Italians' backs they looked as though they were half way to heaven and the cost of that spraying is half the cost of the other spraying. We sprayed last year a ten year old peach orchard with a knapsack sprayer. (Don't say that Hale recommends the knapsack sprayer.) For San Jose scale, we use Scalecide. Our lime-sulfur plant is near my own place. Our orchards are seven miles away. We draw the wash off in the afternoon and use it in the morning. Don't need to be boiling hot. We can warm it up sometimes. Does not always look the same but answers the purpose.

Is there anything better than the lime-sulfur wash?

No, not for peach trees. The oil sprays are better for apple and pear. For peach trees I think we can spray with lime-sulfur one year and oil spray the next. Scalecide is the best of any on the average small orchard.

What kind of apples would you recommend for an orchard in Central Massachusetts?

Ask your land. Would grow Spys, if possible. Baldwins always command good prices. Grow a few of the staple varieties. I believe the time is coming when you are going to grow more and more apples. In getting young trees go to the best dealers you know. If you would have a better orchard get the most vigorous trees you can buy.

Do you know of any man who is growing peaches successfully by the sod mulch system?

No sir, I do not.

After Mr. Hale had finished, delegates from different societies spoke a few words, among them being Dr. George M. Twitchell of Augusta, Me., and H. C. Miles of the Connecticut Pomological Society. Meeting adjourned to 10 o'clock Thursday.

THURSDAY, MARCH 12, 1908

10 O'CLOCK

The second day's exercises were opened by President J. H. Putnam of the Connecticut Pomological Society.

The possibilities of fruit growing in New England are great. Nowhere on earth are there better markets and nowhere on earth can such fruit be grown as here on the hills of Massachusetts.

“The possibilities of fruit growing in Massachusetts” was Mr. Putnam’s subject and he urged upon fruit growers the necessity of study of soil conditions, and the intelligent care of crops. He said that 90 per cent. of the apples in Massachusetts were not raised in orchards but in hedges, pastures and along the roadsides, and if Massachusetts was not the place to raise apples the fruit would not grow under these conditions. The western men that are making a specialty of their garden products could not grow the apples or anything else under the same conditions but they manage to specialize and to receive a good round sum for their wares in the market.

Mr. Putnam spoke of his own experiments in Connecticut and the soil conditions there. He advised other growers to experiment and discover for themselves what variety of apple or other fruit was the best suited to certain locations in their orchards and to go in for the growing of that special kind. By telling of the problems, improper fertilizations and insect pests he described some of the troubles of fruit growers. The San Jose scale, he said, would take care of all the old trees if the men did not take care of the scale.

Mr. A. Warren Patch of Boston then gave The Commission Man’s View of Massachusetts Fruit Possibilities.

The home market for choice fruit is with you every day in the season of apples, pears, strawberries, blackberries, and raspberries. There may be a question about peaches because of the severe winters. I am led to believe they are not a profitable crop for this state taking five consecutive years together. Surely the soil and hills are all right. I do not mention plums because I am not so well informed whether they can be grown as a success. I might include currants; they always have a market although just at present the San Jose scale is causing havoc with the bush. There are grave doubts about the growing of grapes, in some places the Concord has done well. There appears to be no limit to the demand for all fine fruit that can be grown successfully in this state. It settles itself to a matter of quality. Grow less quantity but better quality.

Everybody likes fruit and good fruit. One never hears consumers say anything against a good quality. No purchaser objects to paying a good price for a good article and will continue to purchase and re-purchase while, if he gets inferior fruit even at less prices, he tires of it and soon lets it alone. We have heard it said "fruit is poor this season, don't want any more." My idea is to grow a less quantity, put more time into production. Get the best quality. I am of the opinion that the man who in the future is to be called a successful fruit grower is the one who is something of a specialist. One who devotes time and money to produce the best. You may have noticed that the fine fruit is always sold first and that dealers are often asked for more of "same kind obtained as before." Quality counts. Quality is the name of the most successful fruit grower. It means to feed the roots, cultivate the soil, spray the trees and shrubs. All these matters require attention. They demand work, hard work, and much care. Yet what is worth doing at all is worth doing well, and I may repeat, it is better to grow less fruit in a good manner such as will bring you satisfactory results, after a little the labors will not be so arduous; the crop will somewhat take care of itself. There appears to be a sufficient variety of pears, strawberries, raspberries, and blackberries. It is possible there can be improvements made on these berries. My own idea is that one better try to get the best quality of the varieties already in hand rather than spend time and cash to obtain or up-build some new and untried kinds. No one can deny the fact that color lends much to the selling of fruits. Make the fruits inviting to the eye, the first impression is the one all sellers of any commodity wish to catch, something like "love at first sight."

Where is there a dealer who ever asks growers to send him white currants. The traders are always wanting red ones and in the dark none could tell the difference, but it's the color, the eye makes many purchases. Red apples have proven their claims time and again. It may be a fact that there are a few varieties of apples like the Greening whose reputation was established years ago on which the color line is not drawn, but take it on the other side, notice the thousands of barrels of red colored apples as against hundreds of green, yellow and white ones. The Greening of itself is a magnificent apple of excellent qualities and had

it red color there would not be enough to supply the demand. Even while it is a better apple for using during November, the Baldwin crowds it and why? Because the Baldwin looks more inviting. It pleases the eye, makes the first impression. What demand do you think there would be for strawberries if they were white? I'll wager the consumption would decrease each year and finally cease. Therefore when intending to grow fruit remember there is always an unfilled home market for red strawberries, red raspberries, red apples, blue grapes.

Keep in mind how handsome a dish of blue Concord grapes looks. How attractive a dinner table is with strawberries, blackberries, raspberries, or a plate of McIntosh apples. I'll bet there isn't a man in this room but what would look twice at a young lady going by having on a red sweater, while the same Miss wearing a white cape might hardly be noticed.

I am very safe in saying to each of you that in a commercial sense you cannot produce too many fine apples, raspberries, strawberries and blackberries. They would find a ready market in all your nearby cities and towns as well as in Boston, which is open to you all the time and can be easily and quickly reached by the expresses for the small fruits and freight trains for barreled apples. I believe the possibilities of fruit growing on the hills of Massachusetts are immense. They are equal and, I think, I could say, exceed those of any other section or state. Look at the population of Massachusetts. Notice, please, that at present only a very small quantity of the fruit eaten comes from the soil of this good state.

It is up to the grower to obtain good big profits, a small compensation, or make a failure. Let me repeat, the hills of Massachusetts are with us, the soil is here, the markets nearby and the success or failure lies wholly in the one who is to do the work. Success is yours if you want it.

I wish I could impress upon every man here that the possibility of growing such fruits in Massachusetts as our climate will permit are not realized. You have everything provided for you to grow apples and berries. The only thing lacking is the will power to perform the work. I am afraid too many of the men who own the rich lands of our hills do not appreciate what has been given them, or else

they are too indisposed to put forth the exertion. But, gentlemen, some one will do it if you don't.

These hills are too valuable to remain many more years uncultivated. A few have already realized the richness of these hills and are reaping good reward.

Following Mr. Patch, Dr. George M. Twitchell, a delegate from the Maine Society, reported for the New England conference of fruit growers. Definite action had been taken regarding the size of the barrel or box, and also touching state legislation to secure on every barrel or package the name of the variety and the name of the grower. By invitation the next meeting of the conference will be held with the New Hampshire Horticulture Society, next October. By unanimous vote the association endorsed the action of this fruit conference.

The closing talk of the forenoon was given by Mr. Wilfred Wheeler of Concord.

POSSIBILITIES OF SMALL FRUITS AS A MONEY CROP IN MASSACHUSETTS

Let us look for a moment upon our present conditions and see what cause there is for encouragement in the matter of raising small fruits. We have a densely populated state when compared with other states of the union, with more flourishing cities and towns in a small area than we find anywhere else in the United States. Our census shows that our population is increasing rapidly, and every one knows that this population is using per capita at least four times more fruit today than was used ten years ago. Then, too, our export trade in fruit is going not entirely to foreign ports but to other states north and west of us whose season is later than ours, and who on that account can readily dispose of our products.

Probably our best condition for the possibilities of small fruits as a money crop in Massachusetts is our position in relation to our markets. What other section of the country has such advantages in this respect lying as we do in the center of New England with railroads going in all directions carrying our products to many large centers of population?

Surely we cannot lose sight of this fact and fail to realize that at least in one particular we have a veritable paradise for the producer of small fruits. When we stop and compare our conditions in this respect with those of our southern and western neighbors whose profits are largely eaten up by heavy express and freight rates or whose goods are damaged by long time in transit, then we ought to be thankful that we are situated as we are and that having once grown good fruit we have opportunity to market it easily.

Then again our soils and climate are suited to the development of small fruits, and land that was once deemed unfit to grow fruit upon is now through careful and scientific treatment made to produce large and paying crops. There are no better places for the growing of small fruits than the level land of our hill towns and as for the valleys they can be made to produce abundantly.

I believe that we are only beginning to realize the possibilities for small fruit growing in Massachusetts, but in order to arrive at the best results many of our present methods must be changed. For instance the strawberry is generally grown in matted rows because it is less trouble to grow it this way. The consequence is that the market is each year flooded with quantities of small and poor fruit which hardly pays for picking while the really good fruit brings top prices. To increase our profits we have got to grow better quality fruit, and to grow better quality fruit more attention must be given to the land, to the growing of the crop, and above all to the marketing of the same. Many times profits are cut off entirely by the careless handling of a well grown crop. Let us study conditions and by co-operation help each other so that once a crop is well grown it can be well marketed.

We are all realizing that land is increasing in value in our state and particularly in the vicinity of our large cities so that as the population grows and migration to the country increases much of our best land is taken for building purposes, and the farmers and fruit growers are gradually pushed further back into the country. These conditions, however, should not discourage fruit growing near the cities for an acre of land near a good market is worth more than ten acres that are far away, for in the former case not only can you dispose of your product more readily but

generally the labor problem is found to be not quite so serious.

A good market does not necessarily mean that you have to go to the large cities to dispose of your products for now many of our fruit growers are realizing that a home market is much better and returns a greater profit than is made by sending the fruit to the larger and more congested centers. Last year we had a good example of this in the overstocking of the Boston market with strawberries while many of the smaller towns and cities had to take berries which had been sent to Boston from their localities and then reshipped to them. Of course the fruit was hardly fit to use and the small prices realized raised the cry that the strawberry crop was unprofitable. While all this was going on about Boston I know of a man who was quietly supplying his local market with strawberries which he was selling for 25 cents a quart while it was hard to get 5 cents a quart in Boston for as good berries. Keep in mind your home market and work to supply it with the very best products you are capable of raising.

I have stated that in order to get profits or to increase our profits in small fruit growing we have got to change some of our methods. Let us consider for a moment one of these possible changes.

Strawberries as you all know have the last forty years been grown in the matted row system planting the rows 3 1-2 or 4 feet apart and the plants from 12 to 20 inches apart in the row, thus using from six to eight thousand plants per acre. An acre set in this way costs all the way from \$55.00 to \$100.00 according to various conditions.

Whether you bought your plants or raised them.

What fertilizer you used.

What you have to pay for labor, besides a few minor details.

Now if a man can set out an acre of strawberries for \$35.00 or \$50.00 he is very often tempted to set all the acreage that he can, that is, to spread himself out just as much as possible, believing that there is money in mere acres. What follows? Generally the four or five acres planted in this way are skimmed over with the least possible trouble. The cultivator is used on rare occasions, only when the weeds threaten to entirely cover the plants; hand hoeing and weeding are done in the same careless way and the beds grow

more or less wild sending out quantities of runners which root thickly all over the ground; often, in free plant making varieties, as many as 100 plants will be set to the square foot or over 4,000,000 to acre. When picking time comes there is a great rush for pickers to go over this large area and gather the small and poorly shaped berries that have been produced on these half grown plants. This fruit is then carelessly packed, rushed to market and sold so that the grower probably realizes a profit of \$100.00 per acre. How much better would it be if we would follow the example of some of the New Jersey growers and after selecting an acre of the best land that we have fertilize it very highly and set on this acre 30,000 or even 40,000 plants making the beds four feet wide and setting the plants one foot apart each way, leaving a space two feet wide between the beds. You have the same number of plants on this acre that you have on the five acres referred to but in a more compact form, the setting has cost no more, neither have the plants, the fertilizer has not cost as much nor the application of it, so the only item that we have now to consider is the labor. Of course we cannot use a horse as much proportionately in this acre as in the five, the only place practical for horse labor being between the beds.

Most of the work must be done by hand but this will take no longer than the slight hand work done on the five acres and it can be done more thoroughly. All runners must be removed from these plants for the object in this method of growing strawberries is to get large, well-developed crowns that ought to produce one quart of berries each. Think of 30,000 or 40,000 quarts of strawberries to the acre and place these figures against your five acres of very ordinary fruit. Even at only five cents a quart the acre will produce from \$1,500, to \$2,000 while it would be difficult to get 20,000 quarts from the five acres. The average profit from an acre of strawberries in Massachusetts is not over \$100. This average is taken from a series of five years so it will be seen that we are not getting what we ought to from our land in strawberries growing under the present system.

I said that I would not quote figures but I am going to depart a little from this and give you an outline of the cost and profits comparatively between an acre cultivated intensively and one extensively.

Acres Cultivated Extensively with Plants in Matted Rows.

Ploughing, harrowing, etc.	\$ 5.00 ^s
Fertilizers	60.00
Plants at \$4.00 per 1000	25.00
Setting	5.00
Cultivation and care	55.00
Winter protection	10.00
Spring work	15.00
Mulching	5.00
Picking, 4000 quarts at .01	40.00
Boxes	15.00
125 Crates at .10	12.50
Express at .10 a crate	12.50
Commission on \$400.00 at 10 per cent.	40.00
	<hr/>
	\$300.00

4000 quarts at .10 equals \$400.00 as against 300.00 for the expenses leaves a balance of \$100 in favor of the extensively cultivated acre.

Acres Cultivated Intensively.

Ploughing and harrowing and hand labor	\$ 20.00
Fertilizers	200.00
40,000 plants at \$4.00 per 1000	160.00
Setting	25.00
Cultivation	200.00
Winter protection	10.00
Spring work	15.00
Mulching	15.00
Picking 40,000 quarts	200.00
Boxes 40,000	120.00
Crates 1250 at .10	125.00
Express at .10	125.00
Commission at 10 per cent. on \$4000	400.00 ^s
	<hr/>
	\$1,615.00

40,000 quarts at .10 equals \$4000 less \$1615; profit 2,385.00

From a comparison of the above figures it will be seen that all the profits lie in favor of the intensively cultivated acres. Now let us cut the figures in half on this area and see what result we have:

20,000 quarts at ten cents equals \$2,000. Taking

away the cost of production it leaves a net balance of 385.00 per acre as against \$100.00 per acre in the other method of production. Is not this worth trying for?

Now just a word on varieties, for here lies the medium between profit and loss.

I am not going to recommend special varieties to you for you must find out for yourself what will do best in your climate and on your soil. In Marshfield, Mass., the Marshall strawberry is grown and sold as high as fifty cents per quart, yielding growers \$1,200 per acre profit, yet in our vicinity we cannot grow Marshall at all. We can, however, grow Sample, Glen Mary, Senator Dunlap, Abington, and Parson's Beauty. So study your individual conditions and if you are growing for a near-by market where quality counts for all, grow quality berries and grow them well. If, on the other hand, you have to ship your fruit long distances, grow a firmer berry that will hold its shape and color well. It is at the market end that we must expect our profit, so look to this end more carefully.

While the strawberry is the most popular of the small fruits, the others in that class must not be lost sight of entirely. We may feel that there is a greater profit from a crop which gives a quick return, but this is not always so. The currant, though not grown as a commercial crop to any great extent in our state, is yet one of the most profitable of small fruits and can be grown as easily as any other in this class. The expense of establishing a plantation of currants is greater than that in the case of the strawberry, principally because the returns do not come in so quickly, but once established, the bushes are good for many years and will yield a fair profit providing the market is all right. At present our large markets are supplied with currants from the west and, judging from the native small fruits which appear on the market, it would seem that Massachusetts growers had given but little thought to any small fruit except the strawberry. An acre of currants set four by six feet, 1800 plants, to yield with good cultivation at least two hundred bushels to the acre, or at the rate of about four quarts per bush. These should bring eight cts. a qt., or yield at least \$500 an acre, and after the establishing of a plantation the cost of maintaining should be very small, not more than \$100 an acre per year. The original cost should not exceed \$150 per acre the first year and \$100 the second.

With the increased popularity of the gooseberry, Massachusetts growers should be alive to take advantage of the possibilities of this crop, for its future is certainly assured. Not only is it a profitable fruit to produce, but it is easily grown, cared for and shipped. Indeed, no other fruit crop except the cranberry can be so readily sent to market, for in most cases it is sold green and hard. Its uses are largely confined to preserving or as a cooked fruit, but with a better knowledge of the varieties of the gooseberry its popularity as a table fruit will become more and more apparent each year. Like the currant, the profits of the gooseberry do not come as quickly as in the case of the strawberry but once established a plantation of gooseberries will last at least twelve years and if thorough pruning and fertilizing are practiced, twenty or even twenty-five years is not uncommon for gooseberry bushes to yield and be profitable. Generally speaking fifteen hundred bushes can be set to the acre and after four years these bushes should produce from eight to ten quarts apiece or about three hundred and fifty bushels per acre. The average wholesale price on these should not be less than \$2 per bushel thus yielding in gross receipts about \$700 per acre, or a net profit of at least \$400.

There is a great deal of doubt in my mind as to whether or not the raspberry and blackberry are paying crops in Massachusetts, and while I said that our soils and climate are suited to small fruits these two species will have to be eliminated. So many of our varieties are not perfectly hardy that the crop seems bound to be an uncertain one. To be sure there are localities where the winter does not seem to effect the bushes badly and here provided that the market conditions are right both of these crops can be grown with profit; but I further believe that in order to get the best results from the land both raspberries and blackberries should be grown either in connection with a young fruit orchard or by planting the bushes 8x8 ft., and growing some vegetable crop between them for at least two years. Indeed this combining of small fruits with other crops and particularly with young orchards is proving to be one of the most profitable methods of growing them.

With red raspberries the yield per acre cannot be estimated higher than 2,000 qts. per acre; selling as they do for about .18 per quart the gross returns should be about

\$350 with a profit of about \$150. This will in all probability be reduced to \$100 per acre as an average.

Blackberries while more productive than raspberries seldom bring over .08 per quart and while it is possible to produce 5,000 per acre yet the average yield is much smaller than this.

If 5,000 quarts are produced a net profit of \$200 per acre ought to be realized but for general cultivation not more than \$125 can be expected.

It should be borne in mind that most of these small fruits cost from 2 1-2 to 4 cents a quart to produce so it will not be as hard to figure our profits when the matter is looked upon in this way. For instance if you can produce 6,000 quarts to the acre that fruit has probably cost you \$240 all expenses counted; if you sell it for \$600 you will have a comfortable margin of profit.

Therefore cultivate with the purpose of getting as much for your labor as possible.

In conclusion let me repeat that for profits with small fruits in Massachusetts we have got to cultivate small areas intensively rather than large areas extensively, we have got to select our varieties not only with regard to their productiveness but also to their quality and hardiness, and most of all having once grown our crop to market it honestly packed in the most attractive form, and our profits will not be measured by dollars and cents alone but we will have the satisfaction of producing those fruits that are both healthful and delicious for all mankind.

Former Mayor W. H. Blodgett exhibited a barrel of handsome Baldwin apples which were grown and packed at Belchertown and kept in storage since last fall. Every apple was perfect. Samples were free to the fruit growers.

The meeting then adjourned to 2 P. M.

The afternoon session was a joint meeting with the Worcester County Horticultural Society as has been the custom for years. Prof. Fred C. Sears, Pomologist of the Massachusetts Agricultural College, spoke on "How Can We Develop Commercial Orcharding in Massachusetts."

This was printed in the report of the Worcester County Horticultural Society.

MASSACHUSETTS FRUIT GROWERS' ASSOCIATION

Fifteenth Annual Meeting, March 10-11,
1909

WEDNESDAY, MARCH 10, 10 A. M.

Notices having been duly sent out about 100 members and friends were present at Horticultural Hall, Worcester, when the meeting was opened at 10.30 o'clock by Pres. J. W. Clark of North Hadley who introduced Mayor Logan.

Pres. Clark. I am very much pleased to hear that Mayor Logan gets his living out of his orchard and that the office of mayor is simply a side show. I take pleasure in introducing to you Mayor Logan.

Mayor Logan: Mr. President and Gentlemen: You are not here to have the mayor teach you anything about fruit growing but during the year that has passed since I met you before I trust we have all learned something, you in the matter of fruit growing and I something in municipal politics. Your President has said that I get my living from my orchard. What a living I would have if it depended on that! I have the fun of taking care of 28 trees in the rear of my house and I have the fun each fall of buying barrels to put them in and I then have the fun of giving them away and thus injuring your business because I am cutting the market when I give my apples away. I am glad to extend to you the greetings of the city, but I have wondered quite a little why you men of Massachusetts allow the people of Washington and Oregon to send in beautiful apples for which we have to pay ten or fifteen cents apiece but though these apples are beautiful to look at, they do not have the flavor of apples grown here and I cannot but wonder why you men allow this to be.

If apples raised here could be sold for those prices I might be able to live from my orchard which is in reality a great expense to me as the assessors always find it and I

am made to pay well for it. I am glad to meet you here. I trust that your meeting will be profitable and that you will go away prepared to do your work even better than you have in the past.

Pres. Clark: I think the Mayor misunderstood me. What I said was that I understood that he got his living out of his orchard, not from it.

ADDRESS OF PRESIDENT CLARK

Since our organization here some 15 years ago we have annually met here and I can truly say that Worcester is a beautiful city and we enjoy coming here very much. This hall is one of the best in the state in which to meet and as we come back year after year, we think of the men we have known who have passed away, (the last being Mr. Hadwen) who have done such noble work, and we hope that our society will go on with its good work.

I will say a word regarding western apples to which Mayor Logan has referred as being of poorer quality than ours. A short time ago Mr. Hale was in Missouri and an apple was brought to him with the request that he name it. Now you know what he thinks of the Ben Davis apple. As he bit into this apple he immediately said, "It is a Ben Davis, the best one I ever tasted." The apple was papier mache filled with sawdust. We in New England can grow as good apples as there are and we hope next fall at the fruit show in Boston to show you as good apples as can be grown.

The reports of the Secretary and Treasurer were read and accepted. The Auditor announced that he had examined the books and found them correct.

There being no committees to report the members listened with great interest to the address of Dr. E. Porter Felt of Albany, N. Y., Entomologist of the State of New York.

THE LATEST AND BEST METHODS OF CONTROLLING INSECTS AND FUNGOUS PESTS ATTACKING OUR FRUITS AND ORNAMENTALS.

Dr Felt: I was much pleased to hear our president stand up for the quality of the New England fruit, especial-

ly that produced in the Old Bay State. I have always had a notion way down in my heart that the apples grown on these rugged farms tasted a great deal better than those raised in western New York.

An ounce of prevention is worth a pound of cure. Nowhere has this maxim wider application than in the insect world. The best method of controlling insects, paradoxical though it may seem, is to have none. The man who keeps a considerable area in one crop year after year, particularly if he intentionally or otherwise provides an abundance of winter shelter, such as hedge rows, stone walls with wide waste strips, brush, etc., can hardly blame insects if they make the best of conditions and multiply enormously. Many an outbreak is to be charged not to inability but to ignorance or culpable neglect. Even the gypsy and brown tail moths, enormously destructive and expensive as they have been in this section of the country, exist here solely by the sufferance of man. There is a record of a naturalist giving a public notice of the gypsy moth's escape and pointing out the possible danger if it was allowed to breed unrestricted. Apparently his warning passed unheeded. Similarly, the brown tail moth, in its conspicuous winter nests, was brought into this country and allowed to multiply for some years practically without check. There was a time when both of these pests could have been kept out of the country at comparatively slight expense. Consequently, we are paying dear for neglect in earlier years. Likewise, the aggressive farmer who believes in clean cultivation, abhors waste strips beside the fences and practices rotation of crops, is the party who escapes extensive injury by insect pests, not to mention other benefits. This result can not be attributed to exceptional luck on the part of the individual, but is the logical outcome of following a rational system of agriculture. The man who would control insect pests should first of all consider carefully his conditions, and ascertain whether reasonable modifications in agricultural practice would be likely to result in greater freedom from destructive outbreaks. Having planned operations so as to reduce the danger of loss by insect pests to a minimum, then, and only then, is he in a position to consider what may be accomplished by using insecticides. Too often these materials are regarded as remedial in nature and are so employed altogether too frequently. The ideal and by far the more

satisfactory method, is to use insecticides as preventives in the same way that we are obliged to employ fungicides. This can be accomplished satisfactorily only when one knows the insects likely to cause loss and the manner in which the damage is inflicted.

It will be seen from the above that the hand-to-mouth method of rushing around after insecticides and spray apparatus after most of the foliage has been devoured, is far from true economy. Systematic spraying for a definite purpose is the keynote to success in controlling insect pests. By all means know the enemy and carry the conflict into the invaders' territory. This is possible only when a man is moderately well acquainted with the insect pests likely to cause trouble in his orchard, for such knowledge is essential to the proper planning of a campaign. We now propose to spend a little time in discussing a system of spraying for the apple orchard, because such procedure can be readily adapted to the control of insects in other situations.

The first spraying advisable in this locality is the application of a lime-sulfur wash in early spring before the buds have started to any great extent. This treatment is primarily for the control of San Jose scale. It has been found equally effective in checking the blister mite, is of great service in preventing outbreaks by pear psylla, and is at least of limited value in destroying both oyster and scurfy scale. Furthermore, this preparation possesses valuable fungicidal properties, being exceedingly serviceable in controlling apple scab and is regarded as a specific for peach leaf curl.

What lime-sulfur wash shall we use? This question naturally arises in connection with the above recommendation, particularly as there has been much activity in the development of this combined insecticide and fungicide during the last few years. The home-made lime-sulfur wash is still one of the most successful materials which can be used for controlling San Jose scale. It may be prepared in a variety of ways and considerable diversity in proportions is permissible without materially impairing its usefulness.

The last two years have seen a marvellous development in the East in the production of commercial lime-sulfur washes, preparations which depend entirely for their efficacy upon the lime sulfides in solution. Several of these washes

were extensively tested last season in New York State with most gratifying results as a whole, though a few failures were noted here and there. The commercial preparations cost more than the home-made product. On the other hand, they save all trouble in boiling and, most important, they contain a larger percentage of soluble sulfur than does even the Cordley wash noted above. The relative percentage of soluble sulfur and the specific gravity of the Cordley wash in comparison with three standard commercial washes is given in the following table.

Lime-Sulfur Washes

(Analyses by N. Y. State Experiment Station)

Name	Per cent. soluble sulfur	Specific gravity
Cordley	18.09	1.218
Rex	26.00	1.29
Niagara	29.94	1.278
Grasselli	26.00	1.278

These commercial washes give a maximum of soluble sulfides which are undoubtedly the more active constituents of the preparation. They probably contain a very high percentage of what are known as the higher sulfides and this presumably accounts for the sulfides not crystallizing out, a change which has given many makers of the ordinary wash more or less trouble.

There has been in the last two years an attempt to develop a lime-sulfur wash which might be applied to foliage in summer. This work has been carried out largely by Prof. Scott of the Department of Agriculture and has resulted in a tentative formula calling for 5 lbs. of lime, 5 lbs. of sulfur to 50 gallons of water, being recommended provisionally. Slake the lime in cold water, add the sulfur and then dilute with cold water as soon as boiling ceases. This formula, according to Mr. Wurtz of Pennsylvania, does not even harm peach foliage. It is possible that this wash or some modification of it, may be extensively used as a fungicide. It is still, however, in the experimental stage.

The second spraying in the plan referred to above, calls for the application of poisoned bordeaux mixture to the unfolding leaves. The bordeaux mixture, as is well known, is a most valuable fungicide, while the arsenical poison is for checking early leaf feeders such as tent caterpillars, canker worms, bud worms, case bearers, etc. Paris

green at the rate of 4 to 8 oz. to 50 gallons of the bordeaux mixture can be used with perfect safety. Arsenate of lead is an excellent though somewhat costly poison. The cheapest of all is the arsenite of lime prepared by dissolving 1 lb. of white arsenic and 4 lbs. of sal soda (carbonate of soda, washing soda) in one gallon of water by boiling in an iron vessel 15 minutes or till the arsenic dissolves, leaving only a little muddy sediment. Add the water lost in boiling and use one pint of this stock solution to each 40 gallons of bordeaux mixture, or if the latter is not employed, add 2 lbs. of freshly slaked lime in order to prevent all danger from burning.

It may be feasible, possibly advisable, in clean orchards where there is little fungus and few insects, to omit this spraying and make the second spraying at the time when it will be of most service in destroying the codling moth or apple worm. This insect is too well known to need description. Most fruit growers are familiar with the fact that it can be controlled successfully only when the trees are thoroughly sprayed within a week or 10 days after the blossoms have fallen. The aim of this treatment is well known. It is simply to fill the up-turned blossom end of the apple with poison, since both investigation and experience has shown that such spraying is most effective in checking this pest. There has been more or less difference of opinion as to what kind of a spray should be used. Some have advocated the employment of an extremely fine, misty spray which can be relied upon to float through the tree and not only fall upon the up-turned blossom end of the apple, but cover every exposed leaf surface. Others have claimed that better results can be secured by using a coarse spray. The latest addition to our knowledge comes from the far West, in a recently published article by Prof. A. L. Melander of Pullman, Washington. This gentleman claims that the codling moth can be controlled best by throwing a driving spray through Bordeaux nozzles, at a pressure of about 200 lbs., straight down into the up-turned blossom end of the young apple. A good extension with the nozzles set at an angle and an elevated tower, so that the operator can get close to and above the blossoms, are essentials to success. One such application, according to Prof. Melander, destroys the first brood and thus insures practically 100 per cent. of clean fruit. He

states that such results cannot be obtained with the ordinary Vermorel type of nozzle so generally used in the East, and cites statistics to show that in the West, when the Vermorel type was employed, the average per cent. of worm-free fruit was about 85 per cent., whereas with the improved methods and the Bordeaux type of nozzle the percentage has been raised to 95. These percentages, it should be stated, are not based upon results obtained by professional experimenters, but were secured by practical fruit growers over an extended area. Prof. Melander refers to one party who sprayed under the old system, using Vermorel nozzles and 3 lbs. of arsenate of lead to 50 gallons of water and lost 4,000 boxes of fruit yearly, valued at \$4,000. The orchard was later sprayed by the improved method recommended above, and the loss in wormy fruit was but 6 boxes. In other words, the old-fashioned method of spraying cost this man \$4,000 in fruit, aside from the additional expense represented by \$350 for the four applications, as opposed to \$70 for the one thoroughly efficient treatment. It has been objected by some that these results can not be obtained in the East. Prof. Melander, replying specifically to these objections, states that climatic conditions are not sufficiently great to warrant this assumption and that efficient protection against the codling moth has been obtained in the West, even when spraying was done just before or during a rain. He emphasizes most strongly the importance of forcing the spray past the closely-set stamens down into what he calls the lower calyx cavity, a place where some codling moth larvae at least are likely to feed for the first time. Should there be no liquid in this lower cavity, easily ascertained by slicing through the young apples, he claims the treatment has not been effective. A spraying necessary to secure such results as those obtained in Oregon, may also be relied upon to cover the leaves and the young fruit with sufficient poison to take care of any codling moth larvae which may feed first on either leaf or surface of the fruit. The experience in the West shows that this method can be relied upon to protect orchards, even though in the immediate vicinity of badly infested trees, and to quickly relieve very wormy orchards from the depredations of this pest. It is not for the speaker to unqualifiedly endorse these modifications recommended by Prof. Melander. His contentions, however, are supported by such abundant data

that they merit most careful consideration and, should they accomplish nothing more, raise a grave question as to whether we have been sufficiently thorough in our spraying for the codling moth. There is a vast difference between 50, 60 or 75 per cent. of worm-free fruit and 95 to 99 per cent. of perfectly sound apples. Aside from the cost of spraying it costs no more to grow a good apple than a wormy, gnarly specimen, and if there is a probability that one spraying applied as directed above, can give such magnificent results, let us by all means subject the proposition to a practical test.

A large percentage of our fruit growers, we fear, in actual practice, fall far below the standards outlined above. Some attempt, and possibly wisely, to secure a greater degree of protection from codling moth injury by making a second application a week or ten days later and then give a third treatment the middle or the latter part of July. This last spraying finds its justification in the fact that the codling moth lays its eggs upon the surface of both the leaves and fruit and that the young larvae feed more or less thereupon. It is applied at this time for the purpose of catching young larvae of the second brood. Careful experiments by Prof. Ball of Utah, however, have shown that the major protection against the second brood is to be found in such thorough spraying that very few or no first brood larvae survive. This is such an obvious proposition that no argument is required to support it. The trouble has been that most fruit growers have assumed it to be impossible to do such thorough work in the spring as to practically prevent injury by either the first or second brood. The results obtained by Prof. Ball several years ago, and the more recent ones of Prof. Melander described above, agree very closely and serve to emphasize the importance of most thorough spraying shortly after the blossoms fall and before the calyx lobes have had an opportunity to close.

The system of spraying outlined above, is designed to control most of the important insect and fungus enemies of the fruit grower. There are certain insects at least, which are not amenable to such treatment. The well known oyster and scurfy bark lice, while probably controlled to a certain extent by applications of lime-sulfur washes, are much easier checked by spraying with a dilute kerosene emulsion or whale oil soap solution the latter part of May or early in

June at the time the minute, yellowish or reddish young are crawling over the bark, and before there has been an opportunity for the secretion of the wooly, waxy material which soon mats down, forms a protective scale and thus makes it more difficult to destroy the pests.

The well known apple maggot or railroad worm comes in this category. It is very familiar to many fruit growers of this section and displays a marked partiality for the earlier sweet fruit, though it also occurs to some extent in the sour, winter varieties. The parent insect is smaller than the house fly and with brown-marked wings. The female deposits her eggs under the skin of the apple, through minute slits, consequently it is impossible to check this pest by the application of insecticides. The best that can be recommended at the present time is the prompt destruction of fallen fruit, giving special attention to the early, sweet varieties preferred by this fly. The fruit should either be buried deeply or, better still, fed to stock from day to day. It should not be allowed to lie on the ground or in piles for any time, because the small maggots are likely to escape, enter the ground, remain there over winter and be ready another spring to lay eggs upon the next crop of fruit.

Another insect which should be mentioned in this connection is known as the fruit tree bark beetle or shot-hole borer. This pest displays a marked preference for sickly peach and plum, though it has been known to attack apparently healthy, vigorous trees. This condition is most likely to obtain where large numbers of beetles have issued from sickly or dying trees. There has been considerable trouble with this insect in the Niagara section of Ontario, Canada. We are inclined to believe this outbreak to be the logical outcome of earlier injury by San Jose scale. We know that this scale killed many trees in that part of the country and thus produced conditions very attractive to the borers. The little, dark brown parent beetles, only 1-16 of an inch long or thereabouts, are capable of flying considerable distances and can presumably invade healthy orchards at some distance from the original breeding place. Obviously, one of the most effective methods of checking this pest is to cut and burn all sickly or dead wood prior to the appearance of the beetles in the spring, say before April first. Trees already infested by the insect should be severe-

ly trimmed, a special effort being made to cut out and burn most of the infested branches. Recent experiments with a close ally of this pest show that considerable protection may be obtained by coating the trunks and larger limbs of trees with whitewash. A lime-sulfur wash would probably be equally effective. The first application should be made in early spring at about the time we apply the lime-sulfur wash for San Jose scale, and a second might well be given in midsummer to guard against infestation by a later brood.

A relatively new pest, mentioned above, deserves more than a passing notice. It is the blister mite. This is an extremely small, semi-transparent, spider-like pest, barely visible to the naked eye and measuring only about 1-100 of an inch in length. The winter is passed under bud scales. The tiny mites leave their retreats in the spring, enter the developing foliage and produce light green elevations, which latter turn brown in June or July. These irregular, reddish brown, blister-like spots range in size from 1-16 to 1-8 of an inch and on the more badly infested leaves, may run together to form an irregular, brownish area sometimes covering a fourth of the leaf. The work of this blister mite presents a superficial resemblance to that of the casebearer. The blisters are easily distinguished by the distinct thickening of the leaf and the invariable, minute, irregular hole near the center of the blister while the venation of the leaf has largely disappeared. On the other hand, the case-bearer produces no thickening, the center of the irregular, brown, mined area is marked by a sharply defined, circular hole and the venation of the leaf is rather more marked than on areas which have not been mined. This blister mite has been exceedingly abundant and injurious to many orchards in western New York and also to orchards here and there in the Hudson valley. This pest was earlier known as the pear blister mite. It is only recently that it has appeared in numbers upon our apple trees. As stated above, spraying with a lime-sulfur wash in early spring, is a most satisfactory method of controlling this blister mite.

This paper would hardly be complete without mention of the gypsy and the brown tail moths. Both of these destructive leaf feeders, as many of my hearers are aware, are able to subsist upon a large variety of trees and shrubs. They have already laid an enormous burden of taxation upon this Commonwealth, and particularly communities in the

eastern part. A fight against these insects, while costly, is much more economical than to allow the pests to multiply and spread without restriction. There is a prospect that the heavy expenditures for repressive work may be materially lightened in the near future. Our principal hope in controlling these two pests economically, lies in the finding of efficient natural enemies. You are doubtless aware that the State of Massachusetts, in cooperation with the Federal Department of Agriculture, has introduced large numbers of parasites, not only from Europe but also from Japan. This work is necessarily slow. Marked relief can hardly be expected for a few years. Nevertheless, the introduction and the dissemination of these parasites is undoubtedly the most important work that has ever been undertaken in connection with the gypsy and the brown tail moths. This undertaking is fundamental, since it is an effort to right the balance of Nature disturbed when these two pests were brought to our shores. The far-reaching results, if efficient parasites can be obtained, are apparent to all. I wish to emphasize this most strongly and to state that, in my opinion, this feature of the work should be maintained at all hazards, even though progress along these lines may seem to be very slow.

The elm leaf beetle is another European pest which has become well established in Massachusetts, and has been responsible for much injury. It can be controlled, like other leaf feeders, by thorough and judicious applications of poisons, the arsenate of lead being by all means preferable. The secret in controlling this insect lies in throwing the poison upon the under side of the leaves where the destructive grubs do all their feeding. This pest can also be checked considerably by pouring boiling water over the black and yellowish grubs of the golden yellow pupae, so frequently seen in large numbers at the base of infested trees. An incidental feature of the work with parasites of the gypsy and brown tail moths, has been the introduction of an egg parasite of the elm leaf beetle. It may be that this little insect, introduced through the personal efforts of Dr. L. O. Howard, Chief of the Bureau of Entymology, may be a potent factor in reducing the destructiveness of this beetle.

DISCUSSION

What is the formula for the Cordley mixture?

125 pounds of sulfur
60 pounds of lime
50 gallons of water

This should be boiled for two hours and then diluted to 50 gallons. When ready to use 10 parts of water should be added to one part of the mixture, and it may be applied either hot or cold. If kept warm it can frequently be carried over and used another time.

Scalecide is a very good form of oil of good service in controlling many sucking insects. Can be applied to trees in summer when in foliage. Nine times get as good results in controlling the San Jose scale with lime-sulfur wash as with oils. Three-fourths of the practical fruit growers use some form of lime-sulfur wash. I should not advise the use of either the Cordley wash or commercial washes on leaves. These are used for the San Jose scale but should never be used on foliage. Some have done this and not had much injury result, but I should prefer to use it earlier. About seven or eight years ago I tried using miscible oils later in the season, because I wished to destroy the young scale. Gave it a thorough trial and we found that so far as controlling or killing the San Jose scale it was not a success.

Question. Is the lime-sulfur-wash used as a fungicide?

Answer. Yes, and it is claimed to be quite efficient, but the spraying properties depend upon the amount of soluble sulfides in the wash, and that depends upon the lime and the way it is slacked. It may be done. I don't want to recommend it.

Question. What kind of a boiler should be used?

Ans. You can use most any kind that will boil. If you boil, boil, don't simmer. We found that we could prepare this wash in the minimum time by heating the water first, then dumping in the lime and put in the sulfur right on top. The only trouble in doing this is that the sulfur is apt to collect in little balls, but a vigorous stirring will break these up.

Question. Would you not get greater heat by using less water?

Ans. If you use warm water and are simply slacking

the lime, I presume you would get more heat in this way. I am better satisfied to throw the lime into four or five pails of hot water. The only objection in making in this way is that when you put your sulfur in it does not mix readily, but if kept stirring this is soon overcome.

Question. (Stockwell). Do you add more water?

Ans. Not unless it is too thick. We boil and then strain through screen netting and then add enough cold water to bring up to 40 gallons. If it is too thick it does not do as good work. The only difference between commercial sulfur and sulfur flour is that the flour is more refined. The price of the commercial is far less.

Question. Is it advisable to try to spray large trees with lime-sulfur wash, trees that are 35 feet high?

Ans. I should if I wanted to grow apples and had the trees, but I think I should cut those trees down and get them down nearer to the ground. Out in the Hudson Valley I had a grower who had a number of large trees infested by scale, but he could not get up into the tops, so he went in and headed them down. Now he has a very successful orchard. If Prof. Melaney is right about his method of killing the coddling moth, we must either cut or get up into the air.

Mr. Race: There has been no spraying done in Berkshire County that I know of. The preparation is so painful that they won't use it. You are talking to people who will use the commercial mixture. Now is there not something that these people can buy that will kill out the scale? That is what I want to know, what I shall say when I go home. The largest grower there is going to use Scalecide because he will not bother to make a lime-sulfur wash.

Ans. I am willing to talk about any kind of spraying and I thought I made reference to commercial lime-sulfur washes which can be bought all ready to be applied and diluted and used. I have used lime-sulfur wash but I don't think it is the only thing on earth. The miscible oils can be purchased and diluted and applied, and if applied thoroughly you can kill the scale. I would advocate the use of a miscible oil to the man who was determined not to use a lime-sulfur wash. I prefer, however, just a little, to use a lime-sulfur wash—I don't care whether home-made or bought, but if a man will not use it, use something else,

provided you get a proper preparation of oil and get the results you need.

Mr. Race: Outside of the people here I don't believe that one out of ten will use lime-sulfur wash.

Felt: I am willing to admit that it is harder to cover a tree with a lime-sulfur wash than it is with miscible oils, but, on the other hand, I have used both and have found that the lime-sulfur wash is more effective, and this is the reason that I think this is the wash that more are going to use. As to the matter of getting the wash into the eyes, I think it is practical for most people to spray without harm.

Moved that a committee be appointed by the chair to nominate a list of officers for the ensuing year. Carried, list to be announced later .

Address of Dr. Stockberger of the Department of Agriculture, Washington.

THE UTILIZATION OF WASTE PRODUCT OF THE FARM IN THE PRODUCTION OF DENATURED ALCOHOL.

The farmer has been given the right by Congress to become an alcohol manufacturer under conditions much simpler than those which have been placed about the manufacture of alcohol heretofore.

Through German experience, however, it appears doubtful if alcohol can be manufactured economically on a small scale. It appears to be pretty clear that a plant of economic size can hardly fall below the capacity of 100 gallons of 50 per cent. alcohol in the run of 24 hours. It seems more probable that a rational capacity cannot be obtained under the present law. German distilleries varying from two to three times the legal capacity limit.

To run such a plant economically and safely, requires the management of a trained distiller who must be equipped by experience for the management of the technical processes involved. The ordinary untrained farmer would not dare trust himself with so elaborate a plant. The distillery, in order to run economically, should be operated throughout the entire day, if possible, and should shut down as few times as possible during the season's run. To realize these conditions requires the assembling of a large amount of

crude material at the distillery, which must come from a relatively small area, since any considerable freight bill on crude material would be fatal to the industry. This means that if agricultural distilleries are to be built and operated in the United States, only owners of large estates or cooperative associations controlling large areas of land and large quantities of fermentable crops, can do business. A small agricultural distillery to be set up in a corner of the barn and operated by the farmer or the hired man on rainy days or between chore times in the winter, is a mistaken idea.

Agricultural alcohol is likely to make a feasible proposition in this country only after Congress has so amended the laws to permit the building of larger plants, and only after we realize that alcohol production as such is likely to prove a paying investment only in those very exceptional regions in which large quantities of fermentable material can be had for little more than the asking.

Alcohol manufacture is likely to be a success in the United States only where the distillery and the fermentable crop are a part of a large, well-designed and intelligent alcohol operation, involving corporations and stock raising on a considerable scale, and the profits seem likely to appear, not in the alcohol, but in an increased productiveness of the soil, due to the careful culture of the fermentable crop, and in the increased amount of stock which may be made possible by the increased crop production.

At present we are threatened with danger from two sources. First, from over-confidence due to a misunderstanding of the difficulties of the situation. We shall meet the second danger when the fact dawns on us that the solution of this question is one which involves a vast amount of study and hard work. When the discouraging features of the situation threaten to paralyze further effort, we must look the facts in the face, recognize the difficulties, and hopefully and persistently work out this well-nigh supreme problem of the increased conservation of the resources of our lands.

Meeting adjourned for dinner.

AFTERNOON SESSION

The meeting was called to order and the nominating committee reported the list of candidates. It was moved that the chairman cast one ballot for the list. This was done and the following were declared elected for 1909:

JOHN W. CLARK, President	North Hadley
ETHELBERT BLISS, Vice-President	Wilbraham
S. T. MAYNARD, Secretary-Treasurer	Northboro
J. LEWIS ELLSWORTH, Auditor	Worcester

DIRECTORS

ESSEX COUNTY:	E. A. Emerson, Haverhill; J. J. H. Gregory, Marblehead.
SUFFOLK COUNTY:	A. W. Patch, Boston; George Cruickshanks, Chelsea.
NORFOLK COUNTY:	Monroe Morse, Medway; Abel F. Stevens, Wellesley.
PLYMOUTH COUNTY:	Augustus Pratt, Middleboro; Walton Hall, Marshfield.
MIDDLESEX COUNTY:	C. F. Heyward, Ashby; Wilfred Wheeler, Concord; E. R. Farrar, Lincoln; M. P. Palmer, Groton; E. D. Howe, Marlboro.
HAMPDEN COUNTY:	Ethelbert Bliss, Wilbraham; L. W. Rice, Wilbraham.
BERKSHIRE COUNTY:	G. G. Walker, Williamstown; R. H. Race, North Egremont.
HAMPSHIRE COUNTY:	J. Maxwell Clark, Prof. Sears, Amherst.
FRANKLIN COUNTY:	M. H. Vincent, Conway; E. F. Copeland, Colrain.
WORCESTER COUNTY:	G. C. Rice, Worcester; S. J. Emerson, Lunenburg; Elliott Moore, Worcester; W. D. Ross, Worcester; E. A. Hersey, Westboro; A. A. Hixon, Worcester; C. A. Whitney, Upton.

Prof. John Craig of Cornell University, then addressed the meeting on

**SOME LESSONS EASTERN FRUIT GROWERS CAN
LEARN FROM THE ORCHARD PRACTICES IN
VOGUE IN THE NORTHWEST PACIFIC**

The orcharding of the oldest of the leading fruit growing areas of the Northwest Pacific is little more than a quarter of a century old, yet, in that time, very important innovations have been introduced. Many of these can be profitably copied by the fruit growing fraternity of the East. The natural conditions are conducive to the production of a handsome product. Bright sunshine and clear air discourage fungous diseases, and encourage the development of high color and handsome finish.

In the irrigated regions, the character and amount of growth of tree and fruit may, to a certain extent, be controlled. Aside from these natural conditions, the men and their practice are the important influencing factors. To offset this is the long haul to the world's great markets.

The fruit growers are possessed of great faith in the future of the country. They have unbounded optimism; they realize the necessity of advertising, and more than all they appreciate the advantages of cooperation. In their case, necessity has driven the lesson home and experience has fixed it. The carefully worked out systems of cooperative marketing in vogue in the apple and citrous belts of the Pacific are especially worthy of study and emulation.

Tillage is thorough, not desultory and spasmodic. The need of conserving soil moisture has emphasized the value of tillage in utilizing the natural supply and its influence on liberating plant food. Orchards are tilled as a matter of course, not as an occasional practice.

Spraying is practised because the Pacific slope grower cannot afford to produce culls. These cannot be shipped and the home market has little use for them. A first-class product is the only one he can use in his business. Spraying to prevent injury from insect pests and such fungous enemies as prevail is thorough and persistent. Trees may be sprayed three or five times or more if necessary.

Packing—and here is where the great lesson of importance to growers in the East can be learned. The box

package is universal. The style of package assists honest packing. The demands of the situation prohibit dishonesty. The grading under the eye of a disinterested party is uniform. This is what the consumer desires. He wants uniformity in the box or barrel of apples purchased. Nothing discourages consumption so much as imperfect grading, whether this merely exhibits lack of uniformity or consistent dishonesty.

The eastern packer has not grasped the situation. The use of the barrel aids the packer who is willing to misrepresent, and the personal manner of grading places an additional strain on the man of elastic conscience.

We need more faith in the fruit producing ability of our climate and soil. We should realize that the product of these conditions is a fruit of the highest quality. We should preach quality, and we should pack so that the quality of the grade is as high as the product itself.

Fruit growing is old in the East, but really up-to-date methods are to be learned from our brethren of the West. We have all the advantages of location, the soil and climate are provided, and let us hope that the men who are to inaugurate this newer and better system of fruit growing are in our midst, endowed with energy, optimism, and the business ability to properly exploit the latent fruit growing resources of New England.

This was followed by the address of M. C. Burritt, Department of Agriculture, Washington, D. C.:

CO-OPERATION IN PACKING AND MARKETING OF OUR FRUIT CROPS.

We are living in an age of organization and cooperation. All modern successful business operations are based on organization, and only those lines of business which are well organized are markedly successful. Keen competition and an insatiate desire for greater profits has driven nearly all classes of industry not only to organization, but to cooperation. Moreover, in many lines of business combination was necessary to cheapen cost of production, or increase the selling price, or both. Our great industrial companies are nearly all cooperating in their respective lines. The so-called trusts are, of course, the direct result of this extensive cooperation.

It may seem strange to some, at first thought, that that body of men which has in it the greatest possibilities for associative or cooperative effort, should be the last to effectively cooperate—and this, too, after it had suffered as much or more than any other from lack of such cooperation.

I speak of the farming class. But on second thought we remember that the farmer is a strong individualist. And that the very independence which has developed this individualism, has kept him from cooperation with his fellows.

Among the few, individuality is a potent factor, but in large classes its influence is not so strongly felt, owning as they do, the essentially productive part of the earth, farmers control the world's vital supply of food and clothing, to say nothing of many of its luxuries. But this undoubted great power can only be exerted through organization and cooperation.

Unorganized farmers are weak and the prey of the other strong individuals and organized classes. Organized, they can exert to the full their vast economic and social power. Now, as Prof. Bailey points out, practically every farmer stands alone in his farming, and attempts single-handed to contend with all the cooperative interests of the business world. The result is that for the most part he is a negligible factor in the trade.

Some of these facts are not pleasant, but we might as well recognize them. Indeed, we are recognizing them. All over the country, from Maine to Florida, and from New York to California, are signs of the beginning of a new era. Parts of the West have been organized for some time, but the fashion is now spreading to the East, also, so that one can hardly pick up an agricultural paper without noting that some new local association has been formed. These vary from apple shipping associations in western New York to potato associations in Kentucky and Maryland.

The fruit industry in particular seems to have reached the point where it can no longer be carried on in the haphazard way which has heretofore been the general rule. System must be introduced and with it cooperation. Competition even at home but more especially with the West has become keen. The regions of the West which are now selling their fruits in our eastern markets, are cooperative-

ly organized. They have studied the situation, seen the opportunity and found the means of improving it.

It is not a fact of which we can be proud, that apples, which to say the least are not superior to ours, can be grown 2,000 miles from our markets, and sold in those markets in competition with our own fruit, at prices considerably in advance of ours. At present, we have not the means of meeting the competition successfully, except in a small way by a few individuals.

I think most of you will agree with me that the following outline covers the principal difficulties of the present in the handling and marketing of our fruits.

The grading and packing of fruit is not at all uniform or satisfactory in quality. Too much of our fruit is poorly packed, low in grade and ununiform both as to fruit and to package.

The transportation and disposal of fruit in market is on the whole, unsatisfactory. Most fruit is moved in less than car lots, in which the service is poor, and the cost comparatively high.

There is not the proper relation between the producer and the consumer, supply and demand. Too much fruit is handled on consignment and by too many middle men, some of whom are dishonest.

The individual fruit grower, working alone, has no power to remedy this state of affairs. He is unable to trace shortages, remedy losses in transit, or materially influence better service.

It is not necessary to more than mention these troubles, however, as you are probably too familiar with them. My problem is to show the possibilities of cooperation in meeting and overcoming these difficulties. The most successful attempt at cooperation in handling of fruit was made in Michigan peach belt. Under the very able leadership of Charles E. Bassett, the Fennville fruit shippers' association was organized in 1891. Their steady and consistent growth is indicative of their great success. A local agent loads the fruit which goes to Chicago by special fast freight. There another agent receives the consignment and distributes the fruit. A standard package, saving at least half its cost, has been adopted. The freight rate to Chicago has been reduced from 6 1-2 to 2 1-2 cents a basket.

In one season, 6,000,000 baskets of peaches were shipped

and the saving to the growers by the association was not less than \$200,000. The association has laid by a cash profit which has been used to build and improve roads. Before it began this work 250 baskets of peaches were considered a load; now 500-600 are easily drawn. The combined influence of the growers led the railroads to give 300 carloads of gravel. Whereas, a single individual has great trouble in getting the ear of the railroad official, the representatives of an organization of 400 shippers received a most respectful and gracious hearing. Buyers come to Fennville to buy, and competition for association fruit has been such that prices have generally been kept higher than the Chicago market.

The plan for organization is the common one and simple. Each member must hold at least one share at a certain fixed price. The entire cost of handling is paid by a fixed charge per box. No seconds, or poor varieties are packed. And the association guarantees every box under its label.

Associations are uniformly able to make better sales than individuals having small amounts of fruit, because of the quantity of graded fruit they have, and because of a better knowledge of the market.

My own observation and study lead me to believe that the following advantages have been obtained, and may be obtained in very many more cases, by persons associating themselves cooperatively in the handling and marketing of fruit.

A higher class of fruit in its respective grade than the average individual would pack from his own fruit.

Style and uniformity of the package and grade have been greatly improved, securing the confidence of the buyer; the buyer may also secure a larger quantity of a uniform brand.

Shipment in large quantities, at least car lots, has obtained better transportation rates and facilities. Associations of growers are in a position to demand a fair deal from the railroads.

System has been introduced into marketing, losses have been reduced, and a more complete and efficient knowledge of markets secured.

Growers are enabled and encouraged to produce a better product because they can give their whole attention to

production, knowing that the fruit will be marketed at the highest price without their attention.

Packages, spraying material and other supplies are purchased in large lots at greatly reduced cost.

The whole standard of fruit growing in a neighborhood is raised by cooperative associations, thus benefitting the outsider to some extent, as well as the member.

In brief, to sum up, I believe that cooperative handling and marketing of fruit secures the consumer a better product, and realizes the grower a better profit. Association is assuredly the keynote of the future, the simple combination of mutual interests for mutual benefits. It may be that the time is not yet ripe for cooperative organization in the East, but there can be no doubt that it will come—must come sooner or later, if we are to keep pace with progress in other lines.

DISCUSSION

Q. Is it worth while to pack Baldwins in boxes?

A. I don't like to take the responsibility of answering but would say that if you have handsome Baldwins as I have seen grown in both New York and New England, I think they could be sold if packed neatly in boxes.

I have packed 500 bushels in boxes and when Western apples were selling in New York for \$1.50 a box in carloads, my Baldwins were bringing \$2 a box. I have packed apples for about 6 years. This year a party in Boston took my apples. My price has been \$2 a bushel. These apples are selling right here in Worcester today for \$3 a box.

Pres. Clark: Two years ago I was in New Hampshire at an exhibition, and Mr. Hale asked if some of the apples there were not as good as Western apples.

Mr. Race: What percentage of the crop is fit to pack in boxes?

Gentleman from Lunenburg: 60 per cent.

Race: Two years ago a man in Melrose came and wanted to buy my apple crop. I asked him how he wanted it put up. I had already bought 100 boxes bushel size. He said not in boxes. He said, "You have not got enough good apples to pay and you must ship the others in barrels anyway. He also told me that my seconds would sell best if put up uniformly. I pack my apples in barrels and make two qualities. The little ones sold first.

Mr. Patch of Boston, (Commission man): The gentleman from Lunenburg could not have got the price he did if he had not taken particular pains in growing his apples. We can grow apples here that will beat the world if we will only take pains. I believe if the men here would take the pains that the Western farmers do, we could get the price that the Western apples do. The money is what you are after, and it pays to make a good article.

Prof. Craig: Mr. Patch said that we are not ready for the boxing trade in New England. I would agree with him in saying that, under the present conditions, we are not ready. The Western men grow mighty few seconds. That is the question that is up to us. They eliminate these by thinning, spraying, and by careful cultivation in general. We think we cannot afford to. We spray twice, perhaps; some three times. Many of them spray even seven times. That is business. They had to do it. And it is just a question, gentlemen, whether we shall do it or not. The time in my judgment, is ripe now for boxes, and we can produce the stuff, and while Mr. Patch and others are getting ready to take the boxes even if they do like to see the barrels roll down the other end of the store.

Q. Is not our greatest weakness here in New England in the fact that we don't make a business of growing fruit, but simply dabble in it. The whole secret of their success in the West, lies in the fact that they make a business of it. Here, where we have just a few acres, it does not pay us to fuss.

Prof. Craig. The gentleman has proved his own proposition very largely. It makes all the difference in the world whether the commission man goes to the producer or the producer to the commission man.

We are now finding out that the hillsides are the place for apples.

Pres. Clark: It has been brought out that with proper care and cultivation we can grow good fruit. I believe in thinning the fruit. I thinned a crop of apples one year and it cost me just 7 cents a barrel. It makes the fruit larger and better and you have very little second-class fruit. I can get it all out by thinning close. We can grow good fruit if we only will. Thinning the fruit is the most profitable way to get good fruit.

Q. Does it make any difference about the fruit the next year if it is thinned?

A. Yes, but you cannot get Baldwins to bear every year.

Lunenburg gentleman: I believe the time has not arrived for selling apples in boxes. Most of my apples have gone to dealers in Boston and they say they like them better because they don't take up so much room.

Meeting adjourned to 10 o'clock Thursday morning.

THURSDAY, MARCH 11, 1909

10.00 A. M.

A much larger audience was present than during the other meetings.

President Clark presiding: I am glad to see so many out this morning. It is a beautiful morning. Let us take hold and do our work.

Mr. J. Lewis Ellsworth explained what had been done to organize the N. E. Fruit show. Mr. Hixon further explained what it was proposed to do.

Mr. Hixon: The Massachusetts Fruit Growers' Association was organized in this hall. Secretary Ellsworth stated that we were to have a New England fruit exhibition. Now for thirty years we have bragged about what we could do in New England, and we have let our fruit industry go right away from us. Still, we can exhibit fine specimens and I think we can make good in appearance and quality.

The New England Fruit Show has organized with a president, vice-president and secretary for this exhibit, and each state has a local vice-president, who is to be chairman of whatever takes place in his state. Massachusetts is the state that has given the invitations, and we must take care of the people and entertain them, and we don't want to be behind others in showing our fruit, and we expect each of you to do your level best to help us. We don't yet know what we are going to do, and we lack capital to do with.

What I would suggest is that every one consider this matter, every agricultural society and every organization that has any thing to do with fruit.

Within a short time we will be in shape to say better what we want and what you may expect from us, but if you have any fruit that is unusually handsome, exhibit it somewhere this summer and see if you cannot get the name on at the exhibition this fall. Worcester county has originated more apples than any other part of New England, and we ought to get the credit of it.

I am proud of Worcester county, for such representative men as George Frisbee Hoar and others who have not been figure heads but men who took a personal interest in the work. I suggest that if we are to invite the whole world to see what we have, that some day be set aside for testing our fruit and comparing it with Western fruit, and I shall try to arrange to have apples ready for comparison with any Western apples. You will hear from others in regard to this, and you will hear from us often, and I think we will have one of the biggest shows in the United States. Mr. Hixon was followed by

Mr. Wilfred Wheeler of Concord: We hope to make the New England Fruit show a success. We are known all over the country as New England men, and we hope to get men together as one harmonious body. That is one of the strongest features that we want to make. We also want to make it an educational affair, showing the implements used in raising them. We want to make it a free show, if possible, so that all the people can come in and see what New England can do in the way of fruit growing.

This idea was proposed, as you know, by the Governor, and we want the local societies to unite to make this a great success. We look for these societies to help out, so I hope that you will set aside any fine fruit you may have this summer. We know that if orcharding is conducted on the

right basis we can grow fruit of just as good color and of far better quality than they can grow in the West.

This summer we expect to get out a premium list rather early so you can set aside any fruit you may have for the show.

Prof. Fred C. Sears of the Massachusetts Agricultural College then said:

I think we ought to make a campaign along the question of quality. I think that the New England apple is the best there is in quality and that the Western apple leads in appearance. The average Western apple is a better looking apple than we can grow here. The sunshine and clear air make a fine looking apple, but we can beat them every time on quality, and it seems to me that should be the watchword we should take up. That is where we can beat them.

My opinion in regard to the coming show is that it should be largely a commercial proposition. The Westerners beat us hands down in packing and labeling of fruit. At Spokane, they gave \$100 for the first prize for the best packed box, \$50 for the second prize, and I think that we ought to give liberal prizes all along the line.

A committee, having been appointed to see what we as a society will do at the exhibition next fall, reported as follows.

Report made by Mr. Race:

This committee find that they are up against a proposition, and that we cannot go outside of our own society very well, as others have already formed organizations and taken men right from our lists as officers, Adin A. Hixon, secretary of the Worcester Horticultural Society, being one of the vice-presidents, and J. Lewis Ellsworth, secretary of the State Board of Agriculture, the president.

Recommended that J. W. Clark, S. T. Maynard and Mr. Ellsworth be appointed a committee to cooperate with the general committee for the benefit of the Massachusetts Fruit Growers, that they use all means they see fit in cooper-

ating with other organizations and societies, that Secretary Ellsworth use his influence with the Agricultural Societies as to offering premiums to different granges, \$20, \$15, \$10, \$5, for such exhibits as they see fit to make.

Report accepted and adopted.

President Clark: Two years ago an organization was formed of New England societies, which society appointed a committee. We met at Gardner, and Milford, N. H., and the committee has an invitation to meet in Vermont next winter. The principal thing brought up before this committee was the packing and marking of fruit, and we decided to ask the different societies to see whether they would introduce a bill into their legislatures to have every sealed package of fruit marked with grade of variety, name of packer, and place of residence. The latter committee did not get together, and the secretary brought in practically the Canadian Fruits Marks Bill, which says that you must have 90 per cent. of your apples perfect, and 80 per cent. of No. 2 apples free from scab or disease. That makes it rather strong for us, and we thought it would not be accepted, but that is what they voted, and that is what I wish to present here now. Vermont and Maine introduced a bill, or tried to, into their legislatures this winter. Vermont had the fortune of having the committee refuse to do anything with the bill. Maine started to introduce the bill, but their committee would not accept it; then they fixed it over, and, as I understand it, that bill has not gone through, and as we meet next fall at Montpelier, Vermont, perhaps it will be well to leave it until that time.

If we wish to keep up this organization—as I think it best, because we are getting together as New England, not as different states, so we will go before others as New England—if it is advisable to continue this, a motion to that effect will be in order.

Voted to continue the committee.

Secretary Miles: Connecticut is taking great interest

in the fruit show that is to be held this fall. We have petitioned our State Legislature for an appropriation for the purpose of making an exhibit at the show. Also think of giving up our own show and putting all our efforts into this one.

We have in the Connecticut Pomological Society seven hundred members. We get all the money we can from our membership, but the Pomological Society gets a large appropriation from our state, with which we are able to give prizes on premiums that are worth while.

Vice-President Slater, Rhode Island: To me much of the exhibit in Boston this fall will be the convincing agriculturalists that it is a profitable investment to produce good fruit. We have asked for an appropriation from our State Legislature.

Past President Whitney: I dislike to have people from Connecticut and Rhode Island go away with the impression that we have never had more than one hundred members in this Association. We have had three hundred or more members, but from one reason or another, they have dropped out. These are now so few members that we are unable to print a report.

The first address of the day was by G. C. Seavey, Editor of New England Homestead:

ARE LAWS TO REGULATE THE PACKING AND MARKETING OUR FRUITS NECESSARY OR ADVISABLE IN NEW ENGLAND UNDER PRESENT CONDITIONS?

It is with conservatism that I approach this subject, fully realizing it is to a divided house I speak. Some believe we should have state and national legislation relative to grading, marking, and packing of our fruit, while others feel that such action would be taking hold of the wrong end of the stick, so at least what the legislation thus far proposes

is ill-timed and not in close sympathy with the varying conditions which such a law would necessarily face.

In my observation and investigation of the subject, I have tried to look at the matter in a broadminded way, giving every argument consideration, no matter whether pro or con, and from such an unprejudiced view point am decidedly inclined to agree with the second class mentioned above, namely, the conservatives.

If we must have legislation in this subject, let us have as a starter something more moderate. I have indicated what my answer to the question proposed on the program will be, and now it remains to cover the conditions and arguments that have led me to give you the exact status of the legislative propaganda on fruit as developed to date. Work has been done in this line both by Congress and State Legislatures. In a federal way you are familiar with the so-called Porter bill, which has served to rally the forces for and against national standardization of apple packing.

It is a matter of common knowledge that in handling fruit abroad, and in fact here in America, it is impracticable to examine every package. The custom in the European exchanges is to select a few barrels from every lot of apples received from the United States or Canada, open them upon a table, and judge the lot by those few barrels. In this comparison, American apples have compared unfavorably with the Canadian product packed under competent inspection and the so-called Fruit Marks act. Thus we see the reason why enterprising American growers are seeking to do away with the poor grading and dishonest packing of apples which leads to a poor reputation for our fruit.

The Porter bill has been criticised severely, and, as a matter of fact, is in all probability a "dead duck." Mr. Porter is no longer in Congress, and in a recent letter declared that there were parts of the bill he presented in which he personally did not believe. Therefore, he introduced it "by request."

What little chance the Porter bill had has been further weakened by the introduction of a substitute bill by Daniel F. Lafean of Pennsylvania. This new measure was introduced into Congress Feb. 25, and referred to committee on interstate and foreign commerce. If the Lafean bill became a law, it would establish what would be known as the United States standard, and the three sizes would be known

as A, B and C, instead of 1 and 2, as in the case of the Porter bill.

The conspicuous feature of this bill is that the grades are determined by the size of the apple only. No matter whether a farmer is putting up number 1 or number 3 apples, they must all be well grown for the variety, carefully hand picked, of normal shape, of good color for the variety, practically free from insect and fungous bruises and other defects except such as are necessarily caused in the operation of packing, and must not contain more than 10 per cent. below these specifications.

It will be recalled that number 1 fruit in Porter bill consists of healthy, well grown apples of one variety not less than 2 1-2 inches in diameter, and of good color for the variety, of normal shape, and not less than 90 per cent. free from scab, worm holes, bruises, and other defects mentioned. The number 2 fruit may consist of apples of not less than nearly medium size for the variety and not less than 85 per cent. free from the defects mentioned for number 1 fruit.

In the Lafean bill the sizes are determined as follows: A, not less than 2 1-2 inches in diameter; B, not less than 2 1-4 inches in diameter. This bill further provides that each package be plainly marked before it leaves the premises with the name and address of packer, name and place where grown, and the name of variety contained in the package.

The matter of package is also covered in the Lafean bill. It provides that a standard box shall contain not less than 2,342 cubic inches. The standard barrel shall have a capacity not less than one of the following dimensions: Length of stave 28 1-2 inches, diameter of head 17 1-8 inches, distance between heads 26 inches, circumference of bulge 64 inches outside measurement. Any barrel of less dimensions must be labeled "short barrel." The Porter bill called for substantially the same barrel. For a box, the Lafean bill shall contain not less than 2,346 cubic inches. The Porter bill calls for a box of 2,564 cubic inches. In connection with these two bills, may be mentioned the provisions made by the Canadian law. This requires a barrel with 17 inch head, the space between heads 26 1-2 inches and a middle diameter of 18 1-2 inches. Boxes shall be 10 by 11 by 21 inches and contain 2,200 cubic inches. The Canadian law provides for

four grades known as Fancy, Number 1, Number 2 and Number 3.

Fancy fruit is described as well grown specimens of one variety sound and uniform and at least normal size, and of good color for the variety, of normal shape, free from worm holes, bruises, scabs and other defects. Number 1 fruit must come within 90 per cent. of the fancy grade, number 2 within 80 per cent., and number 3 is virtually culls. It is also provided that any package the fruit of which is below the grade of that shown on the surface, cannot be properly marked under any of these grades.

Those in close touch with the situation prophesy that the Porter bill is a thing of the past, and that consideration will be given the Lafean measure, which is really an amended form of the Porter bill. Effort will be made to bring the matter before the tariff session of Congress convening March 15. However, with the tariff to consider, and such other propositions as will command attention, it is extremely doubtful if any definite disposition is made of the apple grading bill at the coming session.

Here in New England, the matter of legislation has been urged, but has met comparatively little sympathy, except in Maine. In that state, a bill was originally drawn up which did not satisfy the rank and file of fruit growers. This has recently been amended so it meets the approval of a larger number. It provides for four classes: Fancy, Number 1 and Number 2, and unclassified.

Fancy apples shall consist of those of one variety, above the average size and color for the variety, sound, and free from worm holes, bruises, scab, or any other defect that materially injures the appearance or useful quality of the apples. Any package containing more than 10 per cent. of apples below this standard cannot be marked as fancy. Number 1 apples are to be of normal shape and good color for the variety, and not less than 2 1-4 inches in diameter, and be free from worm holes, bruises, scab, etc.

A package containing more than 10 per cent. of apples below this standard cannot be marked as number 1. Number 2's are the same as number 1's, excepting the apples may be two inches in diameter. If an apple is two and a quarter inches in diameter it may have one defect, such as a worm hole, or a bruise, and yet pass as number 2. Packages containing less than 20 per cent. of apples below the standard

cannot be marked as number 2. The important feature of the proposed Maine bill is Sec. 6, which says: "All apples grown in the state and offered for sale or shipment outside of the State of Maine in closed packages not conforming to the foregoing conditions as to variety, size, or other conditions, shall be marked 'unclassified.'"

The standard barrel in the proposed Maine law is the same as in the Lafean and Porter measures. Smaller barrels may be used by growers, but they must be marked accordingly. R. L. Cummings of West Paris, Me., who is an enthusiast for the proposed law, says that at a meeting held a short time ago more than 300 of the fruit growers of the state indorsed the proposed bill, either in person or by representatives.

New Hampshire has not taken much interest in legislation along this line. A few tried to push it through in Vermont last winter, but the effort failed, largely through the inability of the growers to decide among themselves what they wanted. Connecticut does not appear to be especially interested, and what Massachusetts will do remains to be seen.

However radically people may differ in their opinions on the subject, almost all agree on the importance and even necessity of honest packing and grading of our fruit. The trouble comes in agreeing upon a method by which the desirable condition shall be obtained. Some say by the big stick of law, others say by the uplifting force of education. Other conditions being equal, education is by far the preferable course. Human nature is so constituted that a man can be led much farther than he can be driven, and the results accomplished are likely to be more lasting. As I interpret the intention of the reform, the desire is to gain the aid of apple growers and appeal to their sense of justice and cooperation in the matter of handling fruit to the end that our (emphasis on the "our" if you please) fruit may be of the highest quality and in greatest demand.

This, of course, means advanced prices to growers. I fail to see how coercion will stimulate such conditions. True, there are some who can be handled only by knock-down and drag-out methods, but think what a small percentage they constitute of our great body of farmers who sell fruit. Still further, they as a rule are the smaller and less important growers whose influence one way or the other is limited.

These things are true on general principles, but what would be the result if we tried to work out some of the details of the proposed law and enforce the same? The size of apples, for instance, is bound to vary much with the variety and the season. It is no easy matter to establish a minimum diameter that is fair to all varieties alike, or even some varieties under different climatic conditions. A 2 1-2 inch apple would be fair for Baldwins, Rhode Island Greenings, etc., but perhaps too high a minimum for those choice sorts such as Jonathan, Fameuse and Golden Russet. The Lafean bill by requiring 90 per cent. of apples free from worm holes or all defects, establishes a pretty high grade for number three fruit. No particular allowance is made for poor years when apples run small and unsatisfactory. Then again, there are large apples like Wolf River and Gloria Mundi, the culls of which would readily pass the size limit.

One point which seems to have been overlooked, is the fact that a certificate of inspection of fruit cannot hold good indefinitely. Fruit is bound to deteriorate more or less, especially if it was over ripe at the time of packing. The package of apples that the inspector passes as fancy might readily become second or third class by the time it reaches the consumer, and yet on the face of the barrel would be a mark of superiority.

On this point Secretary Wilson says, "Would not a simple requirement that apples be marked with name of variety, the name and address of the packer, accomplish the end in view, which is doing away with the fraudulent branding of our fruit?"

Now it appears to me there are just two desirable ways of disposing of this whole proposition, and I will name the least desirable first. It is that we have state and federal laws providing that every man who packs and ships apples must place his name and address on the barrel in suitable letters, and also indicate the variety. I do not believe I would go much farther than this. It is a short step but better to make this slight advance and maintain the ground, than to attempt a long stride and slip back below the starting point.

Such a regulation would, presumably, work no particular hardship on anyone, and would at the same time cause growers to think twice before they placed little apples in the middle of the barrels which were marked with their name. If

this advance met with favor there would be plenty of time to talk about these more stringent regulations.

I confess that the Maine growers have afforded an outlet for the poorer grades by establishing the unclassified division under which regulation a grower may dispose of whatsoever product he may have, good, bad or indifferent. However, it cannot be marked with desired grade to masquerade as a better product. If this bill finally grows into a law the operation of the same will be watched with much interest, for it appears to have good features.

This brings me to what I consider the ideal solution of this whole proposition, and that is the grading, packing and marking of Massachusetts fruit under the name of the Massachusetts Fruit Growers' Association. Then let this association establish whatsoever rules and regulations it sees fit, taking for its model the Porter or Lafean bill, the fruit marks act, or the modified Maine idea. I can see no necessity for running to the legislature or to Congress with this proposition.

It is the enterprising fruit growers who are most interested in the proposed legislation, and now if they will put the same amount of effort and initiative into forming these packing associations, and putting out a gilt-edged product and marking it accordingly, it will not be many moons before they will have established a reputation for particular brands which is far ahead of anything the fruit marks act has ever established or ever will. This is because the growers believe in what they are doing, they find it decidedly remunerative and do it of their own free will.

Those growers are enterprising and resourceful, and I am under the impression that those in the East who are urging legislation along this line are likewise enterprising and resourceful. If the West found it far better to stay away from the legislature and encourage cooperation, isn't it reasonable to suppose that in the East we will not fall far short of the desired goal if we adopt a similar course, or at least go slow.

The actual working-out of the details of this work need not be laborious. The association can secure any quantity of suitable labels of attractive appearance to distribute among the members. Careful regulations should be drawn up governing the operations of these members. Each must become personally responsible to the association for the fruit

he packs and ships under the association label. It is possible a simple system of inspection would be desirable.

The name of every member must go on the package, and inside must be the guarantee of the association, with the instruction to the consumer that if anything is wrong, the secretary of the Association should be informed thereof. Then the Association can hold the individual grower responsible. If it is possible to enforce the Lafean or Porter bill, or any other similar measure, in a given state, then it ought to be possible for a selected few of the most enterprising growers in the state to enforce standards, as they agree to. In other words, the whole is greater than any of its parts, and if state or nation-wide legislation will work, a small part, or such an association as I mention, ought to have clear sailing.

In the event of such an association it will put a premium on honesty, you secure a gilt-edged product and establish the desirable high reputation for fruit; and, best of all, you are educating your people to the wisdom of grading, packing, and marking fruit carefully and systematically. The favorable results following this work would spread out like the concentric ripple from a pebble dropped in a pool of water. The leaven of education would work day and night for 365 days of the year.

And then, in due time, if you please, you would be ready for your state and national measures which are now being proposed. On the other hand, this very association work is so far superior to the legislative proposition that I am inclined to think you would not care to take your chance with what lawmakers would give you.

If the Massachusetts Fruit Growers' Association does not care to thus advance the interests of horticulture, then ten, twenty or thirty, or even more, of the interested growers in the state can form a separate association with a suitable name, like the Bay State Apple Growers' League; they can design and adopt a catchy and attractive label and proceed to develop a reputation for apples sold under the league name.

What I suggest does not mean the expenditure of thousands of dollars in order that a start may be secured. Once a careful system of inspection is worked out, the cost will be nominal. Only those members should be taken in at the start who are well known for their integrity, and who are willing to sign over some of their individuality to the asso-

ciation for the benefit of all the members. They do not entirely lose their identity, since their names are on the package. The cost of labels could be largely met by charging each member a normal fee for a given number.

Therefore, in conclusion, I am free to confess that I recognize the good results that might follow state and national legislation regarding the packing of apples.

However, there are disadvantages as well. Such action would be more or less of a jump in the dark with a spring which might carry farmers as a class, farther than they would care to go at this time. The medium course of legislation, which only provides that the name and address of every grower go on each package, also the name of the variety, is a much more conservative proposition, and would not be likely to work any particular hardship, and would surely do some good.

But the best course of all is to secure the cooperation of the grower in this reform movement, rather than his enmity. To accomplish this, start your association as indicated. The wheels can be set in motion at this meeting. A committee can be named to take the matter under advisement, or a short session of those interested can be called after adjournment and the matter discussed briefly, and the active committee of construction for the framework of the association selected by those interested members.

Whatever is done, I hope you will be conservative in going to the legislature. On general principles, we have too much legislation already. Maine is better prepared for some legislative action than are we in Massachusetts, and by going slow we stand a chance of profiting by their experience. However, in the meantime, we need not be idle. I have suggested a specific line of work.

This was followed by H. L. Frost, Arlington, Mass.

**WHAT ARE THE REQUIREMENTS IN THE HAND AND
POWER PUMPS FOR THE MOST SUCCESSFUL
SPRAYING OF OUR FRUIT AND ORNA-
MENTAL TREES?**

Two years ago I had the pleasure of speaking to you on apparatus, but I must say that our ideas have changed a great deal on spraying matters. For that reason whenever

I talk of spraying apparatus, I have never been willing to have my talk printed because we are in a very youthful age as regards spraying apparatus.

The first apparatus was a whisk broom with pail and paris green in it. Next was Johnson's force pump, but this has not proved satisfactory. The Colorado potato beetle started the spraying apparatus and spraying, which is increasing every day.

The Gypsy Moth Commission has probably done more toward developing the spraying business than anything else, and although the Gypsy Moth is a deadly pest, it has made the farmers give more attention to their trees and shrubs than they otherwise would. Between 1885 and 1890 the experiment stations began the work, but as there was no inducement for manufacturers to go into the business, they did not.

It is my intention to show what outfit will be best for your special work. Since 1900 several companies have been formed which are furnishing spraying outfits. At the present day the great difficulty is that you go to your dealer and he has one form of pump to sell, and he sells that for all kinds of work. One kind can be used on small trees with lime and sulfur-wash, while another kind of pump should be used on large trees with miscible oils. You cannot use the same outfit on a side hill that can be used on level land. I cannot give you any general rule that would cover all cases.

We are going to have the same conditions here in Massachusetts on our side hills as in other parts of the country when the insects get in here, and we must have apparatus to do the spraying. Before buying a spraying outfit get the advice of an experienced man. Show him your situation, get his opinion and take it, if, in your judgment, it is good.

Three years ago the town of Arlington bought three spraying outfits, for which they paid \$300 apiece. Now conditions have changed, outfits have been improved so that this year those outfits were sold for \$75 each, and they have bought up-to-date outfits. I think we have now reached that point where outfits are improved to such an extent that there will not be any great changes. Look around before you buy an outfit. The fruit grower will be the spraying expert in his own town because he is interested in this business, and because he is up-to-date. First, in determining what outfit you wish, you should let the dealer know what insects

you are to fight, what your problem is, whether it is bushes, trees or vines. In spraying currant bushes, some have found that they can better use a dry poison than a wet poison. I shall not recommend any special make. It has been found by some of the growers that paris green dusted on when the dew is on the plant, is a good method of handling insects on vines and bushes.

I am also going to tell you of some experiments that will be tried this spring. I feel quite sure that a dry poison will be experimented on. It has gone so far that now the dealers are putting up arsenate of lead in dry form, with the idea that it will be dusted on the trees. I speak of this to show you that we are not by any means reaching the point of fixed methods of handling insects and of spraying methods.

1. Here Mr. Frost handed around photographs showing the methods of spraying.

One of these shows solid stream spraying. We are fast coming to give up our ideas of fine sprays. The farmer may not come to the solid stream spraying, as he cannot do it with small apparatus.

2. (Photographs of automatic sprayers used for large growths).

Poisons that require water as a carrier mean that we must use some form of pump. The form that we use will be determined by material, size of trees, natural conditions of surface, etc. If we use miscible oils, which are coming into greater use every year as contact poisons, use the mixture with a small amount of rubber as possible. Some are using metal throughout. That is the pump that we must use for oil sprays. If lime-sulfur wash, then the rubber is required. Some manufacturers are making pumps with porcelain linings, which withstand better the lime-sulfur than the brass outfits.

Next comes size of plant or area, as outside of these two materials any apparatus or form of pump may be used. The fruit grower should watch the insect very carefully. He can often use a small bulb in handling insects where the area is small.

3. (Photograph of knapsack sprayer).

The knapsack sprayer is very valuable for the small grower.

4. (Photograph of small compressed air outfit).

These are not economical except where small operations are to be carried on.

5. (Photograph of bucket pump).

A man with five or six fruit trees can use the bucket pump to better advantage than any other outfit that can be secured. I don't believe it is necessary always to put in large outfits. I have sprayed trees fifty and sixty feet tall with the bucket pump. I find I can do this cheaper and just as effectively as I can with a large pump.

6. (Photograph of barrel pump).

Next comes the barrel pump. Up to orchards of over five hundred trees I think this the best to be used. I have tried all kinds of pumps and find with this I can use two lines of hose in one orchard, and I much prefer to use the barrel pump. I believe we have struck the wrong end in hunting for our pressure. Western entomologists all come out for high pressure. I don't think it is efficient. I believe it is more efficient to thoroughly cover our trees with the spraying material. I also recommend the submerged barrel pump with the air barrel under water. Nearly the entire pump is in the barrel. The submerged pump works better because we have the pressure under water.

Automatic pumps, which are attached to the running gear of apparatus, are not adapted for spraying of high land. They are all right on level fields for crops, etc.

In June, 1907, we bought a large outfit for spraying pump—six horse power gasolene engine weighing 1,800 pounds. Pump weighed about 900 pounds. Imagine the work of carrying around 2,700 pounds in engine and pump. We used about 400 gallons of spraying material every twenty minutes. Four hundred gallons weighs 3,200 pounds. **This meant a tremendous load.**

Last June the engine we had weighed 360 pounds. This brings the engine down to a practical working basis. Our pump today weighs 1,000 pounds. These are not satisfactory pumps. They are cast-iron and are very heavy. Our next move will be to get some one to build a pump that will be light.

The large grower will use a small gasolene engine one-half and three or four horse power, and when spraying put it somewhere where it will not freeze. It is almost impossible for the average man to draw off all the water. If any remains it will freeze and ruin his pump. Buy a pump and

engine mounted on a solid iron base which he can put into any wagon and attach it to a hogshead or tank which he has on the place.

Now comes the hose, which is a very important question. I wish to emphasize the question of power, for I believe it is after the water leaves the pump that we lose the power. We find that on one-half inch hose we get more friction than on three-fourths inch hose, also with fifty feet of hose we are getting more pressure than with one hundred feet of hose. The hose used for solid stream spraying is one-half inch cotton hose made especially for spraying. Special hose is made for different sprays.

Couplings. Nearly every one has difficulty with couplings on hose blowing out. This is offset by long tail couplings with clamps. The advantage of long tailed coupling is that it will never blow out, and it can be used for a life time. You will find that the hose will get bent and cause leaking near the coupling. With long tailed couplings you can cut the hose and use clamps to replace it and have your hose repaired in five minutes.

Nozzles. A reducing coupling has been made that will increase pressure at the nozzle tremendously.

Spraying Extension. The best is common gas pipe. Have the cock at the pump. If cock is on extension the pressure will be on the hose. I prefer the cock at the pump.

Nozzles. There are many types. Without doubt the Vermorel is the best for fine spraying. Nothing will beat it. It is double and triple.

There are several types of the Bordeau nozzle. Buy the heaviest one that you can because they wear more or less. It saves in labor. You can cover higher trees.

Nozzles used for solid stream spraying. We have found that we must have different tips for nozzles in order to get our streams right. We must change tips every time we add lines of hose.

I would recommend as an essential thing in spraying, the emergency kit. It should contain balances for weighing material; getting the exact weight is very essential. For repairs put in a pair of wire pliers, they are handy to have; an extra nipple, as these often break; extra pair of long tailed couplings; reducer; Stilson wrench for pump; square wrench and screw driver; extra clamps; extra reducer and small nipple for nozzle and spraying extension, and a number of

rubber washers ; extra nozzle of every kind used. With these you will reduce your spraying bills, and in reducing your bills you will get better spraying, better fruit, and better prices.

A rising vote of thanks was extended to the Worcester County Horticultural Society for the use of their hall for our meetings, to the officers of the Association, and to the speakers.

The afternoon session was a joint meeting with the Worcester Society, Mr. and Mrs. H. B. Fullerton, Huntington, L. I., speaking on "The Lure of the Land," in which they described the improvement made in the so-called barren soils of Long Island. These addresses were illustrated by well colored stereopticon slides taken from the farms and fields.

MASSACHUSETTS FRUIT GROWERS' ASSOCIATION

Sixteenth Annual Meeting, March 9-10,
1910

WEDNESDAY, MARCH 9, 10.30 A. M.

The sixteenth annual meeting was called to order by Pres. John W. Clark of North Hadley at about 10.30 Wednesday morning. Mayor James Logan welcomed the Association to the city as follows:

Mr. President, Ladies and Gentlemen:

I have not any formal address to make today, simply to extend greeting of the city. I had the pleasure last year of saying a few words at the opening of your conference, and your president asked me today if I was still getting my living out of my orchard, to which he then referred, and I am glad to say that I am getting it out of it, certainly not in it.

Now the years pass quickly and many have been called away from us since we last met and I think we may congratulate ourselves that we are still here and have our chance.

I believe thoroughly in New England, I believe in Massachusetts, and I believe more than all in Worcester and Worcester county; but we must do business on a business basis, and if I may be allowed to suggest I would say that the farmer has been all too slow to realize that fact. We must put our best foot forward in good old New England. We have the best market for selling fruit that this country affords. The problem in business is not so much to manufacture goods as to sell them at a profit.

Now with the market right at our doors the selling of fruit is in a sense your burden, for the market is here. I confess to just a little humiliation to know that apples come

into this city from the Pacific coast. Apples that do not begin to line up with the apples we raise here in New England but they are selling by the car load because they are selected goods, and we must remember this, that in business the only way to eliminate competition is to do things better than our competitors.

The western people have been doing things better than we have in New England and that accounts for the hold that they have over the New England farmer. With our position 3,000 miles nearer than the orchards of the Pacific coast, the New England farmers should hold the market here.

An acquaintance of mine, who has a large farm, told me that he had four or five acres in corn and he had brought it up by scientific farming so he had doubled the product in five years and he did it by applying to the raising of corn the same knowledge that would be applied to any business problem.

James J. Hill and men of his character and foresight say that we are not raising enough on the farm. That, in his opinion, and I believe he is right in saying it, is the cause of the higher cost of living.

It will be a part of your burden, not mine, to prevent this, and to produce enough on your farms to counteract it.

RESPONSE OF PRESIDENT CLARK

I have listened with great pleasure to the kindly greeting that the Mayor has given us. He has told us a good deal of truth. It was a talk that we can take home with us and think over, because we in New England are often a little slow, but I hope we are waking up.

Our society was organized here 15 years ago and I think we have not disgraced your city to any great extent. We have enjoyed our meetings very much and I would like to say this in regard to our society and what we have done. Our society was organized in 1895; eleven men met here and talked over the advisability of forming a fruit growers' society and from that this organization was formed and those who have been here year after year know what our work has been. We have tried to show how to grow better fruit and how to handle it so it would go on the market and bring better prices. But the fruit business from then until now has changed almost entirely. The great fruit industry of the west has come since then but the show we had in Boston

last fall opened our eyes and has shown us that we can here in New England produce fruit equal and even better in quality than they can in the west, and at that show there was fruit that we need not be ashamed to place beside any other. In New England we have produced fruit almost in spite of ourselves. If we should give the same care that the western people give to their fruit, we have fruit that will keep as well—perhaps not as high color and perhaps a little undersize—but if we put the work into it, it will be equal to the western fruit.

And now I want this organization to do something more than we have. We, as an organization have no funds—all we have is membership fees and they do not amount enough to carry on this meeting and publish the annual report. If we had money enough to go out over the state and get people interested, we could do great things. Let us do outside work for the society and help the cause of fruit growing.

The Secretary, Treasurer and acting Auditor then read their reports which were accepted. Committee reports were then in order.

Report of the Committee to cooperate with the General Committee of the N. E. Fruit Show.

This committee met with the officers of the show after they had organized, though it was expected that it should have some voice in the preliminary organization. Offer was made of assistance in a limited way but the only thing that could be done was to donate the sum of \$50 for premiums.

This was offered as follows:

CLASS B. SEC. 1.

For the best and most tastefully arranged exhibit packed for retail trade; at least three kinds of fruit by a member of the M. F. G. A. Package and arrangement at discretion of exhibitor.

1st Premium	\$20.00
2nd Premium	15.00

SEC 2.

For best 10 Plate Collection grown by a member of M. F. G. A.

1st Premium	\$15.00
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Only one premium was awarded, that to Mr. George S. Knapp of Groton of Sec. 2 \$15.00. The balance of the appropriation not being called for, the money remains in the treasury.

APPLE DAY MEETINGS

At the suggestion of several members, two apple day meetings were held in cooperation with Granges, one at Framingham, Feb. 16th, and one at Ayer, Feb. 18th.

At Framingham about 100 were present. The principal addresses were given by Miss Mildred Maddocks of Foxboro upon the subject of "Apples for Food and Health," and by Mr. Harold L. Frost of Arlington on "Spraying and Spraying Appliances." "Lessons from the N. E. Fruit Show" were discussed by the President, J. Lewis Ellsworth, Jonathan Eames and Monroe Morse. This was a very instructive meeting. Framingham Grange provided a generous dinner, for which the small charge of twenty-five cents was made.

At Ayer a much larger meeting was held, about 200 being present. Miss Maddocks and Mr. Frost were the principal speakers, discussing the same subjects as at Framingham.

An apple dinner was provided by the local grange members, all dishes containing apple in some form. This meeting was reported as very instructive and a great success in every way.

A rising vote of thanks was given to the speakers and others who helped make the meeting a success.

For these two meetings we are indebted to the State Board of Agriculture for the payment of one speaker at each.

COLLECTION OF ANNUAL DUES

In years past there has been more or less difficulty in collecting dues and membership fees, from the fact that the

secretary has been occupied in making records and looking after many details of the meetings, and a great many friends attending were not given an opportunity to become members or pay the annual dues. To remedy this evil two tellers were appointed by the chair who quietly passed among the audience and gave everyone an opportunity to become members. This resulted in about 40 new members and the payment of dues by a much larger number than usual. This practice should be continued.

Pres. Clark then introduced Miss Maddocks of Foxboro, who gave the following lecture :

APPLES FOR FOOD AND HEALTH

Miss Mildred Maddocks, Former Culinary Editor of Good Housekeeping

The cost of living is a pertinent question. For centuries the housewife has struggled alone with her individual problem. Today it is an issue for the trained economist as well as the housekeeper; this grave question of demand and supply; of food materials, whose production has not kept pace with the increasing numbers of people demanding to be supplied; and the rise in prices, which has been the result, in part, of this lack of production.

Doubtless there are grave faults of trust and tariff, but a third factor should not be forgotten; the extravagancies and increasing extravagance of the American people. A recent writer has pithily parodied, "Of the three grave faults: trusts, tariff and extravagance, the greatest of these is extravagance."

Yes, the cost and increasing cost of food is important. But it is of vastly more importance to the housekeeper and her family that she have a knowledge of foods and food values which shall make her in part independent of the foods which soar.

It is a pitiful fact that the increased cost of living falls most heavily upon those who of necessity have shorn their diet of all save the simple necessities. The table luxuries of the wealthy are cheaper today than ever before. But flour, milk, sugar, and eggs if fresh, are luxuries now to many. A moment's thought, will show, I believe, that a better know-

ledge of market gardening and fruit culture has brought a class of foods, formerly but little used, within the reach of the average table allowance. Celery, lettuce, fruits and market produce are plentiful and cheap compared to markets and prices ten years ago.

It may be possible that Americans are in process of adjusting their dietary to a condition of affairs based, it seems to me, primarily upon the tremendous influx of country folk and foreigners into the cities, and the opening, through rapid transit and refrigerating facilities, of the food markets of the world. Never before has the housekeeper had such a variety from which to choose for her family. And the question rapidly becomes: does she choose wisely under these new conditions. Standards have changed to keep pace with modern living: formerly the housekeeper who could prepare palatably the produce of the farm had fulfilled her duty as a food economist. Today, far more is involved: The housekeeper is seeking to know the relative cost and nutritive value of foods. She wants to know the different needs of the child and the old person; the student and the laborer; the sick and the well—for they all have their varying needs. More, she is inquiring the meaning of "balanced ration." What are "food principles," she asks, "and how can I make the technical and involved science of diet common, practical and of service to my family." and unless it can be made of service in the homes of the people, it has no excuse for being.

Our subject this morning is: "Apples for Food and Health." But I am asking you first to follow me through a brief, general description of nutrition and foods, that we may more clearly see the exact and valuable place that this fruit should take in the dietary.

First then—what is food? And the answer is roughly: Anything which will form tissue or fluids, repair waste, store up fat or energy or protect, by being consumed itself, the actual tissues of the body from being consumed.

That is what food does, and to do it, food must be made up of one or more of five food principals, of which the first and foremost is water.

Next only in importance, for without it there could be no growth, is "proteid," or tissue forming material. Perhaps the purest natural form is found in the white of an egg. Meat also has a large proportion, while milk, cheese, fish, peas, beans, lentils and nuts are all tissue builders.

Cereals contain some proteid, but are not nearly so valuable a proteid source as advertisements have led one to think. Uncle Sam now, through the food laws, exercises some jurisdiction over extravagant labels, and many of the prepared cereals have been forced to markedly modify their claims.

Next comes a group of heat and energy givers, the starches and sugars, and I use the plural because there are many kinds which the microscope and polariscope have revealed to the scientist. They cannot build or repair tissue, but they can furnish heat and energy for the body needs and are as fat stored up to save the tissues from being consumed at some future time of need.

The fats are another great group, and their special duty seems to be to furnish a quick fuel. It is odd—but fats are seldom or never stored in the body as fats, their quick energy is too valuable, and the slower starches and sugars are used for this purpose. Fats are for warmth then, as the natural diet of all folks in cold climates will show. Finally must be considered, a small group seemingly unimportant, but whose work is to keep the whole machinery of nutrition moving smoothly, and I speak now of the salts and fruit and vegetable acids which go to make up the mineral matter in foods.

Food, then, must be made up of one or more of these five food principles: Water for the fluids of the body; Proteid for tissue building and repairing; Starches, Sugars and Fats for heat and energy, and the Mineral Salts to preserve the proper density of the body fluids, that actual nutrition may take place.

Again, we must consider the proper proportion of food principles for the balanced ration. Age, climate, sex, and occupation all affect this, but even a limited knowledge of the proper proportion of foods should be of service to the housekeeper as she goes to market. Many housekeepers err from lack of protein: starchy foods for breakfast; again they take the important place at noon and still again at night, when green vegetables and fruits might well be substituted.

As a result of a long series of experiments conducted at Middletown, Conn., by the government, we have a number of standard dietaries to fit the varying needs induced by age, sex, climate and occupation.

We will choose a woman in our own temperate climate in good health, and doing a moderate amount of work. She needs 3 1-2 ounces each of fat and proteid, and nearly 11 ounces of starches and sugars. It is found that a man needs slightly more food than a woman, and the average house-keeper has already stored away this information from her own experience. And, that a man doing hard work needs more, especially of the energy giving foods, than the man doing little or no actual work.

Children need slightly more of easily digested proteids, because we must not forget that this is a season of growth for them. Very old people need less food and should have simple and easily digested foods.

But someone has said, "It is not what we eat, but what we digest, that really matters." In this age of food fads it seems fair to speak a word on the subject.

True, it matters little if a food contains a large per cent. of nourishing food materials if they cannot be digested. Aside, then, from the nutritive content of foods, we must consider the digestive value.

Baked beans contain practically as much proteid as beef, but the indigestible, woody fibre of the outside coating makes them far less easily digested than broiled or roasted beef. In general, all vegetable proteids as in peas and beans and nuts are less easily digested than the animal proteids. This does not mean they should not be used—far from it—but it does explain why the lumberman in the logging-camp with his healthful, out-door life, thrives on a diet of baked beans and pork, while the professional man at his desk must forego even the luxury of his Saturday night baked beans, so dear to the heart of every true New Englander.

An easy method of classifying foods for the use of the housewife groups them into the following classes:

Light Tissue Builders: This includes foods which contain proteid in some easily digested form, and the group is to be used with young children, invalids, and with people generally who lead a quiet, indoor life.

The **Hearty Tissue Builders** are for general use with all healthy folk, including older children, who get plenty of exercise in the outdoor air.

The **Hearty Heat and Energy Givers** are less easily digested than the **Light Heat Givers**, and both classes are for use as the tissue-building foods of the same class.

The Foods for Bulk do not have in every case much actual nourishment, but, nevertheless, are of great value in the diet. For, if all foods were completely digested, the large intestine would have great difficulty in emptying itself.

The Complete Foods are not strictly accurate in name. It means merely that either naturally or by combination in cookery all of the food principles are present and in fairly good proportion: beans and brown bread are an instance; they furnish proteid in beans, starch and some proteid in bread and fat in the pork cooked with the beans.

The Appetizers are an important group. Pickles and relishes and the clear soups, etc., are included. They make the meal palatable and thus increase the digestive value, and, in consequence, the nutritive value of the whole meal.

Two other groups, Light and Hearty Desserts, are explained in their very names. The former is to be used after a hearty meal, the latter very often will make a slender luncheon substantial in food value.

To the readers of Good Housekeeping these lists have been familiar. They are not ideal, by any means, but the system was evolved to make it practical for the housewife who wished to plan healthful, well-balanced meals, and yet did not have the time to study deeply into the science of dietetics.

In making these groups, the amount of the various food principles actually contained is first considered, next its digestibility, and this often determines whether it should be used by the hearty folk of out of door, who, after all, need little consideration save that they get enough, or by the more limited and quiet people.

Finally, the method of cookery is considered. A baked potato can take rank among the light heat-givers, while its fried brother must be grouped with the hearty heat-givers.

Now what place, you ask, does the apple take in these food lists? And I ask you to carefully examine the lists following, and you will see that depending upon the method and ingredients used in cooking, apples may fairly be ranked in every class.

Light Heat and Energy Givers:

Baked Apples

Plain Apples

Stewed Apples, with prunes or raisins or dates

Hearty Heat and Energy Givers:

Fried Apples with bacon
Apple Brown Bread

Light Tissue Builders:

Baked Apples with nuts

Hearty Tissue Builders:

Apple Sausage (pork and apple) .

Foods Useful for Bulk:

Plain Apples
Baked Apples

Appetizers:

Raw Apples

Complete Foods:

Apple, nut and celery salad
Escalloped meat with Apple
Apple Pie with cheese

Light Desserts:

Apple Snow
Dutch Apple Cake
Brown Betty

Hearty Desserts:

Apples baked with nuts and maple sugar
Baked Apple Ice Cream
Apple Pie with cheese

The modern Apple, the product of cultivation and selection, bears little relation either in flavor or food value, to the woody, acid fruit the Virginia Colonists found growing in the woods when they arrived in America.

The apple owes its popularity undoubtedly to its delightful flavor which yet to the apple lover is varied with every variety of apple. This flavor in turn is due to the presence of malic acid and to a number of subtle perfume-like compounds called ethereal salts. The commonest is vanillin, the characteristic flavor of vanilla.

Chemists have learned so much concerning these ethers

that they can exactly imitate many of them in the laboratory, and that is why we have artificial vanilla and banana extracts. But Nature, after all, is a more subtle chemist, therefore her compound is finer tasting, more delicate in flavor; while man makes but a harmless, cheaper substitute. I speak particularly of these flavor compounds, because, while of no actual nutritive value, they still bring the food containing them under the group of appetizers.

For centuries, people have eaten apples because "they taste good." They are eating more today than ever before, because they taste better than ever before. Decidedly, a food that is palatable is more valuable than one of the same food value, which yet is not palatable.

As apples ripen they change appreciably in composition. The woody fibre of the green apple, becomes first starch, then sugar; the puckery acid becomes smaller in quantity and thus less biting, while the gum-like substance called pectin, which becomes jelly on cooking, disappears entirely after the fruit is fully ripened.

This latter point is of interest to the housekeeper. Because of it, she will choose unripe fruit for jelly making, and ripe fruit when there is the largest amount of sugar present for bottling as fruit juices.

As one would expect, apples contain a fairly large per cent. of water: 84.6 parts. The next largest, in quantity, are the sugars, of which there are 13 parts. Apples contain a small amount of proteid substance, in the form of albumen .4 of one part; of fat 1.5 parts; while mineral salts furnish .3 of one part. The whole placed in the bomb calorimeter will yield 290 calories for every pound.

Dried or evaporated apples are of course more concentrated: they contain only 26.1 parts of water; 1.6 parts of proteid, 62 parts of sugar, and 2 parts of mineral ash. When this is burned in the bomb calorimeter, one pound will yield 1,350 calories, or almost as much as a pound of pure starch. But it must not be forgotten that dried apples, as dried beans, peas or meat, are seldom or never eaten in this concentrated form, and when ready for the table are little if any richer than the natural forms. A disregard of this fact may be responsible for various misleading statements in regard to relative food values.

Notice is called to one other apple analysis, namely, apple sauce: water 61.1 parts; proteid .2 of one part; fat .8 of

one part; sugar 37.2 parts, and mineral ash .7 of one part. One pound of this burns to yield 730 calories.

Compare this with an analysis of another common food, cabbage:

	Cabbage	Apple Sauce
Water	91.5	61.1
Proteid	1.6	.2
Fat	.3	.8
Carbo-hydt	5.6	37.2
Ash	1.	.7

One pound of cabbage burned in the calorimeter only yields 145 calories against 730 calories for apple sauce sweetened for serving. Which, then, has more value as a food?

Cooking changes the composition of the apple in three ways. Because there is present an acid—malic or apple acid—the woody fibre is changed to some extent by the heat, and the acid together to a sugar exactly as the manufacturer makes glucose out of cornstalks or potatoes and sulphuric acid. Moreover, that portion of the woody fibre which is not changed, is so softened as to be more easily digested. Again, sugar added for sweetening makes the resulting baked or stewed apple proportionately richer as a food.

The raw apple, by actual experiment under the supervision of Uncle Sam, is one of the most completely digested of all fruits, but an apple baked without sugar is easier for an invalid to assimilate because the tough fibre has been softened. If baked with sugar it is not so easy of digestion. Something depends also upon the ripeness of the apple. A mellow sour apple was digested in two hours, a mellow sweet apple in one and one-half hours.

In this experiment the sweet apple was more quickly digested, but if you have proved to your satisfaction that the sour apple digests more completely and more comfortably—why—ignore this data for the personal equation, though a mysterious one, is too important a factor to be ignored in dietics. "What is one man's meat is another man's poison," may be set down as an axiom in the science of diet.

When apples are used in pies and puddings, their nutritive value is greatly increased, and as in apple pie and cheese a well balanced food is often the result.

It is commonly believed that these pies and puddings

are less easily digested, and for that reason should be seldom used. On the contrary they prove to be as completely digested as the simpler forms, and are surely sufficiently easy of digestion for the normal healthy organism. They are too valuable a food source to be neglected. For, unless digestion is weakened, there is only harm to be gained from choosing too easily digested foods. Malted and predigested foods of all kinds, often so widely advertised, have this grave disadvantage. While of distinct benefit to the invalid, they do not sufficiently exercise the normal digestive functions of the body, when in health.

What do apples cost in comparison with other foods?

Where apples can be purchased at 90 cents a bushel, I find they compare favorably with potatoes at the same price.

I use this price merely because it is a convenient one for purposes of comparison, and without regard to present market prices. If you are paying twice as much or half as much for apples you can easily reckon the cost to you of serving apples.

In the meal at which baked apples, served with pork, took the place of potatoes, I found that the apples cost practically the same and furnished nearly as much nutriment as did the potatoes. Rice, plain boiled, was used to furnish the extra starch needed.

By actual analysis 10 cents worth of apples at 90 cents a bushel will yield 1,467 calories; potatoes 2,068, bread 2,430, sirloin steak 440 and celery 140 calories.

But as was previously noted, the caloric system is not fair to the proteid foods, and this explains the seeming low value of beef steak. Apples, then we find, do compare favorably with other foods of similar food value in the matter of price.

An interesting series of experiments was carried on in the interests of the small boy and the green apple.

German scientists analyzed green apples and ate green apples, and finally came to the following learned conclusions. That there was no deadly something in green apples, which was not also present in ripe apples, and that the injurious effects from eating green apples arose from the large amount of hard fibre present, and the imperfect chewing, while possibly the larger amount of acid present caused some difficulty. No tests have yet convicted the green apple of harboring

a chance bacterium, which may cause the trouble, though this possibility must present itself to the mind.

In any event, cooking of the green fruit removes all dangers, and the green apple safely tucked between two tender crusts of pastry becomes the friend, not enemy, of the small boy, and his father.

It has been the common thought that fruit (and I am speaking particularly of that king of fruits, the apple) was of no value save for its pleasant flavor.

But in the face of the evidence presented, I ask you deliberately to change your minds if such be your thought, for apples do really furnish an increasingly valuable source of food material.

Statistics, which I acknowledge are dry things, show that fruit, and of this 83 per cent. must be reckoned apples, in 1900 furnished the average American with 3.7 per cent. of his total supply of starch and sugar. And my authority for this statement is Uncle Sam himself

Moreover, at the California Experiment Station a series of experiments was conducted, which proved beyond a doubt that a man could do work and gain one-half pound in four days on a ration of apples, bananas and walnuts. This series of tests does not seek to prove that this is an ideal diet—far from it—it merely points out that fruit should no longer be neglected as an actual food source.

No—apples may fairly be ranked with green vegetables and root crops. They are real sources of energy.

Aside, however, from their food value, they are of definite and hygienic service. Apples are laxative. This is due to the large amount of water present, to the mineral salts and finally and most important to the crude fibre which cannot be digested and therefore acts as a stimulant to the intestinal walls.

Finally and to sum up—apples are a dilute but actual food. They contain mineral matter which is of value to blood and bone. They are bulky and therefore stimulate what might be a sluggish intestine. They are an economical source of energy and they are good to eat.

Eat apples then for food, eat apples for hygiene and finally and oftenest eat that king of fruits for—pleasure.

DISCUSSION

Quest. Does cooking the apple add to its value?

Miss Maddocks: It does not change its composition. Does not change the actual food value of the apple except as its availability is changed.

Quest. Should apples be eaten at the beginning or at the end of a meal?

It makes very little difference, providing the consumer is well. Fruit eaten alone is always of more value than when taken with other food.

Quest. Is anything beside water lost in drying apples?
Very little.

Quest. Is there any difference in the value of the different varieties?

There has not been enough experimental work with apples to determine that accurately.

Quest. Is it a good plan to eat four apples a day?

In any concentrated diet apples form an ideal food.

Quest. Should apples be eaten in the morning or at night?

Perhaps better at night, because immediately after eating them there will be no added food.

Mr. Wheeler. It is about time we started out on a campaign of educating people to eat our fruit. We must do this if we are to grow enough apples in New England to amount to anything. We are allowing the other parts of the country to get ahead of us in the production of fruit and we must create a market by creating a greater demand and we should have more lectures of this sort and invite the public in. It is for our interest to start this kind of a campaign in New England.

Quest. Is there any limit to the number of apples that a person might eat in a day?

That is a hard question.

Quest. Does pastry have any evil effect on the consumer?

I claim that apple pie and cheese is an ideal food to be taken after a light meal.

Quest. Is it better to eat apples after a meal or before?

You can eat more before than after a meal. If you eat apples instead of potatoes, you have less appetite for potatoes and your apples have done you as much good.

Quest. But children can eat four to twenty apples and still eat just as much dinner?

Standard diets are made up of what we need, not what we want.

Mr. Whitney: As to the number of apples, I think four is a conservative estimate. I would advocate eating two apples either before or after each meal, six apples for the average normal person. Better substitute apples for cabbage.

Quest. Have apple seeds ever been analyzed?

No, but the seeds of all fruits are more concentrated than the fruit itself.

Quest. If a healthy person were to eat freely of apples in the evening would it have any detrimental effect?

Not if the person was in normal condition.

Is it all right to eat the peel of the apple?

If you can do it and it is clean, it is all right.

Quest. Regarding the amount and number of apples: I want to get at the amount that the ordinary individual might take and keep in good health?

The only limit, I should say, would be the pocket book. It seems to me that the American people are more careful of feeding their stock to attain a certain result than they are in feeding their own families.

Quest. Does the apple aid in the digestion of other foods when taken at the beginning of a meal; for instance, in the morning would two or three apples aid in the digestion of other foods?

The use of the apple in that respect would be the same as a glass of cool water.

Quest. I would like to ask how many in this hall have eaten an apple today. (About three-quarters had done so.)

Mr. I have not listened to a lecture like this before. He would be a good physician who could tell us all the effects of fruit on the human system. I think that the medicinal value of an apple is not understood today. A few years ago, I was confined in a city office and had only a half hour at noon; eating hurriedly as I was obliged to brought on severe liver trouble for which I took a great deal of medicine. I at last decided that I did not need any more medicine but began to use apples, and in a short time was cured. There is more medicinal value in one apple than in a whole shelf of drugs from a drug store. I have enjoyed

this lecture and would like to have it supplemented by a lecture on fruit by a physician.

A committee of five was appointed to bring in nominations for officers for 1911 and the meeting adjourned for dinner.

AFTERNOON SESSION

The meeting was called to order and the nominating committee reported the list as found on the second page of the report with the exception of the Secretary-Treasurer. Past Secretary Charles A. Whitney of Upton being unable to serve in that capacity F. Howard Brown of Marlboro was substituted. It was moved that one ballot be cast and the list was elected for the ensuing year.

Pres. Clark then introduced Dr. Felt of Albany.

FRUIT TREE INSECTS AND THEIR CONTROL

E. P. Felt, State Entomologist of New York

The production of perfect fruit is the ambition of every progressive grower. Our friends of the extreme west, especially those residing in Oregon, have obtained remarkable results and, as a consequence, Oregon apples are frequently cited as the desirable standard and the fruit sold at record prices. This follows upon the adoption of the very latest and best methods and is not due to any great extent to the absence of insect pests. These results are impossible with fruit discolored by San Jose scale, disfigured by the codling moth or apple worm, dwarfed and gnarled by plant lice or rendered distasteful by the numerous brown "railroads" of the apple maggot. We propose to discuss briefly some of the more important of our insect pests, giving particular attention to recent developments and making an earnest endeavor to emphasize the practical aspects of the situation.

SAN JOSE SCALE

The first insect pest to receive attention in the spring is the San Jose scale, a species which has become established here and there in our fruit growing sections, and one known to be generally distributed in a number of localities.

The experience of the last decade has demonstrated the feasibility of controlling this pest, not only in young orchards where spraying is comparatively easy, but also on older trees where size, proximity and an uneven surface all contribute to increase the difficulties. Most of our fruit growers recall the tense condition of the earlier days with their discussions of whale oil soap, kerosene and crude oils and their emulsions and mechanical dilutions, accompanied by numerous experiments, trials and applications, some of which can hardly be considered conservative. Limoid, once the center of the stage, is now only a memory. The lime-sulfur and salt preparation has been succeeded by the lime-sulfur wash, while the earlier commercial products have been replaced by the highly charged and, for the most part, very efficient commercial preparations sold under various trade names. The mechanical mixtures of oils have in turn been displaced by the so-called "soluble" or miscible oils and several excellent brands are now upon the market.

Fifteen years' experience, accompanied by many trials here and there throughout the fruit growing sections, ought to justify certain conclusions. One of the earliest infestations by this pest in the East was on the farm of Mr. L. L. Morrell of Kinderhook, N. Y., who at that time possessed a relatively small, old orchard and a large number of vigorous, recently set trees. The latter were very severely injured and naturally received first attention, while the old trees, showing signs of distress later, were mostly ignored. The large trees have been destroyed, while the young trees, despite their having been badly infested and at times in bad shape, are now in a thriving condition and the once dreaded scale well under control. The handling of this pest in an old orchard is admittedly much more difficult, yet the experience of Mr. W. H. Hart of Arlington, N. Y., has demonstrated the practicability of combating this scale on large trees. It was a case of fight or lose the orchard. At one time the writer saw most of the upper fourth of many of the trees dead or dying from scale injury. Acting upon the hint and possibly aided in this respect by the work of the pest, Mr. Hart began cutting out the tops in an effort to bring all limbs within reach of his spray, applied from the ground, since the uneven surface of the orchard prevented the successful employment of a tower. In a few instances, limbs three inches or more in diameter were removed. The

trees are now in full vigor and, from a distance give few signs of the severe heading back of several years ago. Last fall they were heavily laden with excellent fruit and were practically free from scale, except individuals here and there which could not be thoroughly sprayed owing to one cause or another. It must be admitted that these desirable results were obtained only after years of patient trial, and even then might have failed had the execution of the task been in the hands of a less determined or less conservative man.

This large fruit grower has taken a practical experimental course with mechanical mixtures of crude oil, the home-made lime-sulfur wash, the Cordley lime-sulfur wash and the commercial lime-sulfur wash. It has been found that the applications of oil while beneficial, were not so uniformly successful as the lime-sulfur preparations. Experience soon showed that the keynote of success lay in the thoroughness of application and that the latter could be secured only under certain favorable conditions. It has been Mr. Hart's invariable practice for some years, to spray the trees with winds from opposite directions, and whenever this has been possible the results have been most satisfactory. Occasionally adverse winds have hindered the work, and invariably the partly sprayed trees became badly infested and, in some instances, rather seriously injured before the close of the season. These results were obtained not only upon the somewhat resistant Baldwins, but also with the Ben Davis, a variety very subject to scale injury. Mr. Hart is convinced that under his conditions at least, it is almost imperative to have some material which can be applied the moment weather conditions are favorable, and thus avoid the initial delay incident to a somewhat prolonged boiling of the home-made material. Last spring he tested the Cordley formula making it up in advance, and also used one of the commercial lime-sulfur washes. Both were so successful that they will be tried out on a larger scale another season.

There is no longer any question as to the practicability of controlling San Jose scale provided the work is thoroughly done and satisfactory materials employed. There is some difference of opinion as to the relative value of the various preparations now used for this purpose. Those not meeting the demands of fruit growers have been ruthlessly dis-

recorded. Accepting these practical tests under all kinds of conditions as a fair standard for determining efficiency, we must conclude that the lime-sulfur wash still stands as the best remedy for controlling San Jose scale. There is no doubt as to the value of the home-boiled mixture. It has given excellent results under a great variety of conditions. The more recent Cordley formula* is coming to the front in a most promising manner, while the standard commercial preparations appear to be equally satisfactory. There is still some question as to which formula is the most economical and can be relied upon in the long run to give the best results. The desirability of making some modifications while important, should not prevent the employment of the standard lime-sulfur washes. One can hardly err if he uses a good lime-sulfur wash and makes a thorough application.

A word as to materials. Experience has shown that the powdered commercial sulfur, 99.5 per cent. pure is as efficacious as the more costly though finer, sublimed flowers of sulfur. It is advisable to use a pure lime, 90 per cent. calcium oxide and thus escape trouble with sediment. Magnesium lime is unsatisfactory, since the oxide does not combine readily with sulfur to form efficacious sulfides similar to those of the lime-sulfur wash. The presence of quantities of magnesium lime is indicated by the giving off, during the process of boiling, of hydrogen sulfid, a somewhat poisonous gas having an odor similar to that of rotten eggs. Commercial lime-sulfur washes should not be purchased unless accompanied by a guaranty and should give a Beaume reading of about 33 per cent. Such a wash may be diluted with 8 parts of water. Recent experiments have shown that the sediment found in some of these commercial washes

*This wash may be prepared by slaking 60 lbs. of good lime in a small quantity of water in a 75 gal. cooking vessel and stirring in 125 lbs. of sulfur previously made into a paste; then add 45 gals. of water and boil rapidly for one or two hours or till practically all the sediment has disappeared; dilute to 50 gals. The clear liquid should test 25° on the Beaume scale. This wash may be kept indefinitely, and just prior to application it should be diluted with 5 1-2 times its volume of water or till the diluted mixture gives a reading on the Beaume scale of about 4 1-2°. It is also well to add at this time, without increasing the dilution, the soluble portion of 6 lbs. of good stone lime in the form of milk of lime for each 50 gallons of spray.

has very little or no insecticidal value. Therefore, a clear solution, so far as commercial preparations are concerned, is the most profitable investment. A variation of 1° on the Beaume scale means a difference in value of about 40c. if a 50 gallon barrel giving a Beaume reading of 33° is worth \$10.00.

There are conditions where it may not be advisable to employ the lime-sulfur wash, as for example, in the vicinity of painted dwellings or fences. Furthermore, some parties are very susceptible to the caustic action of a lime-sulfur wash. The miscible or so-called "soluble" oils, now on the market under various trade names, require dilution only before application, and have given very successful results in the hands of some growers. They are certainly worthy of trial under conditions named above. Injury from some of these materials has been reported from time to time, though at least one manufacturer claims that nothing of the kind has occurred in recent years when the applications have been made according to directions. It is nevertheless safer to use a material which can hardly cause injury under any conditions, and which appears to give more satisfactory results, all things considered. These reasons lead us to give a marked preference to the lime-sulfur compounds.

CODLING MOTH

The codling moth is one of the most ancient enemies of fruit. It is surprising how well satisfied certain fruit growers are to obtain 50 to 60 per cent. of worm free apples. There have been in recent years some very strong statements made in favor of employing a rather coarse spray and an unusually high pressure in an effort to drive the poison into the lower calyx cavity, that is, the cavity below the stamens. It is hardly necessary to remind fruit growers that after the white petals have dropped we have the green calyx lobes and within a ring of numerous upright, slender stamens surrounding the central, fleshy pistil. Below the stamens and at the base of the pistil there is an appreciable cavity. This is the place, according to some authors, where the poison must be put if we would obtain fairly satisfactory results. One writer has even gone so far as to state that if spraying is not done in this manner, the small apple worm is fairly safe, since it rarely feeds before it gets down

into the lower cup and that the poison sprayed on the outside will therefore not affect it. The claims for this method of spraying were so strong that the problem seemed one worthy of careful demonstration, and the writer therefore planned and conducted a series of experiments for the purpose of obtaining data upon this proposition.

Nearly ideal conditions were found in the large, young orchard of Mr. W. H. Hart, Arlington, N. Y. The thrifty trees were about 15 years old, 15 to 18 feet high and 30 feet apart. Each plot included 42 trees, six in a row one way and seven in a row the other way, the central six being experimental trees and invariably Baldwins, though some of the barrier trees were Northern Spys. The actual experimental trees were carefully selected to obtain uniformity in size, fruitage and infestation as far as possible. There appeared to be a moderately uniform codling moth infestation throughout the orchard, an opinion sustained later by the results secured. Our plan was to make comparisons between a coarse, driving spray such as that produced by a typical Bordeaux nozzle with a pressure of about 150 pounds, and the finer, misty spray of a Vermorel nozzle with a pressure of approximately 125 pounds. A Friend nozzle was used as one of the better representatives of the Vermorel type. There were comparisons between single sprays of each of the above mentioned kinds, applied just after the blossoms fell, between two sprays of each kind, one given just after the blossoms fell, and the second just before the sepals closed, and finally, between two such sprays and a third applied to both of the plots alike, with a Friend nozzle the last week in July for the purpose of destroying the second brood. The same nozzle was used in midsummer on the two plots receiving three applications, because in this later spraying there was no necessity for trying to drive the poison to the bottom of the calyx cavity, and we simply employed the nozzle which gave the most satisfactory distribution of the insecticide.

The Bordeaux nozzles were set to give a maximum of rather coarse spray which would not break up into fine drops till about six feet from the nozzle, and a special effort was made to drive the poison straight down into the tip of every young fruit, the nozzle being held about 18 to 24 inches from the tips of the branches so far as possible. This coarse spray penetrated to the middle of the tree and re-

peatedly passed the stamens, collecting in the lower cavity, especially during the first application at the time the stamens were fresh. Later the stamen bars had withered a little and an examination showed that the dried tips of these organs were very likely to become entangled and present a most effective barrier to the passage of the insecticide. In practice it was found much more difficult to cover a tree with the Bordeaux type of nozzle than it was with the much broader and more evenly distributed spray delivered by the Friend nozzle. The difference was so marked that much greater care was necessary to secure equally thorough work with the Bordeaux nozzle, though it should be noted that the penetration from the Vermorel nozzle was not as great, even in the case of the first application at a time when conditions were most favorable. The spray was applied by practical orchardists working under expert supervision, a special effort being made to cover the entire tree, and particularly to hit the tips of the young apples with the spray.

The trees were sprayed with 5 1-4 lbs. of Grasselli's arsenate of lead, and 10 lbs. of copper sulfate to each 150 gals. of spray, enough lime being added to neutralize the copper sulfate as determined by the Ferro-cyanide test. The first application was made May 20, the second May 31 and the third July 28. Two check trees were left in the vicinity of the experimental plots.

The fruit developed very satisfactorily throughout the season, aside from somewhat severe injury by plantlice, a factor hardly affecting the experiments with the codling moth, though possibly reducing the percentage of wormy apples, as will be pointed out later. Dropped apples were collected September 13 and 14, carefully sorted and classified, and the fruit picked October 5 to 7 and likewise carefully sorted. It should be noted at the outset that the dropped fruit from the various experimental plots gave from 14.91 to 26.67 per cent. of wormy fruit, while the two check trees had 73.91 and 81.02 per cent. respectively, of wormy fruit. These percentages, applying only to the dropped fruit, are mostly interesting since they corroborate a well known fact, namely, that a large proportion of the dropped fruit is wormy.

A study of the results as a whole, is extremely interesting. We find that the three plots sprayed with a Friend nozzle produced 98.81 to 98.99 per cent. of worm free fruit,

the higher percentage being obtained on the plot receiving three applications. In a like manner the three treated with a Bordeaux nozzle yielded 98.55 to 99 per cent. worm-free fruit, a slightly higher percentage, as in the preceding group, being obtained on the plot receiving three applications. This apparent lack of material benefit resulting from the second and third treatments, may be due in slight measure to the fact that the plots sprayed but one produced more apples than those receiving the second and third sprayings, though the difference is not uniform, and the variations between the percentages of worm-free fruit do not coincide exactly with the difference in yield between the various plots. For example, between plots 2 and 3 there is a difference of only 636 apples out of approximately 10,000, a variation hardly large enough to materially influence the percentage of worm-free fruit. This latter is only .06 per cent. in favor of the trees receiving three applications. Similarly, on plots 4 and 5 there is a variation of but 1,030 out of approximately 10,000, and a difference in the percentage of worm-free fruit, of but .46 per cent. in favor of the trees sprayed twice.

A comparison of the fruit on the maximum and minimum trees, shows that in plot one the maximum tree, producing 8,745 apples, yielded but .63 per cent. wormy fruit, while the minimum tree, producing 2,507 apples, had 3.16 per cent. Similar results were obtained in other plots. That these variations are mostly local and hardly of general application, is shown by a study of all the plots. There was, as pointed out previously, a remarkably uniform percentage of worm-free fruit throughout, despite the considerable variation in product. The benefit resulting from one or more thorough applications is shown by comparing the percentage of worm-free fruit, 98.55 to 99 per cent. on the sprayed trees, with that obtained on the two check trees, namely, 72.73 per cent. It is thus seen that approximately 25 per cent. or a little more of the fruit may be protected from codling moth injury by one application. The benefits of the second or third application must of necessity be restricted to reducing the infestation in the 1 or 1.5 per cent. of wormy fruit remaining.

The study of the wormy fruit gives some interesting data as to the point of attack, though very little can be gleaned therefrom in favor of using a coarse spray with a

heavy pressure, as compared with a finer spray and more moderate power. In fact, it is impossible with an average of only 1.45 to 2 per cent. of wormy fruit on the sprayed plots, to obtain any very marked benefit. It was found that on plots 1 to 3, 10 to 18.36 per cent. of all the wormy apples were entered at the end, an average of 14 per cent. end wormy. Similarly, in the case of plots 4 to 6. the variation was from 9.94 per cent. to 12.50 per cent, or an average of 11.50 per cent. of end wormy apples in the total infested. Comparing these percentages with the 69.37 per cent. end wormy of the infested apples on the two check trees, it will be seen that the major proportion of the codling larvae destroyed, must have been killed in or about the blossom end because of the enormous reduction in the number of end wormy apples. There is a slight percentage in favor of the coarse spray with the Bordeaux nozzle. Comparing the totals for plots 1 to 3 and 4 to 6 respectively, it is seen that the first sprayed with the Friend nozzle produced 50,173 apples, 98.87 per cent. being free from infestation, while the latter sprayed with the Bordeaux nozzle yielded 47,298 apples, and had 98.81 per cent. of worm-free fruit, a difference of only .06 per cent. in favor of the finer spraying.

These experiments were duplicated in part in the orchard of Mr. Edward VanAlstyne of Kinderhook, N. Y., and very similar results obtained. The data justifies the expectation that, under normal conditions as they were found in the Hudson valley at least, one thorough application of poison within a week or ten days after the blossoms fall, should result in protecting a very large percentage, 98 to 99 per cent. of the fruit, from codling moth injury. We would emphasize the necessity of thorough work, though by this we do not mean an effort to drive the poison into the lower calyx cavity, desirable though this may be on theoretical grounds, but thoroughness in covering the foliage, the young fruit, and in particular the blossom end, a point favored, as our investigations show, by 37 to 69 per cent. of the worms entering the apples. We would select a nozzle giving the most uniform and rapid distribution of spray without regard to penetration. This should not be understood as discouraging the employment of high pressure, since this is undoubtedly an important factor in thorough and rapid work, the latter being extremely desirable on account of the limited time when successful applications may

be made. We are satisfied that most excellent results can be obtained where conditions permit the use of only moderate pressures.

It should not be understood that the above conclusions are unsubstantiated by other data. An outline of these investigations was submitted at the recent meeting of the American Association of Economic Entomologists. At that session Prof. Rumsey of West Virginia stated that he had obtained practically the same results, while Prof. Sanderson of New Hampshire declared that our data agreed with his investigations. It has long been recognized by entomologists that the first spraying for the codling moth was by far the most important. Some years ago Prof. E. D. Ball of Utah, in an extended paper before the New York meeting of the Economic Entomologists, demonstrated the great utility of this application, not only in preventing infestation by the first brood, but in reducing the numbers of the second by destroying its progenitors.

A word as to the poison which may be used is perhaps appropriate. Generally speaking, it will doubtless be found that any one of the standard commercial preparations of arsenate of lead, prepared especially for spraying, will give very satisfactory results. This poison should be purchased on a guaranty as to the amount of arsenic contained, since there is considerable variation between the different brands. It is not particularly profitable for the fruit growers to pay for filler. It is the poison he is after. This is one of the safest poisons so far as injury to vegetation is concerned, that can be employed. Paris green will give excellent results provided it is not washed off by rains, while the arsenite of lime* is one of our cheapest poisons. These two latter should preferably be used with the Bordeaux mixture.

Our experience last year demonstrated the necessity of very thorough work if the high percentages of worm-free fruit cited above are to be obtained. One tree in a special

*Dissolve 1 lb. of white arsenic and 4 lbs. of sal soda (carbonate of soda, washing soda) in 1 gal. of water, by boiling in an iron vessel 15 minutes or till the arsenic dissolves, leaving only a little muddy sediment. Add the water lost in boiling and use 1 pt. of this stock solution to each 40 gals. of water, to which 2 lbs. of freshly slaked lime have been added or, and the latter is vastly preferable, a pint of the stock solution may be added to 40 gals. of Bordeaux mixture.

plot, where the application was less thorough than on the others, though not perceptible to the eye of a practical orchardist making the application, produced only 95.06 per cent. of worm-free fruit. We would further suggest that thoroughness in the distribution of the poison in an effort to cover every portion of leaf and fruit with minute particles of spray, will, in the long run, prove more effective and satisfactory than the application of large amounts of poison, especially if the spray is used so liberally as to cause dripping.

PLANT LICE

The past season was noteworthy because of the great abundance of plantlice. Hordes of these tiny weaklings were extremely numerous on our fruit trees, seriously affecting the foliage and in not a few instances materially influencing the development of the fruit. There were many complaints by fruit growers on account of the large number of small apples. These latter were probably produced by the plantlice or aphids being so abundant as to reduce the vitality of the trees at the time the fruit was setting, to such an extent as to prevent the one or two early fertilized blossoms of each cluster securing a sufficient start to outstrip the others, and thus result in a large proportion of the fruit dropping at the outset. Instead of the latter, a very desirable and normal outcome, so many blossoms set that the trees are unable, in large measure, to produce average sized fruit. There was, as a consequence, very many small apples and relatively few good sized to large, marketable fruit. The extent of this was strikingly illustrated on the experimental plots in the orchard of Mr. W. H. Hart, Arlington, N. Y. The fruit of over 250 experimental trees, distributed throughout the orchard and therefore representative, when picked and carefully classified, showed that in approximately 100,000 apples there were only 54,845 marketable fruit, many of these being rather small, while 41,982 apples were so small as to be practically unmarketable. This small fruit, popularly designated by many growers as "aphis apples," was easily recognized by its small size and frequently irregular shape. It was estimated by one of the fruit growers that in the vicinity of Poughkeepsie, approximately 33 per cent. of the crop was thus affected, though this figure may be somewhat high. Similar in-

jury was very prevalent in orchards in western New York.

Three species of aphid are likely to occur upon our fruit trees in early spring. The European grain aphid* is a general feeder, having been recorded as occurring upon apple, pear, quince and plum, and such grains as rye, oats and wheat. This insect winters as jet black eggs deposited by the females in the fall around the buds of the more terminal shoots, in crevices at the crotches of limbs, and under scales of the bark. The eggs hatch about the time the young leaves appear, and the small, green plantlice begin to feed upon the unfolding foliage. These early individuals soon produce living young, the latter shortly attaining maturity, developing wings and flying to other trees. This species is most easily recognized by the oval, yellowish green or brown body. There may be four or five generations in the latitude of Washington, and by early July the trees are deserted for the grains, grasses or other host plants, a return migration to the apple occurring in the fall.

The green apple aphid^o, like the preceding, passes the winter as black eggs. The plant louse has a pear-shaped, yellowish green, green or dark green body instead of the oval form of the European grain aphid. The eggs hatch a little later than those of the preceding species. This plant louse frequently causes serious curling of the foliage. It may occur upon the trees throughout the season, and in New Jersey, at least, may produce six generations.

The rosy apple aphid** is distinguished from the preceding by its larger size, rounder shape and usually rosy color, though this latter may vary from salmon to tan or even to slaty gray or black, the body being dusted with white. This aphid also winters as eggs deposited on the trunk and larger limbs. The young plantlice appear with the unfolding of the leaves. There are about three generations before the trees are deserted for an unknown food plant.

Climatic conditions, it is evident to the most casual observer, must have a profound influence upon nearly helpless insects like plantlice, feeding almost unprotected upon the foliage of various trees. This is well substantiated by the experience of recent years. The remarkable abundance

**Siphocoryne avenae* Fabr.

^o*Aphis mali* Fabr.

***Aphis malifoliae* Fitch.

of plantlice last season was comparable only with the outbreaks of 1897 and 1903, years distinguished by the superabundance of these pests. Observation and weather records show a distinct correlation between a low, unseasonable temperature and the multiplication of plantlice. The past summer was remarkably cool and backward, a marked change for the better occurring June 21. That the earlier cool weather was favorable to the plantlice was evidenced by the hosts appearing upon the leaves of many trees. The reason is probably found in the fact that the unusually low temperature prevented the normal activity of such extremely beneficial natural enemies as lady beetles, flower flies, the minute 4-winged parasites and lace-winged flies. Prior to the occurrence of warm weather numerous lots of plantlice, showing no evidence of having been materially injured by natural enemies of one kind or another, were received. Shortly after the rise in temperature a very different condition of affairs obtained. Leaves injured by plantlice continued to come to hand, but in almost every case a few natural enemies had begun to reduce the numbers of the pests, or especially toward the end of the outbreak, most had been destroyed and the leaves bore signs only of earlier injury.

The lesson to be drawn from the above is that plantlice outbreaks may be expected when the late spring weather is unusually cool and backward, unless it is accompanied by pelting rains which are undoubtedly of considerable service in destroying exposed aphids. The advisability of adopting direct repressive measures in specific instances, must depend in a large degree upon the probability of warmer weather developing soon enough so that natural enemies may check the plantlice before material injury is caused.

Remedial measures against plantlice are well known, as a rule, though delay in their application is very general, and the results secured therefore frequently unsatisfactory. The experience of the last few years has shown the futility of depending upon the ordinary winter or early spring applications of lime-sulfur washes for the destruction of aphid eggs upon our fruit trees. There may be some reduction, but the percentage killed in this manner is so small as to be negligible. The practicability of destroying these minute enemies of our plants by thorough applications of contact insecticides, such as tobacco preparations, whale oil soap

solutions, kerosene emulsions, or even dilute preparations of some of the commercial petroleum compounds, now on the market under various trade names, has been demonstrated.

Tobacco preparations have long been used for the destruction of plantlice, though some experience is necessary to secure the proper dilution, owing to the variability of waste tobacco products from which decoctions are usually prepared. There are now on the market a number of ready-made tobacco extracts. A most promising one is known as black leaf extract. It has given very good results in an experimental way, even when diluted with 60 parts of water. Some of our New York State fruit growers are using a dilute lime-sulfur wash in place of Bordeaux mixture, and after adding poison thereto find this preparation a very efficient fungicide and effective in controlling codling moth and of great value in destroying plantlice when the application is made at the usual time we spray for codling moth. Several of the standard commercial lime-sulfur washes, diluted with 40 parts of water, have been used in this way. It is possible that this combination or some modification may ultimately take the place of the poisoned Bordeaux mixture and solve for all time the problem of controlling plantlice outbreaks, since one thorough spraying just after the blossoms fall would probably obviate the necessity of further treatment of plantlice, particularly if this was an annual practice.

The essential in all these cases, so far as plantlice are concerned, is to make the application before the foliage has become badly curled. The need of special treatment for aphid outbreaks must of necessity depend upon several factors, namely, favorable weather conditions and the relative abundance of natural enemies. It has been shown that abnormally cool weather in the spring and early summer is likely to be followed by aphid injury, owing to the fact that plantlice reproduce readily under such conditions, while the activities of their natural enemies are seriously hindered. Consequently, an incipient attack by aphids, accompanied by a scarcity of natural enemies and the probability of continued cool weather, should serve as a warning to the fruit grower, and result in immediate spraying.

APPLE MAGGOT

The brown "railroads," or irregular, decaying tracts of this maggot, are rather common in New England apples, especially in early sweet varieties. The parent fly, a blackish 2-winged insect about the size of our common house-fly, is conspicuous on account of its white-banded abdomen and the irregularly black-banded wings held in a peculiar half raised condition. These flies appear in orchards in New York State about July 1st and are more or less common from then until some time in the fall. One of our correspondents captured several hundred of these insects in his orchard in early September of last year. The tiny eggs are deposited under the skin of the fruit, and according to the observations of the late Prof. Harvey, hatch in four or five days. The young maggots begin to tunnel the pulp of the apple. They grow slowly in hard fruit, and develop very rapidly as the apples become soft and ripe. The channels made by the small larvae are almost invisible, but as the maggots increase in size the galleries become larger and perforate the fruit in all directions. They frequently cross and occasionally unite to form irregular, decayed cavities. During the later stages, fruit apparently sound one day may be literally honey-combed by the pests on the next. The maggots attain their growth under favorable conditions in four or five weeks, though this period may be greatly prolonged by cool weather, insufficient food and unripe fruit. They rarely desert the apple prior to its dropping to the ground, though they may do so very shortly thereafter if the fruit is ripe and the maggots nearly full grown. They enter the ground, transform to brownish puparia, and apparently remain in this condition till early July of the following year. Numerous maggots are undoubtedly taken into fruit cellars in fall and winter apples, escape from these situations, and winter as though in the ground.

This insect breeds in most apples, including the subacid and sour varieties, though it is most abundant in, and destructive to the earlier sweet fruit. Wild haws appear to be its native food plant. The injury to winter apples is not, as a rule, very pronounced, consisting for the most part of irregularities on the surface, and slightly discolored, corky trails in the interior. These defects, though not conspicuous, depreciate the value of the fruit materially. This in-

sect has been recorded as feeding on plums and cherries, though it is possible that these latter records are based on mistaken identifications.

The most successful method of controlling this insect is by promptly gathering and destroying or feeding the infested fruit to stock. It may be practical occasionally to pasture the orchard, though it be but for a few hours a day, with sheep or hogs, thus giving the animals an opportunity to devour the infested fruit before the maggots have had a chance to escape. This insect appears to be quite local in habit, and according to the observations of one of our practical orchardists, exhibits a marked preference for sheltered hollows. Advantage can sometimes be taken of this habit by planting in such situations, varieties not particularly subject to attack. It may be advisable, in places where this pest is injurious to winter varieties, to plant in the vicinity, a tree or two of an early apple such as Garden Royal, in order to attract the flies from the more valuable fruit. It is needless to add that these infested apples should be promptly destroyed, otherwise the tree may become the center of trouble instead of a trap to draw the insects away from the more remunerative varieties. This could be easily accomplished by setting such a tree in a hogpen, provided its base was well protected. Investigations conducted by the Rhode Island Experiment Station several years ago, showed that the sometimes recommended plowing for the destruction of this insect, is probably of little value. There is some evidence in favor of frequent tillage in early summer.

The prompt destruction of infested fruit and the prevention of flies escaping from fruit cellars, are two measures which can be recommended at the present time. In addition, there is another which may possibly prove of service in controlling this insect, since it has given excellent results in South Africa with an allied form. It consists of spraying the trees with a mixture of 3 lbs. of sugar (cheap sweetening of any kind would probably answer), 4 oz. of arsenate of lead, and 5 gals. of water, applied as rather coarse drops. The idea is to spot the foliage here and there with an attractive mixture rather than to give it a uniform coating, as is ordinarily the rule with arsenical sprays. This work can be done rapidly and a small amount of the mixture would go a long ways. The application should be made just about the time the flies are coming out, namely, early July,

and in case of rainy weather, subsequent treatments might be necessary. It is possible that an application of a dilute lime-sulfur wash at this season of the year would have a deterrent effect and drive the flies away to a considerable extent. Both methods are worthy of trial, and it is hoped that suitable conditions for such experiments will be found in New York State this year.

In conclusion, we would reaffirm our belief in the quest for perfect fruit. It is no chimera. It is thoroughly feasible in large measure at least, though attainable only by close cooperation between the practical and the scientific man. Neither knows it all. The experience of one worthily offsets the knowledge of the other. Combined, results beyond our highest anticipations may be possible. This is the experience of Oregon. Why should it not soon become a portion of New England history? It should be our ambition to produce fruit equal to the product of any region and excelled by that of none.

DISCUSSION

Quest. Would you recommend the addition of lime, at the time of spraying, to the lime-sulfur wash?

Dr. Felt: I should. It does not injure the mixture. The concentrated lime and sulfur washes, when lime is put in, are reduced but no sulphur is taken out. I would not let it stand. Add just before beginning to spray.

Quest. Would you recommend any particular lime for it?

I don't care to. I don't know about Vermont lime. Use a good lime which will slack up and give very little or no sediment. Coal lime should be avoided.

Quest. Where can I get suitable lime?

If you have had good results with one brand, use it. If not, find some other.

Mr. Knapp: Would you advise stone lime or marble lime, if there is any distinction?

No; I think probably one is made by burning lime stone and the other by burning the refuse from marble quarries. In either case, get good quick lime.

Quest. Is there any way to destroy the eggs of the aphids,

No; nothing certain.

Quest. How much lime should be added?

Six or eight pounds of lime to 50 gallons without increasing the bulk of the solution.

Quest. Is the homemade lime-sulfur wash equally good as the commercial,

Yes; if you care to prepare it.

Mr. Knapp: How long should it be boiled?

Boil from at least 30 minutes to an hour. The problem is to get a perfect combination between the lime and sulphur. The more rapidly you boil the quicker you get the combination.

Formula for lime-sulfur wash: 20 pounds of lime, 15 of sulfur and 50 gallons of water.

Use a good grade of powdered sulfur. The fine sulfur flour rather than flowers of sulfur. Buy sulfur under a guarantee.

Quest. I understand then that the purpose of boiling is simply to form a solution of the lime and sulfur?

Yes; if you can bring all your lime and sulfur into solution in 30 minutes, you have done all you can expect.

Quest. What is wrong when considerable sulfur is left in solution?

It is due to poor lime and because the lime has been allowed to come in contact with the air. If the lime is all right then your method of preparing is wrong.

Quest. What are the black spots on the apples?

Baldwin spot.

Quest. Is there any remedy for it?

It is due to deficiency in the soil but there has been no satisfactory explanation.

Quest. What is the cause of knurls in apples?

They may be caused by the tarnished plant bug. A simple remedy for this would be clean cultivation to get rid of the conditions favorable to that pest.

Quest. Would clear lime strewed under the trees help to rid the soil of any pest,

I don't believe it would be worth while.

Quest. What is the Cordley mixture?

125 pounds of sulfur, 60 pounds of lime, and 50 gallons of water. It is a clear solution.

Quest. In spraying large apple trees, would you use the direct or the mist spray for the codling moth?

That depends on how near you can get to your tree.

Use considerable pressure because the pressure is a very important factor.

Quest. With a barrel pump how much pressure would you get?

That depends on the make of the pump and the man behind it. 75 to 100 pounds.

Quest. Have you ever had any results from the use of Scalecide for the San Jose scale?

I have known of some fruit growers who have made application of it and got good results.

Quest. Should the wash be applied very soon after it is boiled?

There is no necessity of putting it on hot. Dilute with cold water and go about your spraying. Keep it warm.

Quest. Is it necessary to keep it away from the air?

It is advisable. This can be done with a covering of oil. Put into a tight vessel.

Quest. What do you think of using potash in the water, and would you use it instead of scraping?

I don't believe it would hurt the tree and it might release the coarse bark, but I would rather spend my time spraying with lime-sulfur wash. Mr. Cornell says he has had much better results where he has scraped the bark off the trees before spraying.

Quest. Is there any danger of scale spreading by cutting off branches in the winter and letting them stay on the ground?

—No; but don't do it in the summer.

Quest. Why are plantlice more abundant some seasons than others?

If you have every indication of a severe Aphis outbreak, it is mostly a question of temperature.

Quest. Is there any advantage in spraying twice for the scale, spring and fall?

Spray twice in the spring.

Quest. Does the San Jose scale eat during the winter?

With badly infested trees it may pay to make an application in the fall, because if the scale does live through the winter, it lives at the expense of something, so make a fall application.

Quest. Have you had any experience in using lime-sulfur in place of Bordeaux mixture,

The experience of practical fruit growers is this: They

have used commercial lime-sulfur washes and applied them to apple foliage without injury and with benefit so far as controlling fungus was concerned. Also used arsenate of lead, two pounds to 50 gallons of water, for the codling moth. Some New York State fruit growers are becoming dissatisfied with the Bordeaux mixture, and are trying diluted lime-sulfur wash. I don't recommend it unreservedly.

Then Pres. Clark introduced Wilfrid Wheeler, Secretary N. E. Fruit Show, who opened the topic :

LESSONS FROM THE NEW ENGLAND FRUIT SHOW.

One thing I want to speak of is the relation of the Fruit Growers to the Massachusetts Horticultural Society. If the Fruit Growers of Massachusetts want to increase the interest in fruit growing, the proper thing to do is to join, as individuals, the Massachusetts Horticultural Society, and make your influence felt there. That Society is at present more interested in flowers and plants than in fruits. What is needed is a larger number of fruit growers in that society, so come and join the society and work along the fruit interests.

The Boston Fruit Show was organized to develop New England, but since the show some of the states as individuals have used the show to advance the interest of the state rather than the interests of the whole section. The show was started with the idea that the whole of New England would be benefited, not to make a distinction between the different states. The problem is for us to carry on New England fruit growing as a whole. The prizes show that no one section was better than any other section. Situation, soil, and climate did not count for as much as individual effort that was put into the work. That is what is going to carry us to success or failure here in New England. There are parts where the soils are better than others, but the fact remains that good fruit was grown and exhibited at this show from low heavy soil, from fine upland soil, from all sorts of soil. The labor which sprayed, pruned and cared for the trees is what brought the fruit to its highest development. The Baldwins from New Hampshire proved to be better than those from any other part of New England. Eighty per cent. of the fruit exhibited came from old apple trees, trees 60 to 80 years old. Many of these trees had not had the very best of care. This ought to be a great encourage-

ment to us, because when we get the new orchards growing we will be able to compete successfully with the West.

We came to the conclusion that the Baldwin, Northern Spy, Greening, Wealthy, etc., were best for New England. The first prize of other varieties went to McIntosh Reds in barrels, and Gravensteins in boxes, showing that at the time of the Fruit Show these two were in the best condition to take the prize. It was considered important that the show be an educational feature along the line of spraying, etc., and the lectures proved a very great source of interest to those who came.

The market here in New England calls for the type of apples which the Baldwin represents, while Rhode Island Greenings and Russets are also in demand and bring fully as good prices.

We found also that other fruits of New England, pears, peaches, plums, and other small fruits, are in need of booming, and it is well to keep in mind that there are other fruits that will do just as well as the apple. We can grow better pears here than they can in the West, still they are shipped from the Pacific coast.

We have a number of places in northern New England that are specially adapted to fruit growing; the Champlain valley in Vermont and the Connecticut river valley, for instance, seem to have especial adaptation for fruit growing. Fine fruit is grown down on the end of Cape Cod.

There is great need of capital to develop fruit raising here in New England. This is recognized by business men who are interested in the industry. If the Fruit Show did nothing else than this, it certainly accomplished a great deal. The increased price of New England fruit lands are also due to the Fruit Show.

We should work together to develop this industry as a New England industry rather than a Massachusetts or any individual state, and we want to be proud enough and great enough to recognize New England as an individual unit.

Quest. To what part of New England was the prize for Baldwins awarded?

Ans. New Hampshire.

Quest. What locality took the first prize?

Ans. Hollis.

Mr. A. Warren Patch, Treasurer N. E. Fruit Show: The members of the Apple Association have been working at

the idea for years that if they could awaken an interest in apples the apple market would be larger. The New England Fruit Show had many lessons for us.

Quest. Did you find much Baldwin spot in apples for the Boston market?

Ans. The quality of the apples this year has been very good, and I think the spraying has improved them.

Quest. What variety brought the highest price last fall?

Ans. The McIntosh and Gravenstein.

A circular giving the best varieties for the Boston market for fall and for winter has been printed. The four varieties best for fall are the William, Gravenstein, McIntosh and Pound Sweet or Wealthy; for winter the six best varieties: Baldwin, Greening, Northern Spy, King, Tolman Sweets and Russet.

George S. Knapp, Groton, winner of highest prize at N. E. Fruit Show:

One good thing about the New England Fruit Show was that it gave an excellent opportunity for many to see what possibilities there are for fruit growing here in New England. If more and better fruit is produced, it is better for both the producer and the consumer. The producer should raise the varieties that give satisfaction to the user. It is no matter how the apple looks, if it does not give satisfaction when used the demand will decrease; if it gives satisfaction the demand will increase. Why is it not a good idea for us to keep our products before the public?

I have been taking as good care as I could of the trees in my orchard for the past ten years; have sprayed the trees thoroughly for three or four years, so the fruit was practically first-class, and yet I should not have had courage to take my fruit to the Fruit Show had I not been told that it was very good fruit.

There is a lot of work in fruit raising. I have worked hard and I like the business. I think one's success would depend much on whether he likes the work or not.

My trees are fifteen years old. I have sprayed them for about five years. The trees are located in a low valley. The soil is naturally a little wet, but is drained. I use wood ashes and hen manure for fertilizer. I do not think the trees would do much without spraying. I prune the trees by cutting

back a little each year. I have not given them a severe pruning any one year.

The meeting then adjourned to 10 A. M. Thursday.

THURSDAY, MARCH 10, 1910

10.00 A. M.

The morning session was called to order by President Clark, who introduced Harold S. Frost of Arlington, who addressed the meeting on

FOR WHAT, WHEN AND HOW TO SPRAY.

At no time in our history has agriculture or horticulture been raised to such a high standard as at present, and to my mind, horticulture is being carried on in some places much more scientifically than is any branch of general agriculture. We can with great profit spend much time in studying these different subjects, as the future prosperity of our country, and especially of New England, depends largely upon what is taken from the soil. We have no natural resources, but we are blessed with a land which will produce abundant crops for an indefinite time. Such a famous authority as Professor Louis Agassiz has made the statement that New England is admirably adapted for the production of tree growth. This not only applies to forest trees but to fruit trees, and I think also fruit bushes.

With the exception of market gardening and greenhouse culture, the New England states are far behind in all kinds of farm specialties. I think the main reason for this may be that in the past land was much more expensive and more difficult to cultivate than were the plains of the West. Now, the Western lands have been depleted of much of their nourishment, New England farms have decreased in value, but have not lost any of their productiveness.

With these farms situated at the door of the greatest markets in the world, and with the possibility of buying them at a less cost in many cases than the expense of putting up the buildings which go with them, there is no greater opportunity offered any young man starting out in business.

The complaint of many, when talking of fruit culture, is that it takes too long for the trees to come into bearing.

I would suggest that a combination of specialties be made, as for instance, the raising of poultry, pigs or sheep. Any one of these can be made extremely profitable even by itself.

During the past five years great interest has been aroused in the growing of apples. Many feel that so many trees will be planted that when they commence producing the market will not be able to consume all of the fruit. There cannot possibly be any difficulty in marketing all the crops that will be raised in New England.

First, I feel safe in predicting that at least seventy-five per cent. of the men who plant fruit trees will so neglect them that they will never produce any first-class fruit. A great number of city residents are buying land and setting out trees. They little realize the difficulties of farming in its true sense. Insect pests and fungous diseases are increasing so very rapidly that unless the fruit grower makes up his mind to fight diligently, his trees must succumb. By the grower who will use scientific principles and keep up-to-date, nothing need be feared.

With the improvement of the quality of the fruit, and possibly of the packing and marketing, the demand will increase much more rapidly than production. The average consumer at the present time is demanding more fruit than ever before, and there always has been and always will be, a shortage of perfect fruit.

I have never yet been in a city in the United States but what I have found the greater part of apples, pears, peaches, etc., either wormy or badly covered with fungous growth. During a recent trip in Europe, at which time I passed through six different countries, I was not able to get any perfect native fruit. The only apples which I could find that were not wormy came from the States. I was so surprised at the condition of the fruit industry that I made it a point to meet the entomologists of the different countries, and found that the fruit industry of the greater part of Europe was practically ruined. This applied not only to the apple and pear crops, but also to the olive and fig.

With such conditions in Europe, and with our tremendous market in the eastern United States, can you wonder that I do not fear over-production?

As I travel over New England, I see everywhere great orchards which are either completely killed or about half dead. When I am told by reliable fruit growers that they

are receiving at the present time from \$4.00 to \$7.00 per barrel for apples, I wonder at this neglect. When I make a closer examination of the dying trees, I find that they are being killed by starvation, decay, fungous disease, and in most cases the San Jose scale or other injurious insects.

I feel much worse about this condition of affairs right here in New England, where we are supposed to be more highly educated, than in any other part of the country, when I realize that spraying has been so simplified. There is no reason for allowing the trees to die in this way if a man studies the question at all. A few years ago the subject was much more difficult, but within the last five years spraying apparatus and materials have been so greatly improved that very nearly every problem can be controlled almost perfectly. The fruit grower of New England should be better able to save his trees and crops than the grower in any other section, as we are much more advanced in this line of work. This has come about largely through the experiments of the State Gypsy Moth Department, which has not only given us valuable insecticides and spraying apparatus, but has trained a large force of men.

SPRAYING APPARATUS

The spray pump has largely been a creation of the last twenty-five years, and has been improved more since 1905 than at any time previous to that date. I believe that we have practically reached the standard and cannot expect very many improvements in the future.

It is utterly impossible for me to advise you what pump to use unless I know your conditions and the amount of spraying which you require. However, I wish to impress upon you one point, and that is, buy the best of the size that you decide upon. A spray pump is required to do a great deal of work in a very short time. The season is short, and time lost during the right season may prove extremely expensive. The market is flooded with cheap pumps, and they are being bought very extensively.

Many fruit growers do not realize the importance of spraying until too late. They wonder why the Western apple is selling for such a high price and is reaching such perfection. If you ask the Western farmer if it is necessary to spray fruit in sections where the nicest fruit is raised, he will say no. If you pin him down, you will find that he is spraying

not only once but several times. In many of the Western states he is required to spray by law, and any fruit injured by insects is immediately destroyed. Until we do more of this work, we shall not reach the point where we will produce only first-class fruit.

Pumps can be secured from the small bucket pump, adapted to the grower of two or three trees and a few fruit bushes, up to the 10-horse power gasoline engine and triplex pump outfit, adapted for spraying large woodland areas. The type most generally used and of the greatest service is the barrel pump, and in my experience I have found the submerged barrel to be the most effectual and powerful. An outfit should be chosen which will give the best agitation and at the same time produce pressure enough to carry the stream to any height desired. This can be secured in the submerged type, and with a little care a pump of this description should last a lifetime.

Next to the pump we consider the hose, and it has been the general opinion of late that 1-2 inch cotton covered rubber hose, fitted with long-tail couplings and clamps, will stand the work much better than any other kind. With this a common gas pipe extension, eight or nine feet long with a nozzle on the end, will complete the outfit. For nozzles, the disc type, a creation of recent years, will produce the best spray with the least trouble.

In all spraying operations extra fittings and small tools should always be at hand. A break is liable to occur at any time, and unless means for repairing the same are available, much valuable time is likely to be lost.

INSECTICIDES.

The greatest difficulty with the uninitiated seems to be the lack of knowledge of insecticides. Much of the information which the grower is able to secure comes from experiment station bulletins, which in many cases are not very definite in facts. As relating to various insecticides, even the experts have been fighting more or less amongst themselves; but in the future, as the insecticides and fungicides are being improved, the operation of spraying will become much more simplified. I will endeavor to give you the results of fifteen years' work in the field, and my recommendations for controlling some of the most injurious insects.

SAN JOSE SCALE

The San Jose scale is, without doubt, causing more injury to fruit trees and bushes than any other one insect. It is best handled when the tree is dormant, and is controlled by spraying with a contact poison. For large trees, or trees where the infestation is very serious, and also where the trees are in proximity to painted buildings or fences, soluble or miscible oil can be used to the best advantage. This is a commercially prepared oil to be diluted with water, and is very easily handled. It should make a perfect white emulsion, and when applied should cover parts of the tree not actually touched, as it has the spreading quality of any oil. Lime-sulfur is also used very extensively, and for small trees is of great value, not only for killing the scale, but also for destroying fungous growths. It is extremely difficult to handle, and for this reason it is almost impossible to spray large trees thoroughly enough to control the insects. There are many commercial brands which are very valuable, or the mixture can be made up by the grower himself. Where possible I think it is very advisable to make it up fresh and apply it hot. If you are not acquainted with the formula, write your State Entomologist or some one who has been handling this material.

Summing up the question of controlling the San Jose scale, my advice would be that for small trees not badly infested, use lime-sulfur, preferably home-made. If the trees are small and easily handled, but badly infested, use soluble oil until the insect is at least partially controlled, and afterward use lime-sulfur. If the trees are very large, use soluble oil at least every other year. My reasons for these recommendations are due to the ease with which the soluble oil is handled, and the fact that all of the surface of the tree is more liable to be thoroughly covered.

LEAF-EATING INSECTS

Codling Moth, Etc.

For controlling this class of insects, some form of arsenic is used, preferably arsenate of lead. This poison adheres to the foliage very nearly throughout the season, and does not injure by burning. When using this material do not go entirely by the recommendations as to strength which you will find printed on the label. - The manufacturer is

sending his product all over the country, and is not basing the strength which he recommends on the different insects. Where the gypsy moth is prevalent it will be found that the poison must be used much stronger than where only the codling moth or canker worm are considered. My rule for spraying for the gypsy moth is one pound of arsenate of lead to ten gallons of water, for the codling moth, canker worm and small brown-tail moth, one pound to fifteen gallons of water. As the season advances in spraying for any insect I increase the strength of the poison. Arsenate of lead should not be used on the foliage of peach trees. For spraying apple, pear and cherry trees, apply the poison thoroughly to all of the foliage and blossoms, first, as soon as the petals have fallen. Follow with another application ten days or two weeks later. Many of our best growers consider it wise to give three, four or five applications during the season, but I do not think this is always necessary.

For fungous growth we have not yet reached our ideal remedy, and it would now look as though some form of sulfur might take the place of bordeaux mixture. During the past season in many places home-made bordeaux rusted the fruit badly, but the summer sprays of lime-sulfur not only controlled diseases, but did not injure the fruit. It was also found that the commercially made bordeaux mixed with arsenate of lead caused very little rusting. The only reason which can be given for the injury in one case and not in the other, is that the bordeaux was better prepared in the commercial mixture. Where a fungicide is to be used I would recommend mixing it with the arsenate of lead and applying at the same time.

Whatever material is used, do your work as thoroughly as possible. If you buy the best material that you can obtain you need not fear any injury. Spray all kinds of fruit trees for the scale in the winter. Spray all kinds of fruit trees with the exception of the peach for the foliage and fruit insects, but never spray peach trees with arsenate of lead or bordeaux mixture. Do not spray your peach trees with soluble oil when the temperature is much below 40 degrees Fahrenheit. If the peach trees are sprayed during a warm day, no injury will result from cold weather afterward, and it is possible that the injury may come from the cold water rather than from the oil. The other fruit trees can be

sprayed with soluble oil during any temperature when it is possible to handle the material.

In conclusion, do not be afraid of attempting to spray your trees. Even though you do not do perfect work, you will gain such astounding results that you will find it more than repays you. I have been greatly surprised at the large number of orchardists who are afraid to spray their own trees, but are very willing to hire some one to come in and do the work for them.

You cannot get the same results by hiring outside help as you can by doing the work yourself. In most cases it will not be done as thoroughly, and it is also impossible for any one man to spray very many trees at just the right time. With a little advice each one of you can do his own work as well as so-called professionals. The only thing which you require is a good outfit, which is not very expensive, and a little of the common sense which you use every day in carrying on your farm. All kinds of insecticides are so prepared that all you have to do is to mix them with water. Most of them are so prepared that no injury can be caused.

If your dealer tries to sell you a cheap pump or cheap insecticides when he has better brands in stock, feel assured that he is making a greater profit on the cheaper grade.

Spray your trees every year, both for the scale insects when the trees are dormant, and also for the codling moth, leaf-eating insects and fungous growth, when they are in foliage. If you will do this our fancy trade will not be stolen by the Western fruit grower.

Mr. Frost then exhibited apparatus:

BARREL PUMP

Spray anything under 5,000 trees with the barrel pump. A great deal of money is saved by putting in a barrel pump wherever the mist spray is used.

HAND PUMP

If you have a half dozen or a dozen trees do the spraying with a hand pump; use it also for fruit bushes. If you have cotton hose and long tailed coupling, no pressure will ever break the coupling.

Wash your hose out thoroughly every night, no matter what kind you use. If it is all washed out thoroughly, you will not have much trouble with it.

EXTENSION

For extension get 3-8 inch or 1-2 inch gas pipe. Clean out the nozzles in the spring before you begin using them.

NOZZLE

For mist spraying, we are making use of the disc type of nozzle. If you want to use a large amount of spray, use the disc with a large opening.

There is the straight nozzle and the long tailed. You will find that the long tailed nozzle is the best to use, as you can get the spray just where you want it. The size is standard, and you can get reducers so you will not need to use an extension unless you wish.

INSECTICIDES AND FUNGICIDES

For the San Jose scale use miscible oil and lime-sulfur wash. The lime-sulfur wash is extremely difficult to handle. Dr. Felt's formula has been giving as good results as any that I know of. For small trees not badly infested, use lime-sulfur wash. Spray them with oil in the fall and then with lime-sulfur wash in the spring. I believe much injury is done in the winter. I think that the scale draws some sap from the tree during the winter when there are thaws.

CARE IN THE USE OF LIME-SULFUR WASH

It is advisable to use some protection over the eyes when using the lime-sulfur. I would caution everyone, because we are often careless in handling these materials.

The gypsy moth is getting very near Worcester. Arsenate of lead has not controlled the gypsy moth. I am commencing to feel that the home-made Bordeaux mixture is not good enough.

DISCUSSION

Quest. Why is the San Jose scale found on the blossom end of the apple even if there is no scale on the tree?

Mr. Frost. There probably is scale on the tree though it is not noticeable. After a dry season you can always look for a great infestation of the San Jose scale. In a wet season, considerable scale is washed off.

Since I spoke this morning, some have asked in regard to the spraying of peaches. In speaking of this I wish to

be very conservative. Any spraying of peaches must be done very carefully and under certain conditions.

Quest. How late can we spray with Bordeaux?

There should be two sprayings. The first just as the fruit is forming; then about two weeks later another spraying. Some have to spray more than twice—the orchards on low lands are infested more than those located where there is a good air circulation.

Quest. Is there any parasite that lives on the scale?

Yes; there is a predacious insect of the ladybug family.

Quest. Is it necessary to spray for the brown-tail moth more than once a year?

Sometimes it is best to spray in August and use Paris Green or Arsenate of Lime. The August spraying will catch them if the infestation is great.

Quest. Is it not easier to protect by cutting off the nests than by spraying?

I think the attacks of the brown-tail moth are going to be rather intermittent.

Quest. Does spraying have any bad effects upon the blossom?

I have never seen any bad results.

Quest. Might there not be some device by which the brown-tail moths could be killed at the time they settle on the electric lights in such great numbers?

This has been tried but does not seem to make any material difference. They cannot get enough of them.

Mr. Frost: My remarks today have been applied only to the fruit growing interests. The shade tree spraying is entirely different from fruit tree spraying.

Pres. Clark: I want you to go home with your minds made up to come next year and bring others with you, especially the young men, and the ladies also.

Vice-President George A. Drew of the Connecticut Pomological Society, who had wonderful success in bringing old orchards into shape again, then gave a paper on

ORCHARD RENOVATION

There is a great revival of interest at the present time in New England Agriculture, which to me seems to denote the dawn of a new era. Instead of the old advice, go West,

young man, I believe it should be changed to come East and develop the old New England Farm.

No longer do we believe the too often popular idea, that our soil is worn out and exhausted. All it needs is proper management, right selection of crops, intelligence, faith in the business, and capital for development.

The recent New England Fruit Show demonstrated that in fruit growing at least we can hold our own with any other section. At last conservative old New England, whose sons have been the leading pioneer spirit in developing the West, is finally aroused to her own great possibilities at home.

Specialization, in my opinion, is the key note of the hour—the day of the general farmer must soon go. He will have to give way to his neighbor who works along one or two special lines.

I am a great believer in the possibilities of fruit growing here in New England. I believe we shall soon demonstrate it beyond question. In the belief of these possibilities I have been working for several years on the renovation of old orchards, and to this subject I would call your attention.

Drive through any portion of the East and you will find the situation practically the same, the old orchards, formerly profitable and productive, now neglected and going to decay. Why New England farmers have been so unprogressive as to allow such conditions to exist, is hard to fathom.

Can anyone tell me of any more profitable section of the farm than a well cared for orchard—yet it is generally the last thing on the farm to receive intelligent attention.

Let us consider why these orchards have been so neglected. Is it that the weather conditions or seasons have changed, or insect enemies and injurious diseases made the difficulties unsurmountable? Whatever the cause, we are brought face to face with conditions as they exist today, and we ask ourselves, what are we going to do about it?

Shall we continue to see the old orchards decay, neglect to plant out new ones, and see fruit raised several thousand miles away sold right before us for two or three times what our own native fruit brings, and yet net these Western growers a handsome profit after paying freight, commissions, etc.?

We dislike to admit it, yet there is no question but that the Western apple has captured the fancy, high-priced trade away from us, and we alone are to blame. This is on ac-

count of dishonest methods of packing, lack of business methods and cooperation.

Facing conditions as they are, shall we be content to take second place, acknowledge we are beaten, and simply accept what the market will offer for an inferior article? I, for one, say no; in my opinion the Western fruit grower has had his palmiest days and must soon look to his laurels, for the Eastern fruit grower must soon awake to his opportunities.

We may well ask the question, why we do not grow as good fruit as our Western neighbors? Is their soil better adapted than ours to fruit growing? I cannot be convinced there is anything better than our New England hillsides. When well formed, the product is the equal in appearance and superior in quality to that of the West.

Are they more immune from insect pests and fungous diseases? On the whole, I think they have as many obstacles to contend with. Is their climate more favorable to developing a more perfect fruit? On the whole, I would say no. Color may be easier to get, yet we can do as well under well directed effort. Why, therefore, do they so excel us at the present time? I think we should find the reply to a certain extent in the answer which a friend of mine received this summer when traveling through the Hood River region in Oregon—"Fight them."

There it was a business proposition to raise fruit, and the best fruit, anything that interfered was an enemy which was fought and overcome. We have San Jose scale, codling moth, apple scale, etc, until it seems as though one enemy was overcome only to be confronted by another. What shall we do, give up the struggle? No, emulate the example of our Western friends and fight them.

I have called your attention to our neglected orchards and Western competition, facts of which you are all aware. It takes time to get an orchard started and in profitable bearing condition, but gathered all over this Eastern country are any quantity of orchards from 25 to 50 years old that are in total or partial neglect.

Is it possible to take these old orchards in hand and put them in good bearing condition? Is it a profitable undertaking? To both questions I would answer yes. Can one expect to get as good fruit from these reclaimed trees as from newer plantings? I would answer that I myself have had

no difficulty in doing so. Perhaps one or two qualifications should be made as to advisability of renovation. I would not attempt to reclaim any old orchard where the trunks of the trees were unhealthy, or in too advanced stage of decay, or where the orchard was in a naturally unfavorable location.

What is the best method of accomplishing this renovation? I will speak of the methods, which, while they may not exactly coincide with your ideas, I have followed for some years with a fair degree of success.

It is quite a task to renovate an old neglected orchard, and requires considerable time and patience. For the sake of clearness, let us consider it under the following heads: Pruning, Spraying, Cultivation, Fertilization and Thinning the Fruit.

PRUNING

Most of the older orchards were planted with the idea of harvesting a crop of hay first and apples second. This caused farmers to prune off the lower branches so that the teams would have no difficulty in working underneath. A bad practice, at best it is absolutely fatal under present day conditions. What we want now is a low down, spreading tree, with the ends of the branches touching, or nearly touching, the ground. We want to prune down, not up.

1. These low down trees can be sprayed at much less cost.
2. The fruit can be picked at much less cost.
3. The trees are much less wind racked.
4. The fruit if it falls is not so badly bruised.

Granting that I have stated the case correctly, most of the old orchards have been pruned up, how can we get them pruned down?

It is surprising to see how quickly an orchard will respond to a systematic method of treatment.

In severe cases of scales infestation, I have not hesitated to adopt radical measures, and in exceptional cases cutting back the limbs to mere stubs—this of course will cause many water sprouts to come out, which will have to be thinned out the following summer. It is often advisable to head these back, as the tendency is to shoot upward. It also tends to aid the formation of fruit spurs. Again these are cases where taking two or three years to accomplish this

renovation 1-2 to 1-3 of the main limbs should be headed back severely each year.

Oftentimes all that is necessary is to head back the main branches severely, encouraging those on the side to spread out and develop. By heading back according to the condition of the tree, a new top can be constructed and ready for business in from two to five years, according to conditions.

It is important that the wounds should be cut clearly and with some slope, not perfectly horizontal, otherwise water might stagnate and decay set in. If the limbs have cavities they should be treated, taking out the decayed wood, tarring the surface left, and then closing up the cavity with cement or zinc.

Be very careful to follow up the wounds where so much cutting is done, tar or paint these for two years in succession.

SPRAYING

There is no orchard practice more important and perhaps none less understood than spraying. Some people think it a cure for all troubles, and spray without careful consideration of what is to be accomplished. As you all know, we spray to kill insects and fungi. Old orchard trees generally have both. In my own case, the extermination or control of the San Jose scale was my great problem in this line. The old trees were so thoroughly infested with this pest before they came under my supervision, that in many cases the ends of the branches were killed back for many feet, and the masses of scale incrustations could be scraped off with a case knife. In some cases the life of the tree had been so sapped out as to be despaired of, and yet today these trees can scarcely be told from perfectly healthy trees, never affected. I have used various oils and lime-sulfur solutions. In severe cases I should advise the use of oils in preference to the lime-sulfur solutions, as I think it is a little more effectual in killing the scale. When only a moderate amount of scale is present, would prefer the lime-sulfur for its fungicidal effect as well as its insecticidal. A combination that has worked very well with me is to spray in the fall after the leaves have fallen with oil one gallon to twelve gallons water, and following this up in the spring, just before the leaves unfold, with a thorough spraying of lime-sulfur. Even

were there no scale I would give old orchard trees a spraying of lime-sulfur to kill old fungi.

SUMMER SPRAYING

For a fungicide, I have been using Bordeaux mixture, but lately this has been russeting the fruit badly. Except for that, Bordeaux and arsenate of lead sprayed just as the blossoms have fallen, is effectual. Lime-sulfur and Sulfo-cide, both tried with promising results. Lice on trees has made lots of trouble of late. Spraying with oil early in spring while tree is dormant, will kill many of these.

CULTIVATION

As a general rule I believe in cultivating an orchard. Nine people out of ten cultivate too little rather than too much. That is, cultivation would be my rule, leaving in sod, an exceptional practice. I recognize there are some places where cultivation is not practical. Where cultivation is practiced, I would start to shallow plow the orchard early in the spring, just as soon as the soil will work nicely, and follow this up with a shallow harrowing about every two weeks or so until the first to the fifteenth of June, then sow a crop like clover to be worked into the soil the following spring. I am aware it is a little harder to get a well colored product from a cultivated than from an orchard in sod. But by stopping cultivation somewhat earlier than generally practiced, this trouble will be lessened. Almost always an orchard that has been long neglected has made too little wood growth, and cultivation is the cheapest and best method to start the wood into vigor.

Do not try to get too close to trunks of trees in a low headed orchard—the active feeding roots are at the extremities. Where there is an orchard and a supply of moisture and soil is heavy, the sod mulch method works well, but the ordinary method of cropping for hay is generally to be deplored.

FERTILIZATION

To help promote a vigorous wood growth as well as a fine textured fruit, some form of fertilization is necessary. You still hear occasionally of people who will claim it is impossible to keep up the fertility of the soil without the use of stable manure, that commercial fertilizers are a fraud

and they act as a stimulus for a short time. While I would not disparage in the least the use of stable manure, especially where more vigorous growth is needed, if I was obliged to take my choice between commercial fertilizer and stable manure, I would take the chemical without hesitation every time.

There are fertilizers and fertilizers; some act quickly, while others last for years. Some fertilizers are dear at \$20.00 per ton, while some are cheap at \$70.00 per ton. In all my orchard reclaiming work, I have used no stable manure or mixed fertilizers. I buy the raw chemicals because they are the cheapest and you know what you are getting. In varying proportions I have used agricultural lime, Basic Slag phosphate, Nitrate of Soda, Peruvian Guano, Sulphate of Potash, Nitrate of Potash.

My main reliance has been, however, on Basic Slag, Nitrate of Soda, and Sulphate of Potash and Clover worked into the soil.

The first years in reclaiming have used about as follows:

- 150 Nitrate of Soda per acre.
- 250 Sulphate of Potash per acre.
- 500 Basic Slag per acre.

After the first year about:

- 150-200 Sulphate of Potash.
- 350-500 Basic Slag.

Use clover to supply Nitrogen.

Be sure and broadcast fertilizer—in old orchard—do not put up close to trunks of trees.

THINNING THE FRUIT

No one, I think I am safe in saying, questions the wisdom in thinning peaches after they are large enough to determine what shall be left on. Why should not this principle apply to apples as well? I wonder how many of you have ever tried it. Unless you have tried it, I am sure you would say impractical—that it would take too much time and labor, and that the effort and expense would be all out of proportion to the benefits derived. With the old fashioned high headed trees way up in the air the expense would be much larger, that is why I am advocating low headed trees.

For the past three years I have made it a practice to thin all my bearing trees the latter part of June, picking off

all wormy or imperfect specimens, leaving only one fruit on a spur or the apples not closer than five or six inches apart. The first year that I attempted it the neighbors for miles around came to see the lunatic who picked his winter apples in the summer, and yet in the fall when the demonstration was planned, these same people allowed that there might be something in it after all. It is not such an expensive task as one who had not tried it would imagine.

I would say that, on an average, trees yielding from seven to nine barrels cost us from 35 to 50 per tree to thoroughly thin, yet the percentage of culls in the fruit was slight, the apples were larger, and the trees were relieved of a great strain. Then again we are getting our trees, year by year, down more nearly to annual bearing.

I have photographs showing reclaimed trees, also some kindly loaned by Prof. Maynard.

DISCUSSION

Quest. This orchard was, I understand, an orchard of 200 trees, 35 years old?

Mr. Drew. Yes.

Do you practice heading the inside branches?

Yes; if they go out too far.

Have you found it necessary to prop these trees?

Yes.

Do you apply fertilizer all at once or at different times?

Generally all at once. If the trees are not making progress, I sometimes put on two applications.

Would it be well where the trees bear only every other year to put on fertilizer in the fall?

I think so.

When should the trees be cut back?

Most of them in the spring of the year. In February or March, but it is advisable to follow this up by considerable summer pruning.

How do you keep the water sprouts back?

Thin out and head back.

How far head back?

Just as one thinks best.

What is the best time to trim?

I don't know. I have generally done it in February and March.

Does it make any difference so far as the fruit is concerned whether you prune in summer or winter?

Yes.

Have you found any difference in the flavor of the apples by thinning them?

I can hardly say, but think I have. We think that since we started to thin we have had a superior quality of apples.

What do you use to fill up cavities in trees?

Fill up with crushed stone, gravel, or something like that, with cement.

Do you have any trouble with the bark crawling on the trees?

Not much; have tried in cutting back to leave small side shoots to protect the bark.

Which is the better time to prune, April or November?

Neither; prune earlier.

In applying the chemicals of which you spoke to the orchards will the effect be as good if applied to those in sod as to those that are cultivated?

I think it is always advisable in an old orchard to break up the soil.

Would you clear out the decayed wood?

I certainly would clean out very thoroughly, and then fill up with grouting.

Would you, when you first started on these trees, scrape the old limbs pretty thoroughly?

I don't believe in much scraping, though perhaps it is well to take off a little and clean by taking off the old rough bark.

Does it pay to scrape?

I have not done much of it myself. I have depended mostly on lime-sulfur to clean up the trees.

How would you scrape?

Not into the life of the tree at all.

Have you practiced annual pruning of new growth on either old or young trees?

I practice annual pruning. If a limb begins to shoot off in one direction, I head it in; keep it near the type of the tree.

When would you trim a young, growing apple tree to get the best growth?

I am not a believer in doing too much pruning on an

apple tree when it is first set out. I should be inclined to do the pruning in the summer time.

Would you prune it when you first set it out?

I certainly would, but not too much for the first four or five years.

In putting on lime-sulfur wash, would you put it on after a rain or when it is dry.

Put it on when the bark is dry and have rain come afterwards rather than to put it on just after a rain. It is better to have the bark dry at first. I think that is one reason why people sometimes say that they have been fighting the scale and the more they fight it, the more it thrives. I think this must be the trouble. But the scale does not have any terror for me at all. I should not hesitate to go into an old orchard and clean it up.

Do you think it hurts an orchard to let the cows run in it?

I certainly do. I would not have anything else there.

Why does a tree in a pasture give nice fruit without any care?

There is only one thing I can say. When a tree is by itself it is free to the sunlight, air and moisture. I don't believe in these old straggling trees. Don't try to run livestock and an orchard together.

A rising vote of thanks was given the Worcester County Horticultural Society, the speakers, and the officers of the Association, and the meeting then adjourned.

AFTERNOON SESSION

Pres. Calvin Rice of the Worcester County Horticultural Society presiding:

I owe you an apology but I don't like to make an apology. Mr. Ellsworth was to preside at this meeting but he has been called away to attend to other duties and for this reason I have been asked to introduce to you Prof. J. K. Shaw of the Massachusetts Agricultural College, who will speak on "Apple Packing," and give demonstrations of barrel packing and the different kinds of box packing.

APPLE PACKING

It is plain to see we are on the eve of a great fruit packing revolution, here in the east. Competition from the west has come in, stirring up the fruit growers. The great trouble with the fruit at the present time is the packing. But if only good fruit was packed, there would not be enough to meet the demand. The first and most important requisite of a good commercial apple pack, is good apples. We must have better apples. We must have apples adapted to the conditions of the New England climate. Because an apple does well in the west or south, it is no sign that it will do well here. We must grow a better quality of apples—apples that will create a demand. If you put in practice the hints given you by the speakers here today, you will do more than anything else to bring this about. We must get better color, that is the most difficult thing with which we have to compete. We must grow apples of high eating and cooking quality even if the apples of poorer quality yield more profit for the time being. The success of a few men is a sufficient indication of what can be done if we use the right method.

A few words with reference to the picking and packing of the fruit. As a general rule, red varieties should be picked when the color is right; green ones when the seeds are ripe. The fruit should be left on the tree until it is fully matured, then picked and got into the packages as soon as possible. I don't need to say, 'Never shake the tree;' all the apples should be picked by hand and it takes considerable skill to remove them without breaking the stems.

The baskets in which the fruit is handled should be padded. I think a half bushel basket is the best thing that can be used. The half bushel basket is well adapted for barrel packing. Keep the trees near the ground; a light ladder is the best kind of a ladder to use. Some use big bags for picking. I don't think these can be recommended. There is more chance of bruising the apples and jamming them.

It is a good idea to have the pickers in three groups. The first picking from the ground, the next a little higher up, and the third from the very top of the trees. It is not a wise plan to climb the trees.

If the apples are packed in boxes, a shed is necessary;

if in barrels, they can be packed in the orchard. The packing tables should not be too large, 3 1-2 ft. x 6 ft. is large enough for two packers; many tables are too low, they should be about three feet high. It is very convenient to have packing tables without legs; set them on barrels. The tables should be padded with burlap; have a loose sheet spread over the whole table. We cannot emphasize too much the necessity of careful handling. An orange will stand harder handling than an apple. Pick out perfectly sound apples, put them away, and later compare with apples that were slightly injured; you will be surprised to see the difference in the keeping power.

Some sort of a press is needed. The screw press is light and convenient. It is an excellent idea to have an iron ring a little smaller than the head of the barrel, with two arched cross bars. The screw comes down on the cross bars; this gets the pressure around the sides of the barrel, not in the center, and with this the head goes right into place. In box packing, a press is almost a necessity.

PACKING—BARREL PACKING

This barrel (on the platform) represents the ordinary type of apple barrel. Those with two heads have the decided advantage. New barrels are always to be preferred to second hand barrels. The split hoops are not desirable. It is a good idea to put in a disk to keep the dust out when the barrel is opened. You can have some kind of a brand on the disk. This disk may be of paper and there are various types. It is best to cut the stems for the facing layer as it prevents many stem injuries. The great difficulty in finishing the face layer is the centering. Put the second layer so that it will break joints with the first. It is only necessary to put in these two layers by hand. After each addition of a half bushel, rock the barrel so the apples will settle down. Great care should be taken that the fruit be entire; the contents of a single barrel should be uniform in size and color, and any two barrels headed with the same brand must be alike, so that the buyer may know what is in the barrel by looking at the brand.

The final test is in finishing the filling of the barrel. Great pains must be taken to have it come out even, so that the pressure of the head is evenly distributed and no

apples severely bruised. There is nothing to be gained by facing the apples at the bottom. A thin excelsior pad should be used.

There should be just enough pressure to hold the fruit until it is taken from the barrel. The Baldwin and Russet will stand the most pressure. The Russet especially has much shrinkage, more than most other apples.

Each barrel should be marked with the name of the variety, the grade, the name and address of the owner. If he is ashamed to put that on, he should put up better fruit.

PACKING IN BOXES

The idea is not new. It has been carried on here in the east for twelve or fifteen years, but it has never been a success. Box packing has been done successfully by the packers of the Pacific coast. The box has certain advantages over the barrel. It furnishes uniformity. The great thing in packing fruit is to have it uniform, just as good in the middle as it is in the end; but it means more than that. It means that every apple must be like its neighbor, so that the buyer may know that every year he will get the same thing. This is important in barrel packing, but not absolutely necessary, but in box packing it is a necessity.

The second great advantage is that there is less injury to the apples. However carefully the barrel is packed some apples will be harmed, but there is much less chance for injury to the fruit, when packed in a box. A third advantage is that the box is a factor for educating the fruit grower; there is no trouble but that he will grow a good box of apples; the two things go together.

The box is easier to handle, easier to pick up. It is a better means of handling fruit and that is what the market demands. The box is a little more costly than the barrel. Barrels now cost 35 cts. each. Boxes are ten and fifteen cents apiece. It is more work to pack boxed apples. Since it is a new thing on the market, people are a little afraid of it, but the box is coming in east of the Rocky mountains, although there have been many failures in box packing. The reasons for failures are several. In the first place the market in the east does not demand a box. The principal reason has been the poor work on the part of the packer and lack of uniformity. The apples must

be uniform both in size and color, but more essential than that is quality of the apples which are packed; it will not pay to pack anything but the very best and the packing is confined mostly to the red apples. I hardly think it will pay to pack any green apples in boxes.

The proper size of box must be used because it has been worked out very carefully.

The thing that put the western apple on the market in boxes was advertising. They did a clever thing—they created a demand. The time is coming when we here in the east will get together and cooperate and then we can put the boxes on the market.

The kind we put in boxes are generally the red varieties, the McIntosh, etc. This is where the box is coming in first—with the summer and fall apples, also the Northern Spy the King, and the best Baldwins. These are the varieties that one should start in with in putting the boxes on the market.

You cannot vary the size of the box very much if you are going to have a successful package. This is the Standard box: 10-1-2 inches x 11 1-2 inches x 18 1-2 inches, inside measurement, containing 2,173.5 cubic inches, approximately a bushel. The ends of the box should be 3-4 inches thick, the top and bottom 1-4 inches thick, the sides 3-8 inches thick. This thickness cannot be departed from. The cleats should be 1-4 inches by 3-4 inches.

The Special box is 10 inches by 11 inches by 20 inches. This is the same as the Standard box of the east and Canada. The specifications are 10 inches wide, 11 inches deep, 20 inches long; the ends 3-4 inches thick (planed on outside), the sides 3-8 inches thick (planed). Have the side all in one piece, if possible. Use four penny nails, waxed. Don't nail the bottom on to the sides but to the ends.

ACCESSORIES

The boxes should be lined with some sort of paper; that prevents drying out and shrinkage of fruit. The paper should be 19 inches by 26 inches. Two pieces are sufficient to line the box. Fancy paper is sometimes used for linings, cut 11 inches by 20 inches; put one on the bottom and one at the top. Pads can be used but they are not necessary. The apples are sometimes wrapped. This is

not essential but it is a good thing. To wrap apples properly takes some skill and some practice. The paper for wrapping should be ten inches by ten inches or ten inches by eight inches. Waxed paper should be used only when the apples are to be in the boxes for some time, as for export. If the apples are properly packed there is not much need for wrapping but it prevents spread of decay through the box and, what is of more importance, the waxed paper checks evaporation, keeps the fruit at a more even temperature and adds to the appearance of the package. There may be some device giving the name and address on the wrapping paper. It is easier to make a good package when the apples are wrapped, because the wrapping makes a cushion. It is also an advantage if the apples are put in storage as it takes a longer time for them to cool.

METHOD OF PACKING THE BOXES

The boxes must be placed on a slight slope. The first layer of apples ought to be stemmed; they are put in face down; there are several types of packing which I will illustrate; there is the straight pack, the offset and the diagonal pack. The straight pack: Put the apples in a row across the bottom of the box, another row next to that and so on, another layer on top of the first layer. If you get in the bottom layer right, the box can be set up on end and the layer will not fall out. This is the simplest pack. You must have three or four or five apples across the bottom. Another trouble will come in filling the box up just to the top. Care should be taken to get a proper crown or bulge. This should be about one to one and one-half inches and is secured by packing the long apples in the middle of the box.

The offset pack is going out of use. Put three apples in the first row and then three apples in the second alternating with those in the first. The next layer alternates with the first layer. This pack is not to be recommended.

In the diagonal pack, place one in each corner and one in the middle. In the next row the apples are placed opposite the spaces.

The straight pack is the one to be recommended.

It is essential that the boxes be packed in perfect order and in order to do that, the apples must be graded accu-

rately according to size. Ordinarily you will get four or five layers in a box. The first two layers are to be put in with the stems down, then it is a good idea to put the stems up on the other layers but it is a little more difficult to pack that way.

MARKING

The boxes should be marked the same way as the barrels. Generally put on the number of apples there are in the box. It is also a good idea to put on the number of the packer and the name and address of the grower.

The use of the box will come in rather slowly here in the east unless it is put on the market by some organization. By doing this you will soon get up a name that will help greatly. We find here and there a man who has done just as well with box packing as the growers on the Pacific coast. Every grower should promote its use whenever possible on account of its advantages as an apple package.

The afternoon session was a joint meeting with the Worcester County Horticultural Society.

***CONSTITUTION**

ARTICLE I.

NAME

This organization shall be called the "Massachusetts Fruit Growers' Association."

ARTICLE II.

OBJECT

The object of this Association shall be to encourage the cultivation of fruits adapted to this climate; to collect and disseminate reliable information on the best varieties of fruits, and practical methods of cultivation, gathering, packing, storing and preparation of fruit, for both home and foreign markets; to investigate diseases, insects and other obstacles to success, and the remedies best calculated to overcome them.

ARTICLE III.

OFFICERS

The officers of this Association shall be a President, Vice-president, Secretary, Treasurer, an Auditor, and a Board of Directors consisting of twenty-four members, two from each county, as far as practicable.

ARTICLE IV.

MEMBERSHIP

Each member shall pay an admission fee of one dollar, and an annual assessment of one dollar, which shall be due at the time of the annual meeting.

*With revisions to date.

ARTICLE V.

MEETINGS

Section 1. This Association shall hold at least two regular meetings each year. The annual meeting, for the election of officers, shall be held in the city of Worcester, on the second Wednesday of March at 2 o'clock p. m.

Sect. 2. In the election of officers and the transaction of other business, twenty members shall constitute a quorum; a majority vote shall constitute an election. All officers shall hold over until their successors are chosen.

ARTICLE VI.

SPECIAL MEETINGS

The President and Secretary shall have power to call special meetings of the Association, or of the Directors; or upon the written petition of fifteen members they shall issue such call. The object of these meetings shall be stated in the call, which shall be issued by mail to each member, at least seven days prior to such meetings.

ARTICLE VII.

AMENDMENTS

Any amendment to this constitution may be made by a vote of two-thirds of the members present and voting; a notice of the proposed change having been given at a previous regular meeting.

BY-LAWS.

DUTY OF THE PRESIDENT

1. The President shall preside at all meetings of the Association and perform such duties as pertain to the office. In his absence his duties shall devolve upon the Vice-president, or, in his absence, upon the director for the county in which the meeting may be held.

DUTY OF THE SECRETARY

2. It shall be the duty of the Secretary to attend all meetings of the Association, and keep a record of its transactions; conduct all correspondence; keep a list of members of the Association; collect the assessments and pay over the same to the Treasurer; notify members of their election and members of committees of their appointment.

DUTY OF THE TREASURER

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; he shall keep a list of members and their places of residence, and at the close of his term of office turn over all records and funds in his possession to his successor.

SALARY OF SECRETARY AND TREASURER

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 fifty dollars (\$50) per year.

DUTY OF THE AUDITOR

5. The Auditor shall examine and report upon the books and accounts of the Treasurer; he shall be entitled

to demand all books, papers and vouchers three days previous to the annual meeting.

DUTIES OF DIRECTORS

6. The duties of the 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 localities, as to their quality and probable value for general cultivation.

ELECTION OF OFFICERS

7. The President, Vice-President, Secretary, Treasurer and Auditor shall be elected by ballot, and the Board of Directors by a majority vote of the members present; they shall hold office till their successors are duly elected; the first five officers shall be ex-officio members of the Board of Directors.

VACANCIES

8. Vacancies in any office caused by resignation, death, or removal from the State, shall be filled by the Board of Directors for the unexpired term of the office.

DISCONTINUANCE OF MEMBERSHIP

9. Any member who shall neglect, for a period of two years, to pay his annual assessments, shall cease to retain his connection with the Association, and the Secretary shall have power to erase his name from the list of members.

IN FORCE

10. These articles shall take effect and be in force from their adoption by a majority vote of the Association.

AMENDMENTS

11. 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 proposed having been made at a previous meeting.

MASSACHUSETTS
FRUIT GROWERS'
ASSOCIATION

(ORGANIZED MARCH 21, 1895);

REPORT OF THE
17th Annual Meeting

HELD IN

Horticultural Hall, Worcester

1911

PUTNAM, CONN. :
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1911

OFFICERS OF THE
MASSACHUSETTS FRUIT GROWERS'
ASSOCIATION

1911

S. T. MAYNARD, President,	Northboro
H. L. FROST, Vice-President,	Arlington
F. HOWARD BROWN, Secretary-Treasurer,	Marlboro
H. WARD MOORE, Auditor,	Worcester

DIRECTORS

ESSEX COUNTY:	E. A. Emerson, Haverhill; John Barker, North Andover.
SUFFOLK COUNTY:	George Cruickshanks, Chelsea; A. Warren Patch, Boston.
NORFOLK COUNTY:	George N. Smith, Wellesley; Charles A. Wilson, West Medway.
MIDDLESEX COUNTY:	C. L. Blake, Ashby; E. F. Gilson, Groton; E. D. Howe, Marlboro; E. R. Farrar, South Lincoln; Wilfrid Wheeler, Concord.
HAMPSHIRE COUNTY:	John W. Clark, North Hadley; Fred C. Sears, Amherst; J. T. Geer, Three Rivers.
HAMPDEN COUNTY:	L. W. Rice, Wilbraham; Ethelbert Bliss, Wilbraham.
BERKSHIRE COUNTY:	R. H. Race, North Egremont.
FRANKLIN COUNTY:	E. F. Copeland, Colrain; Wm. Davenport, Colrain; Charles A. Smith, Ashfield.
WORCESTER COUNTY:	S. J. Emerson, Lunenburg; W. D. Ross, Worcester; H. R. Kinney, Worcester; Edmund Mortimer, Grafton.

PROCEEDINGS
OF THE
MASSACHUSETTS FRUIT GROWERS'
ASSOCIATION

March 8th and 9th, 1911
Horticultural Hall, Worcester, Mass.

WEDNESDAY, MARCH 8, 10.00 A. M.

With the largest attendance in the history of the Association the 17th annual meeting was opened promptly at 10 o'clock by President S. T. Maynard of Northboro. He introduced Mayor James Logan who welcomed the Association to the Heart of the Commonwealth as follows:

Mr. President, Ladies and Gentlemen:

In March, 1908, it was my pleasure to extend to the members of the Massachusetts Fruit Growers' Association the welcome of the city of Worcester, and I am glad to be able to extend to you the greetings of the city once more.

There was a landslide last December—perhaps you remember it—and you came pretty near having another Mayor to bid you welcome to Worcester this year.

The people are getting more particular every year and so each year, to use a slang expression of the street, "it is harder to get by," and while I am still doing business at the old stand, this will be my last opportunity to extend the welcome of this goodly city to the members of your association.

When I had the pleasure of speaking to you in 1908 I had had just two months' practice in the business of city government. I have learned a lot since then and I have had a lot of theoretical advice in these years of service all of which I could not even absorb, and most of it I could not use.

If you have added to your stock of knowledge about fruit growing as much as I have added to mine in regard to municipal affairs, you have added considerable.

I am glad to have this opportunity this morning to say just a word of welcome. I am not here to make a speech. You have before you more important business than anything I would be able to say to you and my advice on your business would probably be of as much use to you as is most of the advice that I receive as to the best way to run the affairs of a city.

Tonight we are to break bread together and it may be that after a good feast you may be willing to listen to a poor speech.

I welcome you here today and hope to be with you again tonight.

RESPONSE OF PRESIDENT MAYNARD:

The city of Worcester undoubtedly knows a good official when it gets one. We believe it has been the custom to select a new mayor each year, but Mayor Logan we know has been re-elected to this office several times and from what we know, we believe he will be elected again and that he will be retained still another year as Mayor of Worcester.

We thank him for his welcome and the interest he has shown in our Association and work.

ADDRESS OF THE PRESIDENT

The Massachusetts Fruit Growers' Association has had a fairly prosperous season, not perhaps so much as an organization as in the prosperity of its members. Fruit crops have generally been of fine quality and prices have been

good. The weather conditions have been unfavorable to the rapid increase of insects and fungous pests. Everywhere there has been an increased interest in fruit growing; rich men have been buying up old orchards and planting new, and corporations are being formed with capital enough to do all the necessary work for successful fruit growing. This condition means that the small grower must be thorough in all the details of his business. With the improved quality of our fruit due to weather conditions and more spraying and the advertising our fruit received at the New England Fruit Show, there has been an increased demand for Massachusetts fruit which will continue to increase as long as we produce fancy fruit.

President Maynard then called for the report of the Secretary, F. Howard Brown of Marlboro.

REPORT OF SECRETARY

Mr. President and members of the Fruit Growers' Association:

As the records of our last annual meeting have already been printed, I will not now take the time to read them, but will take up what has been done since that time.

INSTITUTES

Colrain

The joint institute of the Massachusetts Fruit Growers' Association and the Franklin County Agricultural Society was held with great success at Colrain, January 27, 1911, where there was an enthusiastic audience of over 200. Director E. F. Copeland presided in the absence of the president. Mr. H. L. Frost of Arlington was the morning speaker on Spraying and Spraying Appliances, which latter, in the form of nozzles, couplings, etc., were shown and explained. The subject was covered very ably, and much valuable information given. Dinner was served at noon by the Women's Relief Corps.

In the afternoon, Prof. Alvah J. Norman of the Extension Department of the Massachusetts Agricultural College, on Pruning, demonstrated with sections, the right and

wrong way of sawing when taking off large branches. He also showed a pruning outfit, and upon some young trees brought in from outside, demonstrated the proper methods of pruning to obtain the different forms of heads from the time the tree was planted.

Lunenburg

On February 18, a joint institute was held with the Middlesex North Agricultural Society at Lunenburg. President Mead of the Agricultural Society called the meeting to order, and then President Maynard took charge and introduced the speakers. Mr. Elmer B. Parker of Wilton, N. H., read a very practical paper on Peach Growing in N. H. Lively discussion and questions followed until a halt was called for the free lunch which was served by Lunenburg Grange.

The speaker of the afternoon session was Prof. F. C. Sears of the Agricultural College on "Personal Experiences in Starting an Orchard in Massachusetts." A complete description was given of the methods followed and the results obtained to date on this farm where some 25,000 trees have already been planted.

Danvers

A joint meeting with the Essex County Agricultural Society was held March 3, at Danvers with President Danforth presiding. At both sessions the subjects were illustrated by stereopticon. That of Professor Pickett of N. H. Agricultural College, in the morning, was on Pruning the Apple Orchard. The slides showed the various methods of pruning the old high headed trees to lower these, and also it showed the proper ways of pruning young trees. Dinner was served by Danvers Grange at noon.

At the afternoon session, Mr. Wilfred Wheeler of Concord, gave a very interesting and instructive talk on the Culture of Small Fruits. The pictures shown were many of them taken on his own farm which added to the interest.

A strenuous attempt was made to hold an institute at Framingham in conjunction with the Middlesex South Agricultural Society and Framingham Grange. After writing eight different speakers and being unable to secure one for that date and as the Agricultural Society was having diffi-

culty in securing its dairy speaker for the afternoon session, your Secretary left the matter entirely in the hands of the Agricultural Society, as the time was too short before the meeting to warrant further delays necessary where two different parties are working from a distance.

A recommendation for future institutes would be, to have fruit and kindred subjects handled by the speakers who represent the Agricultural societies and not have dairy or non-fruit lectures at our joint meetings; the other subjects having their proper places at the regular institutes of the societies.

The special thanks of the Association are tendered Secretary Ellsworth of the State Board of Agriculture, without whose aid and hearty support the holding of these meetings would have been impossible, and to the Massachusetts Agricultural College, the Franklin County, Middlesex North, Middlesex South and the Essex County Agricultural Societies, the Woman's Relief Corps of Colrain, and Lunenburg, Framingham and Danvers Granges, and to all who have contributed to the success of the meetings; for the hearty response, the spirit of co-operation and assistance given in holding the institutes.

FIELD MEETINGS

Many attempts were made during the past year to hold field meetings, but without success. It has become evident that such meetings must be arranged far in advance, and provisional promises obtained subject to crop conditions.

On this basis meetings have been planned for as follows:

1. Strawberry meeting with Wilfred Wheeler at Concord in June.
2. Last of July, Early Apples at Littleton, at the Drew, Munson Co's orchards.
3. At Wilbraham, the middle of August. Early Peaches with L. W. Rice.
4. At Berlin, with Albert A. Jacobs, Elbertas early in September.
5. Late September, at Newbury where the Russet grows to perfection, centering with Mr. Frank Perkins.
6. At the grounds of the Massachusetts Agricultural College with trips to the Mount Warner orchards of ex-president John W. Clark and to the newly set Bay Road

Farm orchards of Professors Waugh and Sears. Date to be announced.

7. At the Lemans orchards, Hopkinton, showing the practical results from the new system of pruning old apple trees, under the supervision of President S. T. Maynard. Date unsettled.

The usual idea of these field meetings will be to limit them to members, lunch on the basket plan, thus making them less burdensome to those who entertain—an unwieldy crowd not being desired.

Members will receive notices of the meetings in due season.

The Secretary wishes to apologize for making these arrangements previous to the election of officers, but for the good of the Association it seemed necessary.

ACCOUNTS OF THE MEMBERS

An inexpensive loose-leaf ledger has been purchased, and after considerable labor, the account of each member is now shown on a separate sheet. All past payments are recorded, and there are spaces for fifteen future payments. With this system well under way a maximum of efficiency with a minimum of labor is evident.

FIVE YEAR REPORT

Owing to the demands for the printed reports of our Annual Meetings, and with the knowledge that the funds in the treasury had been received with the expectation of obtaining these reports, your Secretary tackled the proposition of preparing for printing the proceeding of the last five years. Thanks are due to past Secretaries for valuable assistance. The result is ready for distribution at the Membership desk. You are entitled to it if you have paid your dues for 1910 (receipts read "to March 15, 1911") others may obtain it by the payment of one dollar.

The sole source of income of this Association is from the annual dues of the members, which are only one dollar a year.. This means we must have a large membership. Do your share by bringing in at least one new member. Many have sent in new names already, and from institutes and other sources, 50 new members have been added. Let us aim at a membership of 1000.

We ought to have a direct appropriation from the State,

and I trust that efforts will be made to obtain it. The other New England Fruit Associations have regular appropriations from their states, besides special appropriations for the N. E. Fruit Show which we decidedly should have.

Your Secretary received notice from Secretary Ellsworth of the State Board of Agriculture to attend the hearing at the State House on the bill for the ten year close season on deer. The weight of the arguments both in numbers and force was opposed to the bill and in favor of keeping the present law on the statute books.

DATE OF ANNUAL MEETING

Many find the date of our annual meeting inconvenient for various causes and the suggestion has been made that the time be changed to the third Wednesday in January, which date does not conflict with the outside State Fruit Growers' meetings, which is a matter to be considered in obtaining out of state speakers for our meeting as well as the attendance of our own prominent members. This date would allow the results of the preceding season's work and experiments to be thoroughly digested and written up after the rush is over, and at the same time allow the report of the meeting to be printed and placed in the hands of each member in time for use the coming season. With our changing methods, and new sprays, each year sees decided improvements which should be placed before our members at once.

Through the kindness and generosity of the Worcester County Horticultural Society it may be possible to obtain the free use of the hall for this date, as has been their helpful custom in the past. In conferring unofficially with the officers of the Society this seems to be the general sentiment.

In connection with changing the date of the meeting, it has been suggested that this will afford an opportunity for the Fruit Growers' as an Association to hold a banquet of their own, as it is well known that the hospitality of the Horticultural Society is at present taxed to the limit to provide room for their own members and the invited guests of our Association at their banquet which occurs at the time of our present annual session.

Many members complain that in an early spring, the meeting now comes at a time when they should be at home keeping ahead of the work. We all know how last spring even those who were ahead found difficulty in finishing their

spraying owing to the high winds before the buds were too far advanced.

Another feature against the present date is that Farmers' Week at the Massachusetts Agricultural College usually comes at that time so we are unable to obtain the presence of our professors at our meeting.

Surely a more representative display of fruit would be possible at the earlier date and if we are to have our exhibition at the time of the annual meeting in the future this is important.

SCALECIDE CUP PRESENTED BY THE B. G. PRATT CO. N. Y. CITY.

This handsome silver cup suitably engraved, is offered to the member of this Association who exhibits the best three bushel boxes of apples of any three varieties grown in the State. The cup is to remain in the possession of the yearly winner (although the property of the Association) until it shall be won by the same member at two annual fruit shows of the Association not necessarily consecutively—after which it will become his or her exclusive property. The winner is to give a short description of cultural methods used, if possible at the meeting or published in the annual report of the meeting, for the benefit of the Association. The judges of the general fruit exhibit are to select the winner, using such score cards as they may elect.

Pres. What will you do? Appoint an Auditor pro tem or wait for Mr. Ellsworth who is not yet present?

On motion it was voted to appoint an Auditor pro tem and Mr. Elliott Moore was appointed.

Pres. You have heard the report of the Secretary, what will you do with it?

Prof. Sears. I think there has been a great deal of work put into this report and it is due great consideration, I move that a committee be appointed to which this report may be referred.

Pres. How shall this committee be appointed?

By the chair, and consist of three members.

Pres. I will appoint Prof. Sears, Ex-President J. W. Clark and Mr. Brown.

President Maynard then introduced Mr. W. A. Munson of the Drew-Munson Co., which won the prize for the greatest yield from any acre of apple trees in one solid block.

TREATMENT OF THE PRIZE APPLE ACRE

W. A. MUNSON, Littleton

In giving you the treatment and care of the orchard that produced 227 bbls. of apples on an acre, I will start with the pruning and follow the work as it proceeded to the picking and packing of the fruit.

The pruning was done by myself with the assistance of one man. The main idea was to open up the centres of the trees, thin out the wood where the branches were thick, and take out all the cankered and diseased wood. In most cases fully one third of the tree had to come out in order to get the desired top opening and what I thought to be a sufficient thinning of the lower branches. In this work it is my aim not to have one branch interfere with another and to leave the tree when finished, open, so that the sun will strike all parts at some time during the day. In some cases a sucker was left to grow up in order to make new wood and fill in the tops which were headed back to keep the trees from growing too high, as my idea is to keep them down where a twenty foot ladder will be all that is necessary to do the picking. All spraying work can be done from the ground, or from the wagon carrying the pump.

After the pruning, the trees were sprayed thoroughly with lime and sulfur. In doing this I generally waste considerable material, but it pays to do it as thoroughly as it can possibly be done. This spraying controlled the canker and there is no evidence of any new infestation.

About the first of April, the soil was plowed as close to the trees as it could be done, and then harrowed to a very fine mechanical condition. At the time the harrowing was done the fertilizer was applied in the following formula. 1000 lbs. of basic slag phosphate mixed with 225 lbs. of high grade sulphate of potash; with this, 2 lbs. of nitrate of soda was cast under each tree. A month later another application of soda was given to the tree most heavily laden, making altogether 180 lbs. of this chemical used in all.

At the time the blossoms had finished falling, the orchard was sprayed with Bordeaux mixture and arsenate of

lead. This spraying did not completely control the leaf spot but it did control the coddling moth so that it was difficult to find a wormy apple in the lot, and very little fungus on the fruit.

Cultivation was kept up once a week until the middle of July, at which time clover was sown, and nothing more was done until picking time.

While the picking was going on I was in the orchard all the time, and insisted that the apples be picked without breaking off the fruit spurs, and that they be handled without bruising. The fruit was taken to the packing shed and sorted into three grades, some of the best was packed in the western style box.

This winter the trees have been scraped lightly and will be sprayed with oil as there is a little scale left which was missed with the lime and sulfur.

The treatment of the orchard this year will be a little different, as the trees made considerable growth, and I do not think that as much fertilizer will be needed, nor will the cultivation be as close to the trees.

DISCUSSION

Q. How old is this orchard?

Nineteen years; not an old orchard.

Q. How many trees are there to the acre?

The trees are about twenty-five feet apart, 60 to an acre.

Q. Do you apply nitrate of soda at all?

Not this year.

Q. Do you obtain nitrogen from clover?

Yes, we seeded to clover last year.

Q. How will you cultivate it this year?

I shall not plow the land at all this year. I use a disk harrow and go down through the trees. The trees were so heavily loaded last year that the branches laid on the ground. It is now almost impossible to get a horse in through the trees.

Pres.: In plowing would a great many of the old roots be injured?

This orchard has been cultivated more or less ever since it was set out.

Q. What do you spray with?

I shall spray with soluble oil just as soon as I can do it.

Q. What kind of a spray pump do you use?

Ordinary barrel pump. There are several good makes. I use the Douglas.

Q. What kind of a nozzle?

The Friend nozzle wastes less material and covers the branches more thoroughly. In the summer time we use this nozzle for lower limbs and the Bordeaux nozzle for the higher limbs.

Q. About how much ground was covered by the foliage?

The foliage in this orchard very nearly covered all the ground, the branches nearly touched each other. I have to cut them back each year.

Q. What kind of apples are they?

Baldwins. One of these 19 year old trees had 10 barrels of apples on it.

Q. If your trees were thirty-five feet apart, would you use it all for orchard, or put a part into a crop?

I should put it all into apples. I don't think you can raise two crops on the same ground and get good results.

Q. What if you have a heavy crop of clover in June and then have a drought?

I shall probably lose by it.

Q. Do you do any thinning?

No; not any.

Q. Do you expect to control the scale better by using oil than by lime-sulfur?

I used lime-sulfur on peaches and nearly wiped the scale out last year, so this year I am going to see what results I can get from using oil on the apple orchard. I scraped these trees and when I took the old bark off I found considerable scale under the bark.

Q. Suppose you use miscible oil and the weather is cold?

Some Scalecide man can tell about that better than I can. I don't want to put oil on peach trees with the thermometer under 50°, but if it freezes afterwards I do not know that it would injure them much.

Mr. Keyes: What becomes of the scale on the bark that you scraped off?

It dries up and dies.

Mr. Whitney: We elect officers this afternoon and I move that we appoint a nominating committee of five to

present a list of officers for the ensuing year and bring them in for the first of the exercises this afternoon.

Pres.: All in favor of this, please say Aye, those opposed Nay. It is a vote.

This committee was appointed by the chair and consisted of the following: Ex-President Whitney, Upton; E. F. Copeland, Colrain; Elmer D. Howe, Marlboro; Monroe Morse, Medway, and John Barker, North Andover.

Pres.: Is the Auditor ready to report?

Mr. Moore, Auditor pro tem.: I have attended to the duties assigned me and find the accounts correct, the vouchers in due order, and money all deposited in the bank.

Pres.: You hear the report of the Auditor, what will you do with it?

Voted to accept and adopt it.

The Treasurer's report was then called for by the President.

TREASURER'S REPORT

Mr. President and Members:

The report of the Treasurer is as follows:

Received from former Treasurer S. T. Maynard,	\$265.41
Received from Membership Dues to date,	139.00
	<hr/>
Total receipts,	\$404.41
Back bill for reporting 1909 and 1910 meetings,	\$ 20.30
Printing report 1906-1910 inclusive,	213.80
Secretary's office, institutes, programs, notices, etc.,	64.08
Salary of Secretary-Treasurer,	50.00
Balance on hand,	56.23
	<hr/>
	\$404.41

Thus we have printed the report of our last five annual meetings, paid one back bill, held three institutes, carried on an unusual amount of correspondence, and after paying the Secretary's salary (which he certainly expected to be obliged to contribute at the time the printing of the report

was undertaken) our Association stands squarely on its feet with every bill paid.

Respectfully submitted,
F. HOWARD BROWN, Treasurer.

Pres.: You have heard the report of the Treasurer. What will you do with it?

Voted to accept and adopt it.

Director Copeland of Colrain here stated that yesterday and the day before he persuaded 28 people to join the Association, thus adding \$28 more to the money in the treasury.

Pres. Maynard then introduced Prof. A. J. Norman, who read the following paper:

DEMONSTRATION ORCHARDS

PROF. ALVAH J. NORMAN,

Extension Work in Horticulture, M. A. C.

Mr. President, Ladies and Gentlemen:

I shall try in a very few moments to give you some idea as to what the College is doing for the fruit growers of the state through its department of Extension Work.

Most of you are familiar with the organization of this department, how we have men who are devoting their entire time to Extension Work along the various lines of Agriculture. It is my privilege to serve as Extension Worker in Horticulture, and it is of that particular work I wish to speak.

In the first place there has been and is a tremendous need for such work. It was definitely started in the early spring of 1910, when four demonstration orchards were placed in various parts of the state, but it was not until September last that a person was engaged to devote his whole time to this work.

The following outline of work, which was presented to the Legislative Committee a short time since, will give you some idea as to the work we are doing and the work we hope to do in the future if money and men are provided.

I. Demonstration Orchards

Four new orchards were planted in 1910, containing a total of about 2,300 trees. In 1911, the total number in these

four orchards will be increased to approximately 2,500. Our purpose is to make a special demonstration of pruning at each of these orchards in 1911, and demonstrations of both pruning and spraying in 1912; this to be continued each year as there may be need. These orchards are at Colrain, Westhampton, Sturbridge, and West Newbury.

This year, 1911, we will plant five orchards, which will contain about 2,500 trees. These will be cared for in the years to come as outlined above. The locations of these orchards are North Adams, Granville, Enfield, Medway, and East Brookfield.

In 1910, one old orchard at Hardwick was taken as a renovation project. The owner did about \$140.00 worth of work, such as pruning, spraying, cultivation, etc., under our direction, and the first year's crop though grown in an off year was sold for \$195.00. We have two renovation projects on for this year.

Our intentions are to place four or five orchards each year until we have a demonstration orchard in each of the more important fruit growing centers of the commonwealth, and it is hoped that these orchards may prove a good meeting ground for all who may be interested in orcharding, and especially for summer meetings of this association.

II. Apple Production Statistics

We need very much to know the amount of apples produced in each town in the state. We should receive as accurate information as possible regarding this subject each year. We expect to do something along this line this year and trust that we may have the cooperation of the members of this Association.

III. Apple Consumption

As we wish to increase the production, we want also to increase the consumption of apples. Few people utilize apples in all the ways they might, and few realize the wonderful possibilities of the apple used as food. This field is not being touched at present.

IV. Orchard By-products

The orchardists of the state should be informed as to the best way to utilize their entire fruit crop. This includes

the subjects of Dried fruits, Cider or fruit juices, Vinegar, Home Canning, Preserves, Evaporation, etc.

V. Institutes

In cooperation with this Association and the State Board of Agriculture much good could be accomplished through Institutes devoted wholly to fruit growing.

VI. Movable Schools

We hope to be able to conduct regular schools of from three days to a week's duration, in some of the more prominent apple towns. The interest is sufficient to make such a project possible.

VII. Horticultural Societies

Live organizations of the fruit growers in each section of the state are needed. Such organizations should work with or be a part of this Association.

VIII. Short Courses at the College

Advanced courses will probably be offered for those who might wish to return for a second or third winter at the college.

IX. Cooperation With Schools

An orchard containing fruit trees and small fruits should be a part of every high school or rural school. It would be more permanent than school gardens, and more instructive. One such proposition is now being considered.

X. Home Gardens

There are not enough vegetables grown at the farm homes. This field should be entered with a view to increasing the kinds and quantities of vegetables consumed on the farm, and to prolong the vegetable season by use of hot beds.

XI. Improvement of the Landscape

About the farm home offers a legitimate field which has not been entered. Also the improvement of rural roads, cemeteries, school grounds, town commons, railroad grounds, etc.

XII. A Soil Survey

To locate the desirable apple soils of the state is under consideration.

XIII. Cooperation With Boards of Trade

With a view to issuing attractive circulars advertising the various sections of the commonwealth.

I think that from this outline you will agree with me that there is a need for this work. Each item might be explained more fully but I wish only to call your attention to one: That is the one dealing with Horticultural Societies.

You will notice that it is our desire to help all existing fruit growing organizations in the state and when it seems necessary, start new ones. We are very glad to know that this organization is doing such good work and we want to assure the members of the organization that the Extension workers in Horticulture will endeavor to go hand in hand with the Fruit Growers' Association. For that reason, we shall be delighted to have you retain in office your present secretary, who has so ably served you and whom we have found to be such a congenial fellow workman. We shall be glad at all times to receive suggestions from the members of this organization, for it is our endeavor to do that which will bring the greatest help to the fruit growers of the State.

In closing, let me say there is no occupation, considering all things, that can equal fruit growing, either from the standpoint of financial gain or the standpoint of pleasure it may bring. And then, too, fruit growing as an influence for good upon the lives of its followers cannot be equalled by any secular employment.

We are not surprised that fruit growers are enthusiastic. They can not help but be; and we, who represent the College, wish to influence or guide that enthusiasm so that it will make for more fruit, better fruit, and the consumption of greater quantities of fruit.

Q. Do you have any men at the College that you send out to do pruning?

We have several students that we send out and if any of you wish them to come to you, you must give your names in at once. They get 25 cents an hour and go out during the spring vacation.

Q. Do you have anyone for grafting?

Prof. Norman: We do not have anyone we can recommend to go out and do grafting.

The principal address of the forenoon session was given by Prof. Fred C. Sears of the Massachusetts Agricultural College, as follows:

OBSERVATIONS ON THE APPLE INDUSTRY OF THE PACIFIC COAST

PROF. FRED C. SEARS

Mass. Agricultural College, Amherst.

I want to begin my talk this morning by giving you some of the general impressions which my western trip has left with me, and I want to close it with as accurate a comparison as I can make of the relative advantages and disadvantages of New England and the Pacific Northwest as orchard sections, and some of the lessons which it seems to me we can learn from them.

As you probably all know, I have done more or less talking during the past three years on the subject of apple growing in New England. I have told people there was money to be made out of it, if properly conducted, and have shown my faith in the business by going into it myself. And I have insisted that New England had very distinct advantages over the West. I still think so. But I want to tell you confidentially that for the first week of my stay in the Northwest I was staggered, and began to consider whether the Bay Road Fruit Farm (the farm Professor Waugh and I have at Amherst) could be worked over into a poultry farm or a game preserve. For I never saw before and may never see again such beautiful fruit! I had expected to see fine Newtons and Spitzenburgs, but to see Baldwins and Rhode Island Greenings absolutely the most beautiful things in the apple line was rather disconcerting, for I thought they were New England specialties. I said to myself, "My boy, you had better go home and apologize to the orchard men of New England for attempting to lead them astray." This impression of their beautiful fruit stayed with me during my entire trip, and will always stay with me. Their best fruit is a glorious sight and a thing to be proud of, and

I take off my hat to the men who grew it. But the longer I stayed there and the more I studied the matter, and in particular the more I got behind the scenes and talked with the growers, the more "comfortable" I felt and the more sure I was that I should not need to offer that apology to the fruit growers of New England.

My second most vivid and lasting impression was that every man, woman and child of those sections was interested in apples. I never saw anything like it! Not only is the whole county, of such a section as Wenatchee or Hood River, one vast orchard, divided up merely by the roads which run through it, but every business in the county is conducted by and for the fruit man; the banks are officered by orchard owners; the souvenir cards represent some kind of fruit or some phase of fruit growing,—perhaps two apples taking up the entire space on top of a flat car, or a man hauling a single pear out of his orchard with a team of horses; the hardware stores are full of every contrivance for the benefit of the fruit grower, from cement-coated nails for his apple boxes to the latest type of box press; every orchard section and every railroad has its advertising booklet, ornamented with apples in colors; and even the ladies' hats, instead of looking like a dishpan or coal hod, as they do with us, looked like a peach basket or an apple box. I can see in this universal interest in the orchard business both an advantage and a disadvantage, both a hope and a menace. On the one hand, it is bound to push the industry forward, it has already done so, and will always do so with an industry where men engage in it in a single section. What one man does not think of, another man does, and the business as a whole is wonderfully advanced. On the other hand, if the time comes when this industry fails or is seriously crippled (even for a single year), the whole county is affected, and disaster is almost certain.

My third impression was in regard to their laws. They are certainly sweeping, yet everybody believes in them and supports them. Two examples will serve to illustrate them. At Wenatchee, we were most royally treated by Mr. Mike Horan (a Massachusetts boy, by the way) who is known as the "apple king of Wenatchee" and who took us all through the Valley in his automobile. As we were passing by a large orchard, I noticed a big pile of apples, several hundred boxes, piled up near the packing house. They were close to

the road and looked perfectly good and I said to Mr. Horan, "Why don't they market those apples?" "Oh," he said, "they are defective ones and we are not allowed to. You could buy that pile of apples, but you couldn't send them outside of the state, the law won't allow it. They can be made into apple butter or vinegar, or champagne, but cannot be sold in a fresh state." Think of that!! Fancy what our New England growers would think, and say, if the state should step in and not allow them to market their wind-falls and wormy apples! Why the howl over Taft's reciprocity proposition would insk into insignificance. Another day, I was talking with a commission man in Seattle, about their inspection laws. He told me that they were frequently visited by the state inspectors who looked through the apples on sale, and if they found a box with codling moth in it, for example, or with any orchard pest, they would put a mark on the box, and a little later a team would call for that box, it would be taken out to some vacant lot, saturated with kerosene oil, and burned up, root and branch, codling moth and apples. The owner would not only get nothing for his apples, but he was obliged to pay for the cost of taking them out and burning them! If every package of New England apples in the Boston markets today which contained apples affected with codling moth or railroad worm were taken out and burned, how many do you suppose would be left? I fancy that the price of good fruit would take such a jump as it never did before. They certainly value the good name of their fruit out there, and this is one reason why it has such a good name. And we might with the greatest profit copy after them, I think. Some of you will remember a talk given by Dean Davenport of Illinois at the State Board meeting in Dracut a year ago, in which he spoke at length of the Pacific Coast fruit industry. And he gave as a reason for this success that "they had learned that two good apples were worth more than the same two good apples with two poor ones thrown in." I often thought of that remark in my wanderings in Oregon and Washington.

My fourth impression was of their climate, and I want to say right here that while we sometimes growl about the weather we get in New England, it is good enough for me! I was in Hood River for most of three days and it rained practically all the time I was there. We took a drive of

twenty-five miles through the Valley one afternoon in spite of the rain, and we asked the driver whether it always rained there. "Yes," he said, "at this time of year! It begins about November 1 and rains all the time up to the middle of January, when it stiffens up and we have two weeks of sleighing. Then it begins to rain again and rains nearly all the time up to some time in April, and from that on into May it rains part of the time. Then it stops and doesn't rain any more until the first of November." Just imagine such a climate! Rain all the time until everything is soaking, the roads are gullied, and one hates the sight of clouds! Then sunshine and no rain at all till the dust is as thick as the mud was before, and one would give a month's salary for the sight of a single cloud! It certainly gives color to their fruit, but I should think it would also give color to their language!

My fifth impression was in regard to the work of their co-operative unions. It is certainly responsible in a large degree for their success. It is co-operation all along the line,—buying, handling, and selling. They establish, in packing, definite grades, as follows:

Extra Fancy—In this grade all apples shall be sound, smooth, free from worms, worm stings, scale, water core, sun damages or diseases of any kind, and of proper shape according to the variety. No apples smaller than 165s shall be allowed in this grade, nor any apples that are of a red variety that are not at least three-fourths red, except that Rome Beauties one-half red will be taken in this grade. Yellow Newtons, White Winter Pearmains, Grimes Golden, Belle Flowers, Winter Bananas will be allowed in this grade, but no other variety of yellow apples. Winter Bananas and Red Cheek Pippin must show a red cheek.

Fancy—In this grade also, all apples must be smooth, sound, free from bruises, blemishes, worms, worm stings, water core, sun damages, or diseases of any kind, and of proper shape according to the variety. No apples smaller than 165s shall be allowed in this grade, excepting apples of the following varieties, which will be accepted when packed as small as 200 apples to the box: Winesaps, Jonathans and Missouri Pippins when red all over. All apples of red varieties ranging in color from three-fourths red down to one-third red will be included in this grade. All varieties of yellow apples will be allowed in this grade.

Grade C—This grade shall be made up of all merchantable apples not included in the Extra Fancy and Fancy grades. These apples must be sound and free from bruises, worm stings, and other diseases. Skin to be unbroken, but will include mis-shapen apples or apples having a limb mark or other like defect. This grade will include apples of all colors and as small as 200s, but no smaller. It is optional with the buyer whether this grade is wrapped or not.”

Then they insure that these apples shall be lived up to by putting the packing of the fruit into the hands of entirely disinterested parties. Every packing house is in charge of a boss who is responsible, not to the owners of the fruit, but to the Union. And if the owner objects to the way things are carried on, his redress is through the Union. We all know what this type of marketing has done for them. The Rural New-Yorker recently contained a statement from Steinhardt & Kelley, from which I quote the following:

“Our contract with the Hood River Apple Growers’ Union, as represented by their board of directors, is certainly a very stringent one, they guaranteeing us a perfect pack and also guaranteeing that every apple in every box is absolutely perfect. We have handled several hundred thousand boxes, and never have we found ourselves in condition to make a single complaint against their pack. It is as near perfect as human ingenuity and honesty of endeavor can make it; in fact, we shall be glad to have you drop in our place of business at any time and take a box of fruit from any heap, and you will find that every box is practically identical, and that every apple is absolutely perfect, whether you open the top, bottom or side of any package. This is more than we have been able to say for any large pack of fruit that we have ever contracted for.”

In order that the packing may be satisfactory, the Union is very careful who does it. No one is allowed to pack who does not have a license from the Union, and only those have proved that they are capable will be granted such a license. In order to keep up the supply of good packers, they conduct each fall, at the beginning of the packing season, a “packing school,” where every one may get two weeks of practice under expert supervision for \$15. At the end of that time, any one of ordinary ability should be reasonably expert. If the “graduate” from this school packs for members of the Union during the whole season,

he gets a refund of his \$15. at the end of the season. Isn't this packing school something which we ought to take up, whether we adopt the box or continue to pack our apples in barrels?

I should like to continue this discussion of general impressions, because there are several other matters which interested me greatly, but I have promised Brother Brown not to speak over forty minutes, and I see he is already getting nervous, so I am going to pass on to the second section of my subject, viz: A comparison of New England and the Pacific Coast.

Some two years ago, at the request of Mr. J. Lewis Ellsworth, Secretary of the State Board of Agriculture, I wrote a bulletin which was called "Western Methods in New England Orchards," giving my notions as to the reasons for western success in orcharding and as to the comparative advantages of the East and the West as apple growing sections. This, of course, was without any first-hand knowledge as to the West. I was greatly interested, therefore, to "check up," in this recent trip of mine, the impressions I had previously received from reading and talking with others, and from observation of the western fruit in our eastern markets. And it was a source of considerable satisfaction to find that my long-range impressions were pretty generally sustained on closer examination. I want now to record my notions on this point, both because many are still looking to the West as the only (or at least the best) place to grow apples, and because those of us who are taking up the fruit business here in New England need every encouragement to keep us "strong in the faith."

I believe then that the following is a fair, and I hope an impartial, presentation of the case of the western apple sections. Their advantages as I see them are:

(1) That they can and do, as I have said, produce fruit of the very greatest beauty, more handsome than we do in the East. I know some of you will want to object to that, and I know that some of our finest fruit leaves little to be desired from the standpoint of beauty, but I, for one, am willing to admit that as a class western fruit is prettier to look at than eastern. I certainly never saw anything quite so handsome as some of the Baldwins, Rhode Island Greenings, Rome Beauties, etc., which I saw on exhibition at Vancouver and Spokane. And since nice looks will always be

an important item in selling fruit, we must concede that the western growers as a class have a distinct advantage there.

(2) Their trees bear earlier, I should say from 2 to 3 years earlier on the average. This, I think, is principally due to their very long season, which really allows the tree to do the same amount of growing, to reach the same amount of maturity, say in four years, that our eastern trees reach in six. Take the following examples:

'The Olds Company, Burch Flat, Wenatchee, Wash., have fifteen acres of King David trees four years old, which will average one box per tree;' or this, "H. S. Wetherald, Miller street, Wenatchee, has ten acres of six-year trees which will give 3,500 boxes, or between five and six boxes per tree;" or this, "N. D. Heath, Wenatchee, has 85 Jonathan trees, seven years old, which will average six boxes, while 85 Black Twigs will go ten boxes." Imagine seven-year Baldwins in Massachusetts giving over three barrels per tree.

(3) Their trees bear more heavily and more regularly. I am not quite sure how much of this may be due to their better care, particularly in thinning, but I believe that it is in some part at least due to their long season, as referred to in the last paragraph, which allows the manufacturing plant of the tree to mature a big crop of fruit and still have enough surplus plant food to develop a fine set of fruit buds for the following year. In support of this general contention that their trees bear more, take the following: "Jack Lillis picked 2,400 boxes from 143 Rome Beauty trees, besides 200 boxes on the ground. These trees occupy one and one-half acres of land, and the fruit will sell for \$3,000. Last year this acre and a half produced 1,000 boxes which sold for \$1,850," or take this, "Sterling Brothers, Wenatchee, will pick 3,000 boxes from 604 trees nine years old. Last year the same trees gave 3,000 boxes and the year before they gave a net return of \$3,000."

(4) There is a more general interest in the industry. I have already discussed this under my general impressions, but want to re-state it here, as I believe it is a great factor in their success. I do not know how far it is possible or desirable to bring this about in Massachusetts, but it does seem to me that such very promising sections as Colrain and Ashfield might profitably develop the orchard business till

they could have warehouses and all the conveniences which go with a well developed industry.

(5) They have fewer pests than we have. This of course will tend to change as the orchard business develops; in fact, many pests are already noticeably on the increase. But with their vigorous treatment of these pests and with the dry growing season, which is so unfavorable to fungous growths, I do not believe they will ever have the same trouble from the ordinary, orthodox orchard pests that we do.

(6) Their virgin soils are better supplied with all the constituents needed by the tree for the production of choice fruits. This, of course, would not apply to orchards started on new lands here, but the great bulk of our orchards are not put on such land, but on fields which have been long in cultivation.

Three other factors which certainly contribute to the present lead of the western grower, but which we want to pass by with a bare mention, are:

(7) Their better laws already discussed, and which I doubt if we are ever able to duplicate here, because of lack of popular support.

(8) The tremendous development of co-operation, another thing which I fear we can never hope to duplicate here, or at least not for many years.

(9) The fact that their trees are all young and are consequently bearing their very best fruit at the present time. This, of course, will "mend itself."

Turning now to the eastern side of the question, I am going merely to state what it seems to me are our advantages, because I have spoken of them so often before and because this speech is supposed to be about the Pacific Coast.

As I look at the situation, our advantages are as follows:

(1) That we are close to our markets! I was told in Hood River that it cost them 89 cents a hundred to get their fruit to Chicago, and \$1.00 to get it to New York. Two boxes are accepted by the railroads as the equivalent of 100 pounds. Mr. E. H. Shepard, the editor of *Better Fruit*, says in the December number that it costs about 50 cents a box to grow the fruit. This makes one dollar per box or nearly three dollars per barrel which it costs them to land their fruit in New York or Boston. Certainly our New England

orchardists can make money, and good money, at three dollars per barrel in Boston, so that we are in a position to make orcharding pay, and pay well, on a price that would just cover expenses for the western grower.

(2) That our apples are better in quality than the western apples. Of course the westerner won't admit this, and even some easterners doubt it, but I cannot believe that the impression would be so general among consumers if it were not backed up by fact. I am not prepared to say that the western apple is not as good as the eastern when it is picked. Perhaps it is. Perhaps the long journey affects the quality. But I do believe that you would not find so many complaints of the lack of flavor in the western apples if there were not something in the charge. And I believe that the better prices this year of the barrel fruit and the lower price of the box fruit means simply that the consumer is coming to realize that he gets quality here.

Now, if I were pleading this case as a lawyer before a jury, I should be perfectly willing to rest my case on these two points. If we can grow fruit of better quality and can market it at a good profit at prices which will only bring the western man out whole, what more do you want if you are going into orcharding at all to convince you that New England is the right place?

But there are certainly other advantages for the East. To keep up the scheme of numbering, these are:

(3) That land is cheaper with us, much cheaper! Good land can be bought for \$25 an acre.

(4) It is easier to get labor. I cannot see how such isolated fruit valleys as Wenatchee are going to escape trouble on the labor problem.

(5) We have a better market for our poorer grades. I know we don't market them in the right way and I know we have too many of this grade; and I know that our western friends, if I were to make that statement, would laugh at it, and say we were welcome to that advantage. But when I think of that big pile of beautiful apples which my friend Mike Horan showed me, I can't help feeling that a good market for it, if it were marketed in the right way, would be a valuable asset.

(6) We have better markets for our perishable fruits like berries and plums and peaches. Of course they do ship plums and even strawberries to the eastern markets, but they

are certainly handicapped more with these than with apples and pears.

In closing this list of our advantages, I want to mention two difficulties which seems to me they face, and which cannot help acting as a drawback to the industry there, and consequently as a help to the eastern grower in the keener competition to which we must look forward. In the first place, I am sure that irrigation is going to bring increasing difficulties in its train. I believe this is one reason for the milder, poorer quality of the western apple. In the second place, their trees are planted very close together, and will soon need thinning. And beyond a doubt many growers will not thin as soon as they should, with the result that the quality of the fruit will be lowered.

But whatever one may think of the relative advantages and disadvantages of the East and West, no one can visit this Pacific Coast section without wanting to go again, and no one can get among the fruit growers there without feeling that he is among men who know their business from beginning to end and who come as near having orcharding down to an exact science as any men on earth. I don't know whether there is something in the air, or the mountains, or the sunshine, which gets into the blood, but one certainly finds a type of men out there who would make any industry anywhere a grand success, and I wish we might develop more of the same spirit here in the East.

The meeting adjourned for dinner.

AFTERNOON SESSION

Pres. Maynard called the meeting to order shortly after 1 o'clock and called upon Mr. Elliott Moore, who gave a short talk concerning his travels in the South, Southwest and West, during the past winter.

Mr. Moore: From what I saw I have concluded that if the people here in the East will put in the same care and interest that the people of those sections do there will be no trouble but that we can produce as good fruit as they, even better. They trim the trees when they ought to be trimmed; they spray them and prune them just when it should be

done. It is thorough work that these people put into fruit raising. Our climate is more suitable than theirs, and there is no reason why we cannot get as good results, if we put into it the same amount of work. The trouble is that we have too many irons in the fire.

Dr. Henry Fernald was then introduced and gave a splendid stereopticon lecture, the summary of which is printed as follows:

INSECT PESTS AND THEIR CONTROL

DR. H. T. FERNALD, Entomologist, M. A. C.

Stereopticon Lecture

I do not come before you at this time to go into the question of the advisability of fruit growing in Massachusetts or of fruit growing at all. If you did not believe in it you would not be here today. I do wish to emphasize, however, one point that the last speaker made, and that is that successful fruit growing cannot be carried on as a side issue. It has been carried on as a side issue since 1650 in Massachusetts, and the result is cider apples and poor fruit. Under our New England conditions apple raising can be carried on successfully only by attending strictly to that and nothing else. I am not afraid of the West, nor am I afraid of over-production, for in spite of all the orchards that are being set out, many of them will be neglected, so for this reason, I do not fear over-production, but what I do fear is that we cannot raise enough first-class fruit to supply the market. The man who is going to make good profits for the next twenty years on apples is the man who is going to eat apples for breakfast, think apples until dinner time, eat apples for dinner, think about apples in the afternoon and for supper—well, I will let him read the newspaper then—but that man must be an enthusiast, first, last and all the time.

I do not for a moment minimize the seriousness of the fact that there are over four hundred insects which may attack the apple alone, still most of these pests are of little importance and only once in a while will one of these less important forms come to the front. Unfortunately there are some that are always with us and always doing damage, and a few of these I wish to speak of this afternoon. I do

not wish to spend my time nor take yours in talking about those with which you are most familiar, but we will spend most of our time on those of which less has been said.

One of the forms that is common I wish to speak of because of some new facts that have been found out. The codling moth is doing as much damage in the West as it is in the East. It is a pest which we find, of course, everywhere in New England. We find, also, that the wood-peckers are very busy attacking it in the winter months and these wood-peckers should be encouraged. In the fall the caterpillar makes an excavation in the bark in which it winters, and about the last of May changes to the moth which comes out and passes to the tree. It now lays its eggs on fruit, leaves or twigs, but mainly on the twigs. The moth flies at night and is not attracted by light. It lays its eggs from the last of May until the fifteenth of June. These eggs hatch about three weeks later, and this period—about the last of June—is the time for a second spraying. Sixty-five to 80 per cent. of the caterpillars enter the apple at the blossom end; the others at any point. After the feeding is over, the caterpillar comes to the surface, generally not at the blossom end, makes its exit and burrows under the bark, crawls in there and stays until the next year. A few do not do this but transform at once to the adult and lay eggs which produce a second crop of moths. Spray just after the blossoms have fallen and while the lobes of the calyx are still spread apart so that the first meal the caterpillar gets will be the poison. After the calyx lobes grow together, it is too late to spray successfully. The material to spray with has been somewhat changed. Formerly Paris Green was used, but arsenate of lead is now taking its place in spraying for the codling moth. It seems advisable to spray first about one week after the petals have fallen but before the calyx lobes close after which there is an interval before the second spraying for this insect, which should be about the last of June. The arsenate of lead should be used at least as strong as two pounds in fifty gallons of water. This would be for thorough work, but it would be safer to use two and one-half or three pounds in fifty gallons of water. This can be used with Bordeaux mixture. The second spraying should be applied about the last part of June instead, two weeks after the first as was formerly advised, and as a result of the two sprayings, we find that most of the apples which would be other-

wise wormy can be saved, and that is well worth doing. Some people spray as many as eight times in the West, but for the codling moth two sprayings, one just before the calyx lobes close and the other about the last of June, give very good results in New England. The New Hampshire station has found that we can save from 80 to 90 per cent. of wormy apples by the two sprayings.

The cost for each tree would be about 9 to 16 cents per treatment, including the cost of everything except the apparatus for doing the spraying.

I do not wish to take any time on the scales because they have been so often talked about. As regards treatment for the San Jose scale, however, the treatment with home-made lime-sulfur seems to have given the largest measure of success, but coming quite close to this, are both the miscible oils and the ready-made lime-sulfur. In general, spraying with lime-sulfur one year, and with a miscible oil such as Scalecide, Arlington oil, or Target brand the next winter, thus alternating the two kinds of treatment, seems to be giving the best results at the present time.

One of our smaller pests is the apple maggot or railroad worm. The fly is tiny, smaller than a house fly, and with dark bands across its wings. These flies appear early in July and lay their eggs in the flesh of the apples. When the eggs hatch the tiny maggots burrow through the pulp of the fruit, which becomes worthless. When they have reached their full growth they leave the apple and go into the ground where they transform into the adult fly, and leaving the ground as the adult fly, they attack the later apples. They are often in these late apples when the apples are gathered for the winter, and when they come out of the apples they cannot get into the ground, so they remain on the bottom of the bins.

This insect is very hard to destroy. The adult fly is not attracted by anything that we have been able to discover, and there seems to be but one time when there is a chance to do anything, that is when the maggot is leaving the apple and going into the ground. Fowls and hogs may be depended on to take care of the maggot at this time, if allowed the chance. That is an indirect method of treatment, but it is the best that we have, and if carefully attended to will certainly be effective unless your next door neighbor has an

orchard that is neglected, as the adult insect is not inclined to fly far.

All parts of the apple tree are subject to the attacks of insects and the Apple tree borer expends its energy on the trunk near the roots. It appears during the summer months and lays its eggs singly on the bark near the ground. The young bore into the tree and dig out cavities about the form and size of a silver dollar just under the bark. The bark over these cavities is apt to shrink and crack and let the sawdust fall out. At this time the borers can be located to good advantage and be cut out with a knife or pointed wire. The following spring the borer will work inward, into the root or into the trunk, and in the following fall will work out to the trunk, preparing the way for its escape the following year.

It spends its second winter in the tree in the pupa stage and in the spring the adult beetle comes out and escapes and then another generation of eggs is laid.

The question as to how important this insect is, may be answered by examining two trees, one of which has been infested by borers, and another from which the borers have been kept. You can see the difference as shown by the picture (on the screen).

It is important to watch for these insects and keep them out of the trees, first getting out all that are in, and then keeping others from getting in. To keep the borers out the most effective remedy seems to be the use of wire mosquito netting made in the form of a cone set into the ground and running about two feet up. Care should be taken that the wire cone does not touch the tree except at the top. As the borer likes the bottom of the tree, it will not often go up higher than about two feet above the ground, and the netting is an effective protection, and is also a protection from mice and rabbits during the winter time. Care should be taken that there be no breaks in the netting through which the borers can crawl. This has proved a very successful device.

Our fruit trees are infested by a large number of different kinds of caterpillars. The treatment for these is to spray a sufficient amount of stomach poison (generally arsenate of lead) upon the leaves that the caterpillar eats, and the caterpillars will be destroyed. Where they feed in groups hand picking is often more convenient than spraying, but if for any reason this cannot be done, spray with

arsenate of lead and let them eat the poison and kill themselves when they come to it.

The main point is that insects of that type, feeding on the leaves, are easily controlled, compared with those that suck the juices and which are so small that we overlook them.

The bud moth is a small moth which frequently does much damage to our fruit. This insect lays its eggs on the leaves in the latter part of June or in July, and the caterpillars skeletonize the leaves, leaving the upper surfaces. When they stop feeding they crawl out on the twigs and make places to pass the winter. In the spring, they go to the buds (flower and leaf) and draw the parts together or burrow in and feed. One caterpillar will not usually entirely consume a bud, but will eat out the heart and then go to another bud and thus destroy a large number of buds before we have any idea of what is going on. After feeding on this way for a time, they draw the leaves together and go into the cocoon and about the first of July, out comes the moth which starts the new generation, which works during the summer. The trouble with this is that the insect is small and works at a time when we do not know of it. Orchardists judge their fruit by the estimate of the blossoms, but in the case of this pest the injury has already been done before the blossoms appear. This insect is easily controlled by spraying with arsenate of lead, and the time to apply it is just before the blossoms open. Fortunately, this is also a good time to spray for fungous diseases, and the two treatments can be combined by using arsenate of lead and Bordeaux mixtures.

The Fall Canker Worm.

It is now some years since Massachusetts has had what would be called a canker-worm year. It is not unlikely that we may have one before long. Connecticut has been having hers. When it does appear it is liable to be pretty serious. The male canker-worm has wings, the female not. There are two kinds, fall and spring. In both kinds the caterpillar is an inch worm, so called; in both the adult moth comes out of the ground; in both the eggs are laid on the twigs of the tree; in both the female is wingless and hence must crawl up the tree; and in both the caterpillars feed in the spring of the year. The moth that lays the eggs comes

out of the ground, and anything to prevent that moth from crawling up the trees is sufficient. The best thing for this pest is whatever keeps sticky the longest and that is Tree Tanglefoot.

For the fall canker-worm the band should be put on about the first of October. If it is the spring canker-worm the band should be put on about the first of March. The real trouble is that most people do not know that the canker-worms are present until the worm is feeding on the leaves. In this case, spraying with arsenate of lead will be effective.

The Pear Psylla

Winters in the adult condition and in the spring lays its eggs. The young suck the juices from the tree and when abundant often check its growth entirely. The tree should be sprayed with kerosene emulsion from the 15th to the 20th of May.

Peach Borer.

The adult of this pest is a very pretty little moth. These moths appear from about the 10th of July until the 1st of September and fly freely in the daytime, reminding one of small butterflies. The eggs are laid singly on the trunk, and the borer which hatches works its way through the trunk into the stem and feeds until winter comes, then becomes quiet. In the spring, it starts again and when through feeding, makes its way outside, transforms to the adult, and escapes.

The Plum Curculio

As an apple pest is becoming very much more important than we appreciate, for it not only attacks and injures 80 to 90 per cent. of the plums, but going to the apples feeds upon them, and while I doubt if the plum curculio ever matures in the apple, it has an effect on the apple itself, so if you find an apple indented at one point and a hardness running into the core, you may decide that the plum curculio has been at work there. We must count the plum curculio as one of the worst apple pests in Massachusetts today.

The Tussock Moth

Is a general feeder, including fruit trees. This insect is not often very abundant, and can easily be controlled by spray-

ing with arsenate of lead, or in most cases the egg masses covered with white can be picked off. There are two broods in a year, the egg masses of one being found in the latter part of July and August, and those of the other brood in the winter.

In conclusion I would like to say that in spite of our 400 odd insects that attack fruit trees in Massachusetts, treatment just before the buds open, with arsenate of lead, combined with Bordeaux mixture and a second spraying after the blossoms have fallen but before the calyx lobes have closed, together with a third spraying the last of June, will prevent the most of the trouble with the chewing insects I have considered.

For the scales and sucking insects, the entire treatment is different. The point to be carefully adhered to is first, to spray thoroughly, second to spray thoroughly, and third, to spray most thoroughly. It does not matter how many times you spray, or what you spray with, if you do not understand the object of the spraying. Therefore, if spraying is worth doing at all, it is worth doing well, and the man who is going to make a success in Massachusetts in fruit raising, is the man who is going to do all parts of his work thoroughly, at the right time and in the right way.

Quite a portion of the lecture was devoted to the explanation of pictures thrown on the screen, and cannot therefore be printed.

DISCUSSION

Q. Did I understand you correctly to say that it was desirable to remove the Tanglefoot band after the spring insect has gone?

Dr. Fernald: I think not. It can stay on and be effective a long time. The great point is to get it on in time. If you are a week too late, you might almost as well not put it on. Put it high enough so it will not be rubbed off.

Q. Would it be possible to use the wire netting for peach trees?

No, for some reason the use of wire netting for these sometimes increases the borers. Why that is, I don't know. Nothing has been recommended that is always effective. Tar is sometimes put on the trees and at one station it worked first rate, at another it killed the trees.

Q. What damage would it do if you used 5 pounds of arsenate of lead to 50 gollons of water?

Well, for one thing, you would be paying 10 cents for a 5-cent article. Arsenate of lead is not supposed to burn the tree, however strong it may be. Is not supposed to, I say, but once in a while it does burn.

ELECTION OF OFFICERS

Chairman Whitney: The nominating committee is agreed unanimously on the following as the list of officers. (This list is printed on page two of the report).

Pres.: You hear this list of officers, what will you do with this list?

Moved and seconded that the Association proceed to ballot for these officers and that the Chairman of the Committee, Mr. Whitney, cast one vote for the election of officers.

Pres.: You hear the motion, all in favor say Aye. Those opposed Nay. It is a vote. Mr. Whitney will cast the ballot for the officers. I declare them elected.

Wilfrid Wheeler: In the Secretary's report this morning it was advocated that the date of the annual meeting of this Association be changed from the present date to the third Wednesday in January. It seems to me that this is a very good change to make at this time. As the date of the meeting is now, it is almost too late for many of us. Not only that, if we wanted to have an exhibition of fruits at the annual meeting, it would be better to have it in January than at the present time, and I wish to make this motion—That the Constitution of this Association be amended by stating that the annual meeting shall be held on the third Wednesday in January and at such place as the Executive Committee shall decide.

Pres.: You hear Mr. Wheeler's motion. Has anyone anything to say?

Mr. Whitney: Some of our members have wondered if it was wise always to hold these annual meetings in the

same place. We could hold Institutes here in Worcester and in other places. We do not want the Horticultural Society of Worcester to feel that we do not appreciate their courtesy, but we do feel that many would attend the annual meeting if they did not have to come as far as Worcester. There are other sections of Massachusetts that desire to have the annual meeting.

Pres.: We can vote upon this at the next regular meeting.

Mr. Mead: I think it would be better to hold the meeting at some other time.

Mr. Moore: What is the meaning of the notice on the Marlboro program, saying that "Action will be taken in regard to changing date of annual meeting from second Wednesday in March to the third Wednesday in January?" Does it mean that we are to vote on it at that time?

Sec'y Brown: That will be a regular meeting of the Association, and as previous notice is given at this meeting, we can vote at Marlboro on the amendment.

Mr. Whitney: There cannot help being some difference of opinion in regard to the time of holding the annual meeting, but the point seems to be well taken that if the report were printed and in your hands sooner you might get it in season to do you some good the same season. It is not meant to kill the Worcester meeting, but that the annual meeting may be held elsewhere.

Pres.: This notice today is a formal notice of a change in the Constitution of the Association.

Mr. Sears: I wish to make a motion that we appoint a committee of three to look into the matter of this Association preparing for a State exhibition of fruit in connection with the New England Fruit Show.

Sec'y Brown: Would amend this motion so that the committee consist of five members.

Prof. Sears: I accept the amendment.

Voted and committee appointed by the chair.

Mr. Clark: For this exhibition of the Massachusetts Fruit Growers' Association the members should be urged to keep the very best apples grown this season and donate them for this purpose.

Q. Will the New England Fruit Show allow us space?
Wilfrid Wheeler: Yes.

Mr. Race: This matter of the change of date of the annual meeting is rather serious; also, in our section of Berkshire County it is just the time when the ice harvest is beginning. December is a better month for a fruit exhibition than any other month so far as the fruit itself is concerned. Action should not be taken on this now. It is a splendid idea to hold the meeting in different parts of the state.

Mr. Whitney: If we had the annual meeting at different places we could get more members in the different counties.

Sec'y Brown: Merely in order to avoid future question and acting according to our Constitution, I move that it be the sense of this meeting that the next regular meeting be held at Marlboro, March 22.

Q. Does this mean that we take action on this change then?

Mr. Whitney: Before this motion is put I want to say a word. I realize that it is a serious matter to change the time of the annual meeting. If I understand it, our Constitution cannot be changed without notice having been given at some regular meeting. This is rather rushing matters along, and I realize the fact that most of us who come to this meeting will find it impossible to be at the meeting in Marlboro. I suggest we let the matter go over until the next annual meeting.

Mr. Wheeler: Have a vote taken by those present to show when the majority would like to have the annual meeting. Take a test vote.

Pres.: There is a motion before the house.

Mr. Wheeler: I am perfectly willing to withdraw my motion.

Mr. Clark: If the meeting was held sometime before Jan. 15, it would be all right so far as the ice is concerned, would it not?

Mr. Wheeler: The motion is withdrawn.

Mr. Whitney: To get the opinion of the people who are here now. I ask you to take a test vote as to when they would like to have the annual meeting. This will not decide anything. Simply show their opinion.

Pres.: All in favor of this say Aye; voted.

The result of this test vote:

For second Wednesday in March,	23
For third Wednesday in January,	55
For December,	3

Sec'y Brown: As long as we have had the test vote I want to make a motion that the next regular meeting be held in Marlboro.

Mr. Whitney: I oppose the meeting in Marlboro as a regular meeting with a view of changing the Constitution. I think we must go slowly or we shall antagonize some of our older members who have always had the interests of this Association at heart, and I fear that we may lose them. Many have not had the time to think this over, and it seems to me it would be advisable to leave it until our next annual meeting.

Sec'y Brown: Every member received notice of a possible change of the date of the annual meeting one month ago, and a large majority of those I have talked with are in favor of January. I am sure it is solely with the idea of helping the Association that any change should be made, and if it is liable to have the opposite effect by voting upon this at Marlboro, I withdraw the motion.

The President then introduced Mr. Charles E. Lyman of Middletown, Conn., who spoke on

PRESENT AND FUTURE OF FRUIT GROWING IN NEW ENGLAND

Mr. Chairman, Ladies and Gentlemen:

I was up here a year ago, and I am very much gratified with the appearance of our audience today. A year ago it seemed to me that there were very few young men, but today a very large proportion seem to be young or middle-aged men.

I fear that the subject of my talk today will not interest you as much as some others. You seem to be all interested in apples, but I think there are other things that you might be interested in as well as apples.

My subject refers to the conditions of the peach business as it is today, and its future. I shall first speak on the condition today as it appears in New England.

In Connecticut there is quite an interest in peach growing, but it is confined to a few localities. There is a great deal of interest there among certain growers, but I must say that quite a good many are somewhat discouraged. That is because of lack of intelligence in growing their trees. They don't consider that the peach is a very different tree from the apple to grow. It is adapted to a temperate climate, and is not supposed to stand the very low temperature that the apple tree will stand and live, but if grown right, it will stand quite a low temperature.

Those orchardists that have failed—their failure is owing largely to new methods of growing their trees, to the use, very largely, of nitrogen fertilizers. This makes a tree which is very susceptible to cold. We, in Connecticut, are not quite as cold as you are up here, but we are cold enough, so if the trees are not grown right, if forced in the fall, they are very apt to be thrown into some disease. Some people think that the "yellows" is a special disease. The tree may not indicate the yellows at all, and yet the fruit will indicate that the tree has the yellows and the days of those trees are numbered. I might say that peach culture is centralized in Connecticut in parts of the state that do not exceed 500 feet above the sea level. A few years ago along the Sound were many peach growers, but they became discouraged because they grew the tree so that it would not stand up well. The brown rot would get a foothold, (owing to the long continued fogs) and wipe away whole orchards. For that reason

the culture of peaches has almost died out along the shores. I think, however, that they might have stayed in it if they had not used nitrogen fertilizers.

Now, we come to Massachusetts. I think that the opportunities here are very favorable. I should not dare to set out trees much above the 600 feet level.

We might take up this matter of fertilizing, which is the cause of so much trouble. These methods of forcing the tree were not adopted in Connecticut until about 10 years ago.

Since that time a very great many peach growers have become discouraged. Mr. Hale, for instance, seems to talk as if peach growing was a back number. But he was misled by the wrong methods of feeding his trees.

My advice would be to set out some fruit trees with some peach trees between the other trees. Once I would not have advised this, but now our spraying can be done without injuring the foliage at all. The only thing needed in my opinion is to regulate fertilizing and cultivation so that there shall be no forcing of trees.

I took up peach growing as a side issue about 20 years ago. I decided to set out a few peach trees, and from that one experiment my orchard has grown. The culture that I gave those trees was very indifferent, yet they bore great crops of fruit. This opened my eyes to the situation, and now I am more enthusiastic over the business than I ever was. I do not see why others cannot do the same that I have done. I am very certain that Massachusetts can do the same. Massachusetts has a better market for fruit than any other place in the country.

I want to call your attention to the difference in the price paid for the fruit according to the way it is shipped, that is, by rail or by trucking. A grower told me that he got \$1.50 a basket for his peaches because he could let them stay on the tree until they were ripe and then carry them right to Providence and sell them to the people who want them and who will pay any price for good ones. I got 50c. a basket for mine, but I had to pick them when hard and ship to Providence by rail. There is no market in this country that will compare with the Massachusetts market for peaches, but they must be in prime condition.

I consider that the first three or four years, before the tree bears, are perhaps the most critical years in the life of

the tree. There are so many things that may happen to the tree that one must not try to raise it in a haphazard manner.

DISCUSSION

Q. What kind of fertilizer do you use?

One thing I am very careful about, that is, to have plenty of phosphoric acid in the soil.

Q. What do you consider a yearly average growth?

That I cannot tell. We cannot judge in one season what any one kind of fertilizer will do.

Mr. Wheeler: Have you ever considered shipping peaches to England or any other European countries?

No sir. I think that was tried out years ago; think it might perhaps be done now. I don't know why Elbertas should not stand up and arrive in fine shape.

Mr. Everett: My experience has been that people get only one crop of fine peaches.

There is no need for that. I have trees that are sixteen years old. I have one block of Elbertas that are at least thirteen years, and they have been a regular gold mine. These results that you speak of are owing to wrong growing. They were grown by forcing the trees too much, and this threw them into the yellows, and when a young tree has the yellows, there is no hope for them. There is an idea that you cannot grow two good crops in succession, but there is no reason why you cannot grow ten crops on the same tree.

Mr. Barker: What do you do with trees that have the yellows?

Take them out. You can force them for one season and then cut them out.

Q. Do you burn the old trees?

Yes.

Q. How cold has it been to kill the "Champion?"

We have had it 25° below zero.

Q. What are the three best varieties?

For a money maker, the Elberta, second is the Carmen and third the Hiley. There are other varieties such as the Champion and the Greensboro that are good.

Q. When you pull out a tree, do you put another in its place?

Not often.

Q. Does the white peach sell as well as the others?

It depends upon the market. Local conditions vary.

Q. Does it not make a difference what kind of a peach tree you have as to the length of its life?

There are only a few varieties that I would set out any way. I have six or seven varieties.

Q. What varieties would you recommend?

Greensboro, Carmen, Champion, Wardell, Hiley, Elberta,

Q. What is the best location for a peach orchard?

I would select an eastern slope every time. I get the most peaches from the eastern slope.

Q. What is the best soil?

Rotten sandstone. It is what you put on that brings the color. I believe in the use of slag. There is iron in the slag.

Q. Is there any iron in the soil?

We plant on any kind of soil. The Elberta does better on general kinds of soil. Massachusetts people have the finest conditions that I know of; you have the markets here and can get half as much again as we can for what you raise.

Q. Do you use lime-sulfur for summer spraying?

Yes, we cook it right on the farm.

Q. Do you use arsenate of lead?

No.

The meeting then adjourned till 10 A. M., Thursday.

Mr. Parker was unable to be present owing to sickness in the family but sent his paper.

PEACH GROWING IN NEW HAMPSHIRE

ELMER B. PARKER, Wilton, N. H.

Peach growing in New Hampshire has in years past been more of an incident than an industry. In a small way, we find peaches have been grown in Southern New Hampshire for thirty-five years, and have recently learned of their successful cultivation in Tamworth, up in Northern Coos County, where a man purchased a run down farm, and contrary to the advice of his friends, recently planted a few peach trees. He has proved to the people, by an abundant harvest, that they only lacked faith.

Near Lake Winnepesaukee, a body of water that freezes over, and from a scientific standpoint the conditions would

be adverse to peach growing, an orchardist is meeting with success, and in several other towns in different parts of the state the fruit is being successfully grown.

In a recent number of the *New England Farm Magazine* was a sketch of my methods, etc. In consequence of which I have received many letters of inquiry from men in our state and from other states also, who were surprised that New Hampshire could produce such peaches, and asking if I supposed they could grow peaches in their town. No one ever tried—some said it was considered too cold. This shows that farmers have lacked courage and confidence to break away from the old traditions. "It was good enough for father—it is good enough for me." They seem to be waiting for "bacteria," as it were, or a starter—someone with a will-power to lead off. Take for illustration, spraying. It took twelve years to convince all the apple growers in our section that it paid to spray the orchards.

While New Hampshire may not ever be as important a peach state as Massachusetts has been, yet, I believe there are sections yet undeveloped where the orchardist will succeed who goes at it with the determination that he will properly care for the trees and study the needs as he would in any other line of business. We surely have some of the best markets here in New England, with only short distances of transit by rail, and much of our fruit comes in direct competition with that grown outside our state, yet our product meets a ready market at very satisfactory prices.

In selecting a site for the orchard, one of the most important considerations is elevation. We must get back to the hills to escape the late spring and early fall frosts, for good air drainage is as essential as land drainage for the trees. Extreme steady cold weather is not always so harmful as sudden changes—trees are apt to have their buds destroyed by a sudden low temperature when preceded by a week or so of warm weather in mid-winter so as to swell their buds. On a farm one-half mile below us, is an orchard that last year did not have a peach—all because it was at the base of the hill.

I do not consider any of our land too good for orcharding when the returns are compared with other crops or branches of farming, as, for instance, the milk business as it has been conducted during the past fifteen or twenty years. In my case, I took the best fields first, planting the

more level ones with peach and the hillsides with apple trees. These apple trees will not have the whole ground cultivated, but a strip of three or four furrows is ploughed each side of the tree, and this will be worked over occasionally. We have got to look out for the heavy rains which do so much damage in cultivated orchards; so some of the peach orchards have furrows ploughed across the slope of the orchard to take off the water and prevent washing.

In going into an orchard the appearance and character of the trees tell us what is needed, for the color and character of the leaves tell the whole story, and if we are careful planters we will notice and investigate any trouble and take measures to remedy the difficulty. If the orchard has proper care it will make rapid development and be of a dark foliage. We often see orchards shifting for themselves—stunted trees, sickly, yellow foliage, an eyesore to the progressive grower. We must remember a tree is a living thing—it cannot supply itself with nourishment, but must be carefully trained and nourished from infancy.

We see orchards of peach and apple trees planted by men who have been influenced by the success of others, yet who were entirely unfit for the work, become discouraged after a few years, and put the orchard back into sod, and in the fall stock is turned in to get the last bit of vegetation, and at this time the orchard, if any is left, gets fall pruned.

Pruning should be carefully considered and studied—each tree must be shaped to conform to its individual needs. We take the peach tree as it comes from the nursery, three to four feet high, cut back to a whip, fifteen or eighteen inches, and at the same time the roots are pruned or shortened. The second year one-third to one-half of the leaders are removed. The third year about one-fourth of the new leaders are shortened and some removed to keep the trees with open tops or heads. This method brings many of the bearing limbs near the ground, for many of the heads are formed at the ground. The tops are low, thus making the labor of spraying much easier, and allowing the harvesting of the fruit without the use of a step-ladder, so ladies can pick the fruit equally as well as the men. In fact, in the busy season, a man and a woman will take a row together thus making the work more interesting where otherwise it might become monotonous. We find people will help in peach harvesting, who, if they were asked to do any other

labor on the farm, would feel insulted. Some of our pickers have been with us every year that we have had peaches.

I was once asked the question, if I thought I would have succeeded in any other locality. That was hard to answer. I am in the business because I love the work and realized there was a great possibility in peach culture near our home farm. Our local conditions were about as ideal as any I knew, and also having other local interests in mind, I was content to settle near the home farm.

I remember once at a meeting, I think it was here in Worcester, Prof. Rane said he was planting an orchard of apple trees in a Western state. Mr. J. H. Hale asked him why he went West—why he did not stay in New England where they had the best markets on earth, the purest air, and where man really lives. Prof. Rane replied he went West because it was his old home, and there was a love in his heart for the home place. Mr. Hale said he had always liked the Professor, but now he loved him because he loves the old home, and any man who loves the West enough to go there and plant an orchard, he certainly hoped would succeed.

I believe we have got to break away in many cases from the old customs. Farmers have been slow in experimenting—they were content with the old traditions and methods of their forefathers. When I told one of my neighbors I was going to give up my dairy and devote my whole time to orcharding, he said the farm would soon run down and we could not afford to buy needed fertilizers. When I came on my place, eighteen years ago, the farm had one field of eight acres that had been well tilled, one field of twenty-five acres that had been allowed to run down, some of the best fields not having been ploughed for thirty years, all the hay that grew was removed and no fertilizer put back. The former owner had tried peaches and said they were not a success. I was not to be turned down, so started an apple orchard of Baldwins, using peach as fillers, gradually other orchards were planted, until we have the farm practically covered, the more level ground being kept for peach—the steeper slopes for apple trees. Last spring an orchard of one hundred Sour Cherry was planted. There is a great demand for this fruit, and it is a very reliable bearer, the buds being more hardy than the peach, yet we find but very few who are planting this fruit, commercially. Our orchards are

planted in the spring—fourteen feet apart each way for peach, the land is squared and staked off and a notched planting board used in setting the trees, so as to run accurate lines. Ground bone is used under the trees, mixing it well with the soil. The first two years field corn is generally grown, insuring good cultivation for the trees. Cultivation commences in the spring by shallow ploughing with a one-horse plow, and harrowing throughout the season with the two-horse spring tooth. As our trees are low-branched, many heads starting from the ground, we could not go close enough with the harrow, so I separated the sections of the harrow and put in a spreader, about eight feet long, which enables me to go under the trees, and by going two ways, and occasionally over the strip in the centre of the rows, I completely control the weeds and save all hand labor. At the last cultivation, about the last of July, a cover crop is sown. After trying several kinds; crimson clover, cow-peas, buckwheat, rape, winter vetch, and spring vetch, we have concluded spring vetch is the best for us as this makes a thick mat-like mass of vines, insuring a good soil covering during the winter, and also prevents washing of the land, adds humus and nitrogen to the soil, and will not start growth the next spring.

Last spring we used lime-sulfur for a dormant spray both for apples and peaches, and it completely controlled leaf curl. Previous to this time we used the home-made Bordeaux, until 1909 we used Pyrox with much better results than from the home-made mixture. We spray peaches only once, for the curculio trouble us but little and most of the peach diseases are not found in our section. San Jose scale we do not have, but one serious fungous disease, brown rot, is working in on the early varieties, especially Carmen, so eventually we will probably have to use a summer spray. The borers trouble but little, yet we intend to go over the orchards each fall in search of them. I have one mulched orchard planted on a clover sod, the grass being cut and placed around the trees. This orchard made a fair growth and was more stocky than the cultivated trees. It received the same fertilizer as the cultivated trees. For three years things went well, the fourth year there was a big crop of fruit set, but in July we had a very dry spell, and the orchard being on a dry place, suffered. The leaves were turning yellow and the peaches were dropping, some trees

losing nearly all the fruit, others just commencing. I took the two-horse plow and turned the sod over, ploughing toward the trees thus leaving a strip of sod two or two and one-half feet wide in the tree row which has not since been disturbed, only mowing it often. The disc harrow was immediately put on and it was given a thorough harrowing. In a few days the peaches stopped dropping and soon the leaves began to grow darker in color. In ploughing this land not a particle of moisture was found, while in the cultivated orchards with a dust mulch, there seemed to be sufficient moisture and there was practically no drop. Last fall these trees produced some of the best fruit we had—the orchard contained about two hundred Elbertas. The Elberta is our principal variety, although Carmen, Belle of Georgia, Crawford Early, and a few other varieties are grown in a small way. Our trade demands a canning peach, the Elberta being called for and when it ripens on the trees, as it does here, it has everything to recommend it, color, size, flavor, and keeping quality. With a large testing orchard, we have found many varieties suited to our locality, and many which are worthy of trial. The finest quality we found in the Mamie Ross and Miss Lolo.

For fertilizers, last year a mixture of two hundred pounds nitrate of soda, three hundred pounds high grade sulphate potash, and five hundred to eight hundred pounds basic slag per acre was used, this being put on with the Hoosier endgate broadcast seeder before ploughing.

We market in fourteen quart baskets, using the cushion and wooden cover, costing about seven cents. Each basket is distinctly marked fourteen quarts.

Our planting of apples has been very successful. In 1904 an orchard of McIntosh and Wealthy was interplanted with peach here we made a mistake in putting in too many Niagara for they were nearly a failure. In 1908 we picked our first apples, in 1909 some trees produced a half bushel and last fall we picked over a barrel from a few trees and several had one half barrel each. These were sprayed with commercial lime-sulfur when dormant 1 to 11, and when the petals fell 1 to 30, with the addition of two pounds Pyrox to forty gallons water. Before using this formula I wrote our Experiment Station regarding it. After I had used it, I received a letter saying, don't do so, so you can imagine my anxiety in the matter. What was the result?

I had perfect MacIntosh, Hass, and Tolman Sweet, but Wealthy were badly russeted. Others used the same formula on Baldwins with the best of results. We do not profess to be scientifically correct, but a life spent in the fruit-business gives one a broad field for observations and for knowledge not learned in schools. We visit many other fruit districts and find the fruit growers a whole-hearted people, ready to impart information on the How and the Why of their methods.

If in this paper any points will be brought out that will be helpful to anyone, then will my efforts not have been in vain.

An effort was made by your Secretary to obtain the presence of Prof. W. M. Scott, Pathologist, Bureau of Plant Industry, National Department of Agriculture, but as his field work in the South would be begun by the present date of our Annual Meeting, he was unable to come. However, he very kindly sent the paper which follows and which balances up the program of the meeting. I am sure Prof. Scott has a hearty vote of thanks for this courtesy.

THE USE OF DILUTE LIME-SULFUR SOLUTION IN THE SUMMER SPRAYING OF APPLE ORCHARDS

PROF. W. M. SCOTT

United States Department of Agriculture

Bordeaux mixture has been the standard fungicide for the control of apple diseases since spraying apple orchards came into vogue. It has made profitable apple growing possible where it would otherwise have been a failure, and has been the means of untold wealth to the commercial apple growers of the country. It has formed practically the sole remedy for apple scab, bitter-rot and various apple leaf diseases, and has been universally used on grapes, potatoes and other crops. In recent years, however, there has developed a very serious objection to the use of Bordeaux mixture as a fungicide on apples owing to the injurious effect it produces on both fruit and foliage. The fruit of many varieties like the Ben Davis and Jonathan becomes russeted and often dwarfed and distorted from the toxic action of

the copper in the Bordeaux. This injury is produced mainly by the applications made within three or four weeks after the blossom petals fall and is especially serious in a wet spring. Midsummer or late spraying, such as required for bitter-rot, rarely russets the fruit, the skin at that time having become tougher and more resistant. The skin of the young fruit is injured by the copper and as the apple develops the injured portions enlarge, resulting in russet blotches and streaks. In wet seasons the russetting of the fruit is sometimes so serious as to reduce its market value 25 per cent. or in some cases even 50 per cent.

The pathologists and apple growers have, therefore, been driven to seek a less caustic fungicide and the result has been the development of various lime-sulfur preparations. During the past four years the Bureau of Plant Industry, and some of the experiment stations, have been conducting experiments with lime-sulfur fungicides and the results have been such as to warrant the recommendation of dilute lime-sulfur solution as a substitute for Bordeaux mixture in a large part of the apple spraying operations.

The Lime-Sulfur Sprays.

For two or three decades a preparation known as the lime-sulfur wash has been used in the dormant season for the control of the San Jose scale and other scale insects. It has been known for years that the same spray applied to peach trees in the early spring two or three weeks before they bloom would prevent peach leaf-curl and it is now a common practice to spray for scale and leaf-curl at the same time, using the lime-sulfur wash. The lime-sulfur solution, now rapidly coming into use as a summer spray for apples, is only a modification of the old lime-sulfur wash.

Home-made Lime-Sulfur Solution: Concentrated lime-sulfur solution to be diluted and used as a summer spray on apples may be prepared as follows: Boil 16 lbs. of sulfur and 8 lbs. of lime with about 10 gallons of water for 45 to 60 minutes, finishing with 8 gallons of concentrated solution. Then strain and dilute it with water to make 200 gallons of spray. This makes 4 lbs. of sulfur in each 50 gallons of spray, which in our experiments, has proved to be about the right strength for summer spraying of apples. It may be made in larger quantities by using 100 lbs. of sulfur and 50 lbs. of lime and boiling them together for 45 to 60 min-

utes, using enough water to finish with 50 gallons of concentrated solution. The boiling may be done in a kettle over a fire, or in a barrel or other tank with steam. A 75-gallon feed cooker is perhaps the most satisfactory equipment. In diluting for summer spraying 2 gallons of this solution should be used in 50 gallons of water. Used at this strength in our experiments it controlled apple scab, leaf-spot and cedar rust, fully as well as Bordeaux mixture, without seriously injuring the fruit or foliage.

Commercial Lime-Sulfur Solution: A number of manufacturers are now placing on the market concentrated lime-sulfur solutions to be used as a fungicide and an insecticide. Most of these preparations test 32° to 33° on the Baume hydrometer and contain in solution about 2 1-2 to 2 3-4 lbs. of sulfur to each gallon. They are practically the same as the home-made solution, but are a little more concentrated and therefore require more dilution. A strength of 1 1-2 gallons of the solution to 50 gallons of water gives about 4 lbs. of sulfur in each 50 gallons of spray and produces the same results as the home-made solution diluted to contain the same amount of sulfur.

We have experimented with several different brands of these commercial products and have found very little difference in them. All that were tested gave fairly uniform results and compared favorably with the home-made solution. It appears, therefore, that, except in the matter of cost, it makes very little difference whether the preparation is purchased from the factory or made at home. The home-made product is less expensive but more troublesome.

Results of Experiments

Experiments comparing the lime-sulfur preparations with Bordeaux mixture in the treatment of apple diseases have been conducted by the Bureau of Plant Industry in Virginia, Michigan, Nebraska, Missouri, and Arkansas. Excepting bitter-rot and blotch, all diseases of the fruit and foliage in all the experiments were as thoroughly controlled by the lime-sulfur solution as by the Bordeaux mixture. The lime-sulfur produced very little or no russetting of the fruit and no serious foliage injury while the Bordeaux injured both fruit and foliage of Ben Davis, Jonathan, Yellow Newton, and some other varieties. The lime-sulfur sprayed fruit

was invariably superior in appearance to that sprayed with Bordeaux.

Experiments for the control of apple scab on Winesap were conducted in Virginia during 1909 with the following results: On the plots sprayed with lime-sulfur solution less than one per cent. of the fruit was affected with scab; on that sprayed with Bordeaux mixture about two per cent. of the fruit was affected; and on the check or unsprayed plot, thirty per cent. of the fruit was scabby.

During the same year similar experiments were conducted in Michigan with like results. The scab was held down to four per cent. of the crop by the lime-sulfur solution and to three and one half per cent. by Bordeaux mixture, while eighty per cent. of the unsprayed fruit of the same variety (Wagener) was affected.

In both the Virginia and the Michigan experiments the commercial lime-sulfur solution at a strength of 2 to 50 slightly scorched the leaves particularly on the terminal shoots, but this did not prove to be serious and at the end of the season the foliage was in good condition, the apple leaf-spot having been controlled and the cedar rust held in check. It was found also that arsenate of lead used with the lime-sulfur solution did not result in injury to fruit or foliage and that it controlled codling moth as thoroughly as when combined with Bordeaux mixture. A full account of these experiments was published in Circular No. 54 of the Bureau of Plant Industry.

Experiments of 1910

During the past season further experiments with the lime-sulfur sprays were conducted near Waynesboro, Va., in the orchards of J. G. Hunt, W. Plumb, and W. F. Gilkerson. A part of the work was conducted as a demonstration in cooperation with the Bureau of Entomology. From 75 to 200 trees each of Winesap, York Imperial, and Ben Davis, were sprayed and ten trees of each variety left unsprayed as a check. The principal part of the experiment consisted of four plots treated as follows:

Plot 1. Commercial lime-sulfur solution, 1 1-2 to 50, 2 lbs. arsenate of lead.

Plot 2. Home-made lime-sulfur solution at the rate of

2 lbs. of lime and 4 lbs. sulfur to 50 gallons of water, with 2 lbs. arsenate of lead.

Plot 3. Bordeaux mixture, 3 lbs. bluestone and 4 lbs. lime to 50 gallons water, with 2 lbs. arsenate of lead.

Plot 4. Check, not sprayed.

The Winesaps were sprayed (1) after the cluster buds opened, just before they bloomed (April 5); (2) as soon as the petals fell (April 19), (3) three to four weeks later (May 17); and (4) nine weeks after the petals fell (June 26). The Ben Davis and York Imperial received only three treatments, the first application given the Winesaps having been omitted from these varieties, for the reason that in Virginia they do not suffer seriously from attacks of scab.

Effect on the Foliage. The weather was unusually cold and wet during April and May and the conditions were favorable for spray injury. Toward the end May, soon after the second spraying of the Ben Davis and Yorks, the leaves of these varieties showed considerable spray injury on all the plots. On the lime-sulfur plots, the leaves of the young shoots were somewhat scorched around the margins, and, as a consequence, some of them were crooked or curled.

A few dead spots appeared on some of the leaves and at that time it looked as though the injury might prove serious. It did not progress any further, however, even after the next application, and the trees soon grew out of it. By mid-summer nearly all evidence of injury had disappeared and during the remainder of the season the foliage was in excellent condition. In respect to injury there was practically no difference between the home-made and the commercial lime-sulfur.

Bordeaux mixture caused more injury than either of the lime-sulfur preparations and this injury increased as the season advanced. The leaves were more or less spotted with circular brown areas and a considerable percentage of them turned yellow and dropped off. The trees sprayed with the lime-sulfur solution went through the season with much better foliage than those sprayed with Bordeaux mixture, demonstrating the superiority of the former fungicide over the latter in this respect.

The apple leaf-spot disease was controlled equally well by both fungicides and about the same was true of cedar rust. The lime-sulfur solution, however, showed some superiority over Bordeaux in controlling cedar rust. This

disease seems to yield more readily to sulfur sprays than to copper sprays.

Effect on the Fruit: There is practically no difference between the lime-sulfur solution and Bordeaux mixture in the control of the diseases that occurred on the fruit. Apple scab, fruit spot, and sooty blotch were controlled equally well by both fungicides. In the case of the Ben Davis, particularly, however, there was a decided difference in the appearance of the fruit sprayed with the two kinds of fungicides. The fruit sprayed with Bordeaux mixture was russeted considerably although very little of it was dwarfed or distorted as often occurs with Bordeaux sprayed fruit. The Winesaps were also russeted but not so much as the Ben Davis, while the York Imperial showed only a slight roughening of the skin.

The fruit of all varieties sprayed with the lime-sulfur solution was almost free from spray russet. The natural russet of the stem end was enlarged slightly and on some specimens this ran over on to the side of the apple, but as a rule, the fruit was smooth, clean, and highly colored. The high color and general appearance of this fruit would place it in a grade higher than that sprayed with Bordeaux which would mean twenty-five cents to fifty cents a barrel in price.

The Control of Apple Scab: In order to determine the comparative efficiency of the sulfur and copper sprays in the control of apple scab, the fruit from four Winesap trees in each plot and six check trees were sorted and the results, in terms of percentage of fruit affected with scab, are given in the following table:

Table I. Lime-sulfur Solution vs. Bordeaux for Apple Scab.

No. of Plot.	Spray Mixture Used.	Per cent. of Scabby Fruit
1	Commercial lime-sulfur solution (1 1-2 to 50) plus 2 lbs. of arsenate of lead,	2.2
2	Home-Boiled lime-sulfur solution (2-4-50) plus 2 lbs. arsenate of lead,	6.1
3	Bordeaux mixture (3-4-50) plus 2 lbs. arsenate of lead.	6.2
4	Check, not sprayed,	99.8

It will be seen from this table that the home-made lime-

sulfur solution and the Bordeaux mixture both held the scab down to about six per cent. of the crop, while practically all of the unsprayed fruit was scabby. The plot sprayed with the commercial solution had the lowest percentage of scabby fruit (2.2 per cent.), but this was probably due to a difference in the plots and not in the fungicides. Plot 1 contained medium sized trees easily sprayed, while the trees in plots 2 and 3 were large and rather difficult to spray with the outfit used.

It would seem from these results and those obtained in previous experiments that the efficiency of the lime-sulfur solution as a remedy for apple scab could no longer be questioned.

The Satisfactory Experience of Orchardists

A large percentage of the Virginia apple orchards were sprayed with the lime-sulfur solution during the past season. We personally examined some of these orchards and have had reports from many of them. In every case, so far as we have been able to ascertain, the results were satisfactory both as to the control of diseases and as to the effect of the spray on fruit and foliage. In the early part of the season there were a number of reports of injury to the young leaves, but in no case did this prove to be serious. In the Yellow Newtown orchards where bitter-rot is a serious factor the lime-sulfur solution was used in the early treatments for scab and leaf-spot, and this was followed by applications of Bordeaux for bitter-rot. This plan was entirely successful, the russeting of the fruit having been avoided and the bitter-rot diseases controlled.

In one orchard, which had been sprayed with the lime-sulfur solution, a small percentage of the fruit had a sunburned appearance. Brown sunken spots from one-half inch to one inch in diameter occurred on the upper or sunny side of the fruit. This is probably due to the action of the sulfur in hot, dry weather. The same injury occurred in our experimental plots at Siloam Springs, Arkansas, during 1909, but it does not promise to be a serious objection to the lime-sulfur sprays. It results mainly from the late sprayings, and applications made during July and August might cause considerable damage especially in hot, dry seasons.

Conclusions

The evidence obtained from various experiments conducted by the U. S. Department of Agriculture, and several of the experiment stations, as well as the work of orchardists, seems to warrant the following conclusions:

Bordeaux mixture often russets the fruit and injures the foliage of many varieties of apples and its use in the early part of the season should, therefore, be avoided as much as possible.

Lime-sulfur solution, diluted so as to contain four pounds of sulfur in each fifty gallons of spray, is a good substitute for Bordeaux mixture in the treatment of apple scab and some other diseases, and will not materially russet the fruit nor injure the foliage. The concentrated solution may be purchased from the factory and diluted at the rate of 1 1-2 gallons to 50 gallons of water, or it may be prepared at home.

This fungicide will control apple scab, fruit spot, leaf-spot and cedar rust, fully as well as Bordeaux mixture, but has not yet proved to be as satisfactory for bitter-rot.

Arsenate of lead may be safely and successfully used in combination with the dilute lime-sulfur solution for the control of the codling moth and other insects.

For the control of apple scab, leaf-spot and the codling moth the following course of treatment is recommended. Use the commercial lime-sulfur solution at the rate of 1 1-2 gallons to 50 gallons of water or the home-boiled solution diluted so as to contain 4 lbs. of sulfur in each 50 gallons of spray. To each 50 gallons of the mixture add 2 lbs. of arsenate of lead for the control of the codling moth.

Spray the trees (1) after the buds push out just before blooming; (2) as soon as the petals fall, beginning when they are about two-thirds off; (3) two to three weeks later; and (4) nine to ten weeks after the petals fall. In some seasons, especially on bad scabbing varieties, it may be necessary to make an additional application a week or ten days after the petals fall in order to secure full protection against this disease.

THURSDAY, MARCH 9, 1911

10.00 A. M.

The morning session of the second day opened with a fine attendance. Pres. Maynard called the meeting to order promptly at 10 o'clock, and asked if the committee on the Secretary's report was ready.

Prof. Sears, Chairman of Committee: I want to say, personally, that I think this is an unusually good report and complete in every detail. Your committee wish to recommend it in every particular. It shows the hard work that has been done by our enthusiastic, wide-awake Secretary. We ought to find ways of giving advantage to our members, and one way that would be advisable and increase the membership would be to give to each member the subscription of some paper. Something to make the members feel that they are getting more for their money than the outsider. A number of Field Meetings have already been arranged for at different places. Now, some of these would be open meetings where the public will be invited; others would be restricted to members, as those entertaining may wish.

Moved and seconded to accept the report.

Pres.: All in favor please manifest it by saying "Aye." It is a vote.

Sec'y Miles, Conn. Pomological Society: I am interested in this report, especially the idea of having the Field Meetings restricted. This idea of restricting to members only is a new idea to me, and I think there might be justice in it. I think, if possible, the advantages of fruit growing should be given to everyone who is interested in it.

We get invitations for Field Meetings during the winter, but when the busy season comes on the invitation is apt to be withdrawn.

The idea of giving a subscription of some paper we have tried in Connecticut, and found it worked out well, although it is somewhat expensive.

Pres.: Recently we have not had so large a number at our Field Meetings as to interfere very much with their usefulness, and it would seem that until we are overcrowded, it would be better to let all come who will.

The first paper this morning is that of Mr. J. H. Putnam, of Litchfield, Conn., ex-president of the Connecticut Pomological Society, on

CULTURE OF SMALL FRUITS

J. H. PUTNAM, Litchfield, Conn.

Ex-President Connecticut Pomological Society

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

I do not feel like one coming into a strange country in coming up here, because as a boy, I used to peddle cabbages all through your beautiful city, and was a member of this Association when I was here.

The subject of fruits is at the present time one of interest everywhere you go. They could not produce one hundred years ago such fruit as we do today, because they did not know how to do it. The farmer must be about everything under the sun if he is going to produce today the finest, high-quality fruits.

It is only by knowing the scientific way of doing it that we can produce them. The farmer must be a scientist, a chemist, and a student of conditions. We do not need more fruit so much as we need better fruit. We have been teaching and stimulating our farmers to grow more and more and more. Now, the manufacturer does not do that. He limits the output to a great extent and makes the people pay the price. It is good fruit that the market wants, and good fruit never goes begging.

What are the requirements for the growing of fruits? Some people think it requires a knack. Now, it does not, but it requires care. You can all remember some old farmhouse where there seem to be no conditions favorable for the growth of plants, but the little old lady who lives there

has them in her windows, waters them carefully, puts papers around them to protect them when the thermometer goes down. You would say, "Why, she can never make plants grow there," but some day the last of winter, you drive by and her windows are filled with blooms, many more than you will see in fine, warm, steam-heated houses where conditions are better, and you say, "Why is it?" I can tell you. It is because this old lady loves her plants. She knows what they want and she does the best she can to supply their needs. It is the sentimental fruit grower that is going to be successful. The fruit grower must get into communion with his plants. Not every man is such a man, but every man who is willing to give attention to details and is willing to work hard and is willing to smile when he finds that the weather has practically spoiled his products, such a man is going to make a success of fruit growing.

It is a pretty hard problem for me to come up here today and tell you people how to grow small fruits. I can not tell you anything new today. I am a great deal like the frog who found himself in a can of milk that a farmer shipped to Chicago. Now, this frog was very much afraid that he would be drowned, but determined to do all in his power to prevent such a disaster. Naturally, he kept jumping around, and before that can of milk reached Chicago, he had churned it and rode into the city on a ball of butter. And so, if we keep agitating enough, and stimulating each other and get each other thinking, perhaps we may be able to learn something. Don't hesitate to ask me questions, and perhaps together we may get some good out of it.

There is today an almost unparalleled interest in growing of fruits. This is especially true of apples and peaches. In some sections the people seem to be going apple crazy, and good fruit land is doubling in value, while it is almost impossible to obtain good nursery stock at any price. At first thought it might appear that this does not materially affect the small fruit grower, but a careful consideration of the subject will, I think, convince us otherwise. Many people, hitherto not fruit growers, are becoming interested, and while they are waiting for returns from their larger fruits, will be likely to turn to small fruits for a revenue while their trees are growing.

I do not, however, fear that there will be any danger of overproduction, because the consuming public are in-

creasing their appetite for good fruit more rapidly than it is being produced, and because many who are planting very heavily now will lose their enthusiasm and drop out, and while there may be at some time temporary surplus of fruit the careful grower who sticks to it need have no fear for the future market.

Bacon wrote, "When ages grow to civility and elegance, men come to build stately sooner than to garden finely as though gardening were the greater excellence." History has proved this to be true. It is only when the development of the sciences gives us the keys to nature's secrets, when the study of the fine arts has created a refined taste, and when the development of manufactories and the extension of commerce has created the wealth to purchase, that the united application of art, science and distribution to agriculture gives us the finished product of the modern skilled fruit grower.

While there may be no especial knack needed for success in fruit growing, one must be prepared to give careful study and attention to details, and the man is really the first requisite to success. He must get in close touch with his trees and plants, he must get into communion with them so he can talk with them, ask them their needs and understand their answers. He can then supply their needs and reap his reward. Not everyone is such a man, but any man who is willing to study and learn and watch and work, get up with the sun and fight insects and diseases, smile when frost destroys or muggy weather rots his promised crop, take his medicine and smack his lips when the bulk of his crop strikes an overloaded market and his returns barely pay the freight bill, such a man is sure of success in fruit growing.

I believe that the time is past when we should spend our strength trying to stimulate the planting of fruit, but should bend every effort to improve the quality of that being grown. The fruit grower who makes quality his watchword will never have to search far for his market no matter how much is planted. The public are becoming more discriminating every year, and better able to pay for the privilege of having the best.

It is a hard problem to stand before this body and try to tell anything new about small fruits. Some of you were growing small fruits before I was born, and for years the

best growers have been telling you of their methods. Like the frog, I can keep on agitating, trusting some good may come from it.

The strawberry is the first fresh fruit of our climate, and none is more welcome. Modern transportation facilities have made its season in our markets a long one, but I notice that no matter how many berries have been shipped in or how cheaply they have sold, the first natives are just as welcome as ever.

The strawberry lends itself to such a variety of soils that every farmer can raise his own berries at least. As a rule, the early varieties do best on light soils and the late varieties do best on the heavy soils.

The soil should be thoroughly prepared. Never use an old sod if it can be avoided. Better cultivate some other crop the first year. We have improved wonderfully in the preparation of the soil for all crops in the last few years, and modern machinery makes this comparatively easy. I do not, however, remember that I ever fitted a piece of land so well that I did not think I could have improved it if I had had unlimited time, teams, men and fertilizers. Proper fitting is of the utmost importance and if we fail here we can never fully make up for it by cultivation.

Spring is the only time for me to plant the strawberry, and the earlier after the land can be properly fitted the better. Of the various modifications of the hill and matted row system, I prefer the narrow matted row for general market and the placed runners for choicest fruit.

Three years ago I planted two plots of strawberries and kept exact account of the cost of each from the time of planting until cultivation ceased. This did not take into account the cost of mulching, the cost of fitting the land, or the manure and fertilizers.

One plot was composed of nine beds of four rows each, rows one foot apart, plants one foot apart in the rows, and beds two feet apart. This system is commonly known as the Kivet system. This made 4,500 feet of land and took 3,600 plants. The cost of planting, cultivating and keeping all runners cut off was \$25.10, or at the rate of \$243 per acre for labor of planting and growing. I charged nothing for the plants, simply the cost of digging, trimming, and planting, which I found was about 15 cents per hundred. If I had purchased the plants at \$3 per thousand it would have

cost \$105 per acre, as it takes 35,000 to plant an acre this way.

The other plot consisted of 1,300 plants placed in rows three feet apart and two feet in the row, thus making a little less than one-fifth of an acre, or about twice the amount in the other plot. One-half of this bed I let make matted rows and the other half I placed the runners, letting five set to each old plant, and cutting off the rest. The cost of this bed was \$22.10, or \$125 per acre, just about one-half of the other. Of course the cost of growing the matted row half was less than the set runners, but I did not keep separate accounts.

As to yields, the yield was nearly the same in proportion on the two plots, that is about 500 quarts on the Kivet bed, and 1,000 quarts on the other bed of twice the size. The matted rows gave me the most berries and the set runners gave me a little the best berries. This trial was not quite fair, as I ran out of plants for the Kivet bed of the varieties I planted in the other, and had to use some varieties that I do not consider as good for that method of growing, but after two years' trial I gave up the close planting as not profitable for me. I now practice the narrow matted row for the field, and the placed runners for the garden.

Whatever method is used, we must limit the number of plants either by narrow rows or by thinning in the wider beds. We must have quality for profit and to get this we must have plants that have room to develop strong and vigorous crowns and root systems.

For planting I prefer a good strong mason's trowel to any other implement I have tried.

Perhaps I am a crank on plants, but I think that the first great mistake in many strawberry beds is made in the plants used. Plants should be grown especially for that purpose, the rows dug clean and only the strongest used. The quicker I can get a plant back into the ground after I get it out the better. I never but once had a really satisfactory yield from shipped plants.

As to varieties, I used to be very free with advice, but am glad to say I have recovered. It all depends upon you, your soil, location, methods of culture, and object. If for the family table or a private trade, you will look for quality first and make the other characteristics subordinate to it; if for local market, size, appearance, quality and productiveness

are the important requisites, while if for shipping, firmness and ability to stand up must be given due consideration.

For myself, I have sifted them down to Brandywine and Glen Mary for market, and Marshall for home use, and every summer when the white tips on the Glen Mary come to table, I declare I will never plant it again. These varieties with the constant trial of new ones give me plenty of range.

I have little faith in pedigree plants. I think that the selection of strong mature individuals will accomplish all that the pedigree will.

The strawberry needs thorough but shallow cultivation. It is a gross feeder and wants plenty of food. I have used chicken manure with splendid results. In most seasons water is one of the cheapest and most valuable stimulants we can give the strawberry, and will pay the largest dividends on the expenditure in increased size and yield. I know of no crop that pays better for irrigation than the strawberry.

Some winter protection is needed, and I use straw horse manure when I can get it, and then finish with oat straw. Care must be taken not to mulch too heavy. I like to select a day after the ground is well frozen, when there is a little rain or snow falling, to put it on, and then it will stay put. Owing to our elevation, our season is later than your season, and nearly two weeks later than the New Haven berry districts, so I cannot, of course, compete with them in early berries. I therefore leave the mulch on just as late as I dare and select late varieties. Care must be taken not to leave it on too long or the plants will be smothered. As a result of our methods and conditions we escape all danger of late frosts, and our first pickings go to market the last of June and continue to about July 20. Our first berries come into competition with the tail-enders of the berry districts, while our tail-enders have no competition. With these conditions it doesn't pay to be the early bird.

The methods of marketing depend on the local condition, and on attention to this point depends most of the profit.

I sort all berries at the table except the last few pickings, which go as they run. I would have the pickers sort, but I cannot get pickers that I can trust with our reputation. If the berries have been properly picked they can be sorted at the table without injury and at very little expense, and if they have not been well picked they should be sorted

anyway. It pays well to sort, at least for my market. I can get from three to five cents more for the firsts and still get market price for the seconds. Last year my berries netted us twelve and a half cents a quart wholesale for the crop. I can never supply the demand for the firsts. People of very moderate means will pay 18 cents for the firsts, when shipped berries are selling for three baskets for a quarter.

The raspberry is a profitable crop, but it is not as sure with us as the strawberry. My conditions are such that my experience may be of little use to you. Our winters are so severe that we do not attempt to carry Cuthbert through without laying down and partly covering. Phoenix has proved quite hardy, but it is not a strong grower, and while it has a long season and is desirable for the home garden, it does not fill the baskets or make the money that we expect from the Cuthbert. The Herbert is the most promising berry we have ever tried, and we are now planting it wholly.

As I have needed a long slender cane to lay down, I have not practiced summer pinching in recent years. I use little stable manure and fertilize with quick-acting chemicals, stopping cultivation early to ripen up the canes as fully as possible.

I plant in rows six feet with plants four feet, and let them make solid rows. I set posts about 25 feet apart and two and a half feet high, and drive a nail in the top. I then stretch a No. 13 wire rather loosely on each and hook it over the nails. I can easily throw this wire down for pruning and hang it up to keep the plants in for cultivating.

I prune twice, taking out the old wood in the fall after fruiting, and removing the weak canes, and in spring I cut out the winterkilling and if that does not thin enough I cut more canes and cut back those left. I have had little trouble from diseases, having an eleven year old plantation now as vigorous as ever.

I have made a complete failure with Black Raspberries for several years, and until I learn how to grow them I will let some one else tell you how.

Currants are one of the most profitable of the small fruits and easily grown. The San Jose scale is cutting out the bushes in the village gardens and many that have had what they wanted themselves and a few for the neighbors are now in the market to buy. Your Massachusetts cities.

furnish markets for much of the fruit from the Hudson River valley, something you should not allow.

Currants like a rather heavy soil with good feeding and cultivation, and will do well in partial shade so they can be used as fillers in young orchards. A patch of good currants helps keep the gang of pickers good natured when the strawberries get small and the raspberries don't fill up the baskets very fast. A little while in the currants puts new life into them.

In pruning, I try to cut out about one third of the old wood, forcing new shoots from the base. I cut out the weakest of these and cut back the new growth about a third.

The Red currant is the only one profitable for market, though I cannot see why the black currant is not more popular. To one who has acquired a taste for black currant jam this is inexplicable.

I am now planting only the Wilder and Perfection currants although others may be as good. The Perfection is well named. While some think it too mild in flavor such varieties will promote the use of currants as a fresh desert fruit and greatly increase their consumption.

I spray the currants and gooseberries as soon as the first worm appears with Bordeaux and arsenate of lead. This takes care of both broods of worms and helps to keep the foliage free from leaf spot.

The gooseberry is also a profitable fruit that is not grown as much as it should be, but while the market is limited it is growing every year. I am growing the Downing and Chatauqua, both of which are of as easy culture as the currants.

I can remember as a boy when the hills of northern Worcester County were covered with famous vineyards, and I believe that there is today opportunity for the profitable cultivation of the grape.

The grape does well in rocky soil with little humus where other fruits do not succeed and it can be used to make profitable use of waste land. Of course we have to give it close attention and spray very thoroughly, but spraying is now looked upon as much an essential to the growing of fruit as is the planting of it, and spraying has lost most of its terrors.

In this tremendous wave of apple enthusiasm that is sweeping over New England let us not forget the other

fruits which are just as well adapted to our soils, and which our proximity to the best markets in the world enables us to put into these markets fresh from the vines and in condition to defeat all competition.

I might easily write a chapter on the profits that have been reported in growing fruit in New England. Some of them are astounding, and I cannot think that there will ever be a time that good fruit produced in New England will not net its producer a fair profit.

Russell H. Conwell, in his famous lecture, "Acres of Diamonds," tells of the man who after a struggle with a refractory collar button invented the lever button, and made a large fortune from the royalties. He had been going around all of his life with his fortune under his chin and couldn't see it. Many of our New England farmers have been in much the same position. They have been looking away from their farms dreaming how they might make their fortunes in some far off land or occupation. Many a Massachusetts farm may be turned into "Acres of Diamonds" if we but put into it all the enthusiasm, all the brains and endeavor of which we are capable and make it produce the best in kind and quality of fruit of which it is capable.

DISCUSSION

Q. Do you pay by the box or by the hour?

Mr. Putnam: By the box.

Q. What do you pay per quart?

Two cents.

Q. Why do you raise the Glen Mary when you have to sort one-half of them for seconds?

It is a big yielder. The Glen Mary is a good producer. I think every year that I will not plant it another year, but I do.

Q. Is the Brandywine a good yielder?

Fine. It also has quite a large hull and when you get a big berry the hull sets the berry off and makes it look handsome. With us it has a fine color but in some parts of Connecticut the hull turns black and is not thought much of. My berries go down to my local market and are sold within three or four hours after they are picked. I think everyone must try out the varieties for himself. I cannot do a

thing with such berries as the Clyde and the Senator Dunlap.

Q. Does not the soil make a difference in the flavor and the productiveness of the fruit?

Yes.

Q. Does not the firmness of the berry have something to do with the fertilizer that is used?

Yes. And the irrigation also. My fertilizers for strawberries are chicken manure and sulphate of potash. I use all that I can get on my strawberries.

The raspberry is a profitable crop for us to raise here in New England. Where I live the winters are so cold that we have to protect the raspberries. I prune them twice a year. I don't do any summer pinching because I want a long withy cane that I can lay down in winter and cover. We do not have as much trouble with raspberries in spite of our conditions as is experienced in some other sections. The Phoenix has done pretty well with me. I have planted the Herbert and it has done well. It is fully as vigorous as any.

Q. Is the Herbert as large as the Cuthbert?

About the same size. My raspberry bed is about 11 years old and is just as good as it ever was. Blackcaps I cannot make grow. They have been a failure with me so I won't tell you anything about them.

The blackberry is a good crop to grow. It will stand lighter soil than the raspberry. I lay them down in winter. I trellis my blackberries and this trellis makes it easy to cultivate and easy to prune.

Q. What varieties of blackberries?

The Snyder.

Q. Did you ever try the Agawam?

Yes.

Q. What is the best?

With me for market, the Snyder, but it is the worst blackberry ever raised. I like the Erie and the Eldorado, but they are soft and not good for market.

We now come to what I consider is one of the best fruits to plant today, the currant. You, here in New England, are buying lots of your currants and gooseberries from the Hudson River Valley. The San Jose scale has cleaned out all of the currant bushes that used to be in the gardens and these people are coming into the market for

currants. It is a splendid berry to grow today. It requires rather heavy soil but I consider it one of our most promising fruits to grow. I plant the Wilder and Perfection for late crops. I cannot get the early bird so I try to be as late as I can. The Perfection is a mild flavored berry and it is a good berry every way, but it is very expensive at the present time, being worth three or four times as much as the Wilder. The Perfection is a bright color. Of course we must spray and I aim to get a new plant about once in three years.

Q. Do you get plenty of new wood in the Perfection currant?

I cannot tell, as it is a new variety.

Q. Do you get one or two year old plants?

Two year.

Q. With proper cultivation you could grow a currant bed almost indefinitely, could you not?

I have a bed that I have had thirteen years and I expect to replant them this year.

Prof. Pickett was unable to be present at the last minute, but his paper is printed in regular order.

STARTING THE APPLE ORCHARD

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Of course you are going to plant an apple orchard. The apple is King of New England farm crops today. Everyone—farmers, doctors, lawyers and politicians, are proposing to mend or increase their incomes by planting apples. Some of these men will be successful, many will be losers. The only absolutely safe class at the present time is made up of the nurserymen who cannot supply stock enough for the great demand. The successful ones are those who will most carefully study the problems of the business, commence right and handle it throughout in a sensible, economical and skilful manner.

The man who proposes to plant an orchard has, among considerations of greater or less importance, to take into account the soil, the location, the site, the climate, the varieties, the preparation of the soil for planting, the method

of planting, arrangement of his trees, character of the stock which he will purchase and time of planting.

Apple Soils

The apple thrives on a great variety of soils. It may be found growing on the lightest of sand and the heaviest of clay, in valleys, on uplands and in river bottoms, but it reaches its maximum of productiveness on well drained, fertile, loamy soils with perhaps a preference for those of limestone formation. Fertility and drainage are, however, the most important features. Stony soils are not objectionable unless they interfere seriously with cultivation.

Location for Apple Orchards

Commercial orchards should be located in sections that have already proven themselves to be satisfactory for the growth of this crop. It is exceedingly desirable that they be on good lines of railway within short and rapid communication with large markets. Such locations reduce very greatly the cost of marketing. Every cent saved on freight rates is clear profit. Every hour saved in time of transportation may mean the prolonged keeping quality of the fruit or saving in ice charges where fruit must be shipped under refrigeration. The nearer an orchard can be located to a railroad station, the better, as the cost of hauling by horse power is proportionally very much greater than the transportation charges from the railroad station to the market. The state of Massachusetts and in fact the New England states in general offer a good choice of locations.

Sites for Apple Orchards

The site for an orchard means the immediate piece of land on which it is located, with the character of its contour, its aspect, and convenience to the house, water supply, etc. The ridges and hills of northern, central and western Massachusetts offer many suitable sites for apple orchards. The ideal site is one at a considerable elevation above the immediately surrounding country, with a gentle slope that insures good air and soil drainage without the danger of soil washing, and where the expense of cultivation, spraying, pruning and harvesting will not be increased by the cost of operating on a steep hillside.

It is an advantage to find a site protected on one side by the hill on which the orchard is planted and on either

flank by other hills or wind breaks of forest or strips of planted trees. Without going into a full discussion of the advantages and disadvantages of wind breaks, it is sufficient to say that in most localities they are a decided advantage. They afford the desired protection to the trees during the winter and prevent breaking of the branches when the trees are loaded with fruit or coated with ice. They prevent severe losses by wind storms when the fruit is approaching maturity and liable to be blown from the trees. Wind breaks should be located on the side of the orchard toward the prevailing winds, or on decided slopes should be located along the top and sides rather than at the lower edge of the plantation. Where locations face the water, the wind breaks must be at the end farthest from the water and along the sides of the orchard. Where the orchard is exposed to bleak winter winds, it may be an advantage to plant several lines of evergreen trees across it. Wind breaks may consist of a considerable variety of trees, but for this region, I recommend Norway spruce and white pine.

Preparation of Land for Planting

Undrained soils must first be ditched or tile-drained. We may assume, however, that with the number of suitable sites for orchards at the disposal of the Massachusetts fruit grower, it will not be necessary to do much artificial draining.

Where conditions will permit of it, one season should be given to preliminary preparation of the land. This will consist in deep and thorough plowing, preferably with the cultivation of corn or potatoes, and the application of a generous supply of stable or commercial fertilizer. The quantity should be sufficient to grow a first-class crop of corn or potatoes and leave some for the future orchard. If the land is not too steep, it should be plowed late in the fall after the crop has been removed and left exposed to the frosts and rain of winter. On steep lands a catch or cover crop of rye may follow the crop removed, thus preventing washing down during the winter. The land should be plowed again in the spring, just as early as it can be worked and put into the best possible planting condition.

For planters who do not wish to grow farm crops in the preliminary preparation of the land and whose soils are in need of cultivation and fertilization, I would recommend

the following plan. Plow the land early the season preceding planting and sow Canada field peas, plowing these under early in July, and following them with a crop of summer vetch or crimson clover. This crop in turn should be turned under late in the fall if the land does not slope steeply, or early in the spring in case there is danger of washing. Such a system will add humus and nitrogen to the soil and put it in excellent shape for the growing of apple trees.

It is not impossible to start an apple orchard successfully in rough land that has not been previously tilled, but the orchardist who attempts it must plant with exceeding care and fertilize and mulch his trees freely.

Time for Planting

I have but one recommendation which I can consistently make in this connection, plant at the earliest moment in the spring that the ground can be properly prepared and the trees set. We order our trees delivered by April first and plant them as soon afterwards as possible. Had we had our trees earlier in 1910, we should have planted in March, but ordinarily the season is not sufficiently far advanced to permit such early planting. By planting early the trees become established and make a full season's growth the first year they are set. If planted after May first, they frequently fail to become established until the growing season has passed and thus make little new wood the first season. Many instances of successful fall planting in New England are on record, but in our experiments at the New Hampshire Agricultural Experiment Station, it has been unsuccessful.

Varieties for Planting

Of all the fruits that garnish the granite hills of New England and gladden its fertile valleys there is none to compare with the apple in popularity, usefulness and variety. Saith the Preacher in the book of Ecclesiastes, "To every thing there is a season and a time to every purpose under the heaven." And of the apple we may say there is an apple for every season, an apple for every palate, an apple to please every eye and satisfy every fancy for form and color, an apple for the epicure and an apple for the labourer's lunch, an apple for the wealthy and an apple for

the poor, an apple for the merchant and an apple for the small boy to steal from the neighbor's tree. Folk-lore, mythology and poetry find frequent themes in the apple. An apple is declared to have been concerned in our original parents' downfall, though we have reason to believe that it was basely slandered. Even at the worst we should have to admit that the temptation must have been a great one. The apple has, however, outlived its first reputation and we find the wisest of men in trying to describe truth and tactfulness saying that, "Words fitly spoken are like apples of gold in pictures of silver." One of the nine labors considered worthy of the labors of Hercules consisted in the gathering of the golden apples of the garden of Hesperides. A labor worthy of the farmers of this state of Massachusetts is the production of the finest and fairest apples for the home and for the market, to supply the needs of the people of the east with a plentiful quantity of one of the most wholesome and satisfying products of the husbandman.

There have been described in this country more than three thousand varieties of apples, enough one might say to fit all climates, soils, purposes and tastes. I might trespass on James Whitcomb Riley for words to describe the number and variety of our favorite fruit:

"Apples crimson, yellow, red,
 Striped, pink, and mottled, too.
 From golden skies to tintings drowned
 In dusky drops of dew,
 I praise you all, wherever found,
 And love you thru and thru:—
 Oh, Apples on the Trees,
 With your breath upon the breeze,
 There's nothing all the world around
 Half so good as you!"

To a connoisseur this immense number of varieties offers a great delight for he may choose many sorts, each good in its own particular way. To the amateur with a small garden they are his despair. To the commercial orchardist they are a temptation and sometimes a snare for he has difficulty in limiting the number which he should plant.

To the uninitiated the differences between varieties is often so slight as to pass unnoticed but to the close observer many of these differences are of the utmost practical im-

portance. One can but become well acquainted with varieties of apples by intimate association with them. The man who works in a nursery comes to know the trees with the long crooked roots that dig hard, the varieties that bud easily, that must be rootgrafted, that are most subject to nursery diseases and pests. The tree agent knows the straight handsome growing sorts that please the customer as young trees whether they produce good fruit or not. The grower knows the trees by the character of their growth, their hardiness and productiveness. The buyer and shipper get acquainted with their shipping qualities, firmness, texture of skin, bruising, etc. The storage man learns the differences in keeping qualities and the consumer gradually but surely learns that the bright red skin, of a Ben Davis or a Gano may cover an interior of cork or mush while the dull homely skin of a Domine may hide a flesh of crisp and juicy lusciousness. In the days which are rapidly going, "Man looketh on the outward appearance of the apple," but tomorrow he will try its heart.

Success in commercial fruit growing depends much upon the selection of the proper varieties. Varieties must be so well adapted to their environment that they will be regularly productive and the fruit must be desirable in the market. The planter must choose varieties to fit his conditions. He will ascertain the more suitable kinds by consulting his neighbors, the state experiment stations and the standard books and bulletins and his markets. New varieties should be tried sparingly and standard sorts relied upon.

The varieties which we are recommending for the southern part of New Hampshire and which should be satisfactory under your conditions are, for summer kinds, Yellow Transparent, Duchess and Red Astrachan. For early autumn, William's Favorite; for standard autumn, Gravenstein, Wealthy and McIntosh; and for winter, Baldwin, Rhode Island Greening and Hubbardston. In a very limited way we are advising growers to try out the Stayman, Delicious and Esopus Spitzenburg.

Choosing Nursery Stock

Orders for trees and plants for spring setting should be placed early. Many growers prefer to order in the fall or early winter specifying delivery by a certain date in the

spring. This plan has many advantages to commend it. Nurserymen are not likely to be sold out of particular varieties. His trees arrive on time. His selection of varieties, being unhurried, will be made with great discrimination. Late orders are very likely to be unsatisfactory, sometimes to both the nurserymen and the buyers.

Ideal trees and plants cannot always be obtained. In fact they are the exception instead of the rule. It is not difficult, however, to obtain good satisfactory stock if the purchaser insists on having it and pays the price that good stock should bring. The original cost of the tree or plant is the smallest item in the expense of bringing it to fruitage. How often we see farmers, gardeners and fruit growers nursing along a bunch of unthrifty trees that were bought because they were cheap, for two or three seasons, spending fifty cents a tree each year on fertilizers, cultivation, spraying, digging out borers, washing, etc., and then finding at the end of that time that they were no better off than they would have been at the end of the first season if they had planted good stock! The old adage, "Poor trees are dear at any price," is well worth remembering when purchasing nursery stock.

Good nursery stock should be free from plant diseases. The diseases most commonly found are crown gall and canker on apple trees, crown gall and pear blight on pears, crown gall and anthrocnose (rust) on raspberries and blackberries, and leaf spot (rust) on the strawberry. Crown gall may be recognized by the large swelling immediately between the root and the stem or by the appearance of large knots on the roots. Canker is difficult to detect in nursery stock but if the trees show any signs of winter injury in the nursery, canker will almost certainly appear during the first season. Pear blight may be detected by a blackened appearance of the twigs extending backward from their tips and stopping with a rather well defined line at some distance from their extremities. Anthrocnose causes canker (sometimes called rust) on the stems of the brambles. Strawberry leaf spot (rust) is seldom found on trimmed plants.

Nursery stock should also be free from noxious insects, including San Jose scale, Oyster Shell scale, Brown tail moth nests, Gipsy moth eggs, borers and woolly aphids. The best nurseries send out their goods under inspection

permits or certificates which assure reasonable immunity from such pests, but as it is impossible for an inspector to examine every tree, the buyer should keep a sharp look-out on his own account and reject infested stock.

All plants should be well grown, thrifty, and be well rooted for their kinds. Trees should be typical of their variety whether it be naturally a straight vigorous grower, a crooked grower, or a weak grower. Farmers often buy trees from agents because they look like nice trees and pay no attention to the variety. In planting commercial orchards, only standard sorts should be chosen. Up-to-date nurseries seldom make mistakes of substitution for standard varieties. Direct dealing with the nursery is preferable to ordering through agents, especially where large numbers of trees are to be used.

The ages of trees wanted should be clearly specified. In apples, pears, plums, and cherries, two year old stock will be found satisfactory. Peaches are planted at one year old and there is a growing demand for one year old apple trees. Generally speaking the specialist should use one year old stock and the farmer who grows fruit as a side line should use two year old trees. I strongly advise against using any trees older than two years.

Finally, the planter should insist on an early delivery of the trees, April 1st being about right for the southern half of New Hampshire. A tree planted as soon as the frost is out of the ground in April (or March if the opportunity should present itself) will become established and ready for a full season's growth by the time growth should normally commence. A late planted tree will require so long to start root action and establish itself in the ground that it will lose a season's growth.

Arrangement of Trees in the Orchard

The arrangement will depend largely on the system of management which the orchardist proposes to follow. The specialist who proposed to make his trees yield the largest possible income from the very earliest period will use fillers and arrange his trees to permit the cutting out of his fillers at the proper time and leave his orchard in desirable arrangement for later operations. He will plant on a rectangular system with trees in the center of each rectangle

and perhaps also between the trees on the sides of the rectangle.

The farmer who wishes to grow crops between his trees and at the same time plant the most trees on a given area of land will not use fillers, but will plant his trees on the hexagonal plan, thus getting the maximum number per acre, about fifteen per cent. more than as if he planted in squares.

Where time and space are of little consequence, the most convenient arrangement is that of squares.

The distance apart for standard trees is thirty-six feet, but where fillers are used, this should be increased to forty feet.

Locating the Trees

Many devices have been employed for the location of trees. For the sake of appearance and for convenience in all future operations in the orchard, the trees should be located in straight lines in two directions. On small plantations it will be most convenient to place a stake where each tree is to stand, lining them each way, with a row of stakes placed all the way around the piece to be planted or placed where they may be seen from any part of the field. This may necessitate dividing the field into a number of sections, but this is not likely to happen in a small orchard. When the hole is dug for the tree, the stake of course is moved and its re-location determined by means of a planting board.

In large plantations the locations of the trees may be determined by setting a row of stakes around the sides of the field to be planted, together with two rows of stakes running cross-wise to each other through the middle of the field. From any point at which a tree is to be located, it will be possible to obtain lines in at least two directions, thus locating it correctly.

Where trees are planted on the hexagonal plan, a row of stakes is set along one side of the field properly spaced for the trees. Two wires made the exact length of the distance between the trees and each provided with rings at either end are used to determine the location of the next line of trees. One end of each wire is slipped over the stake or held against the first row of stakes or trees. The other ends are brought together so as to form the sides of an equi-

lateral triangle at the apex of which the next tree will be set.

Planting the Trees

The hole should be dug two or three times wider than the spread of the roots and somewhat deeper. The sub-soil and the top soil should be kept separate. The tree with its roots spread out in as natural a manner as possible should then be placed in the hole for lining up or properly locating with the planting board. The top soil should then be placed about the roots and packed in place very firmly, only a little at a time being added. When the tree is finally in place, it should be set as firmly as a fence post. The last soil placed about the tree should be left loose so as to form a mulch.

The Newly Set Trees

One year old trees are cut back to a height of eighteen to twenty-four inches, depending upon the taste and nerve of the planter. Two year old trees are headed in so as to leave but three or four buds on each branch remaining. Undesirable or poorly placed branches are removed. The broken ends of roots should be cut back to clean, unbruised wood and exceptionally long roots should be cut back to correspond with the remaining part of the root system.

Fertilizing the Young Trees

No other fertilizer appears to produce so rapid growth in young trees as stable manure. This is spread on in the form of a dressing, covering a circle three or four feet across. As a commercial fertilizer we find that one ounce of nitrate of soda, one ounce of sulphate of potash and two ounces of basic slag meal or Thomas' phosphate per square yard makes an excellent fertilizer for young trees. This is put on just as the leaves begin to unfold and is hoed or cultivated in at that time.

Following Mr. Putnam's discussion Pres. Maynard introduced Dr. Wm. P. Brooks, Director of our Experiment Station, who spoke on

“RESULTS OF ORCHARD FERTILIZING

DR. WM. P. BROOKS

Director M. A. C. Experiment Station.

We have been carrying on at Amherst some of the longest continued experiments in manuring apple orchards that have ever been carried on anywhere, I believe, and I think we may learn some very valuable lessons from these experiments; what seem to me to be some of the most valuable lessons, I am trying to point out. But, it is important first that I give you an idea of what the experiments are.

The orchard is located on a hillside which is crowned by a chestnut grove. The soil lies fairly uniform throughout the entire length of the orchard. The soil is one of the commonest types of soil selected for the use of orchards in this state. It is a deposit of material brought there during the ice age. A few boulders strewn around and some stones. It contains a moderate amount of clay and retains moisture quite well. It lies on the western slope of the hill. I don't think there can be any question but that the rains sink into the soil. They do not wash off down the hill but sink into and work off down the hill and have a tendency to ooze out on the hillside. You will recognize that I have described a type of soil that is very common throughout the state. You may question if there is not a wash from the top of the hill. A roadway was made to obviate this difficulty. This roadway has a ditch on the upper side so there is never any wash from the top of the hill over the orchard.

In 1889 the orchard was laid out and it was divided into five equal parts. Originally it included pear and plum trees and was interplanted with peaches, but none of these trees did well and after a short time were taken out and only the apple trees remain.

The system of fertilization began in 1889, a year before the trees were set, they being put out in the spring of 1890. The whole area was divided into five equal parts and the portion remaining in apples is about one-third of an acre in each plot, one and two-thirds acres in the orchard.

I may as well tell you how each plot has been manured, and each plot has been manured in the same way and at the same time. Plot No. 1 has received barn yard manure at the rate of 20,000 lbs. or 3 1-3 cords per acre; No. 2, com-

mon wood ashes at the rate of 1 ton per acre; No. 3, in the middle has not had anything applied to it from the start to finish. No. 4, each year has had ground bone meal at the rate of 600 pounds and muriate of potash, 200 pounds; No. 5, bone meal at the same rate and low grade sulphate of potash.

The trees were ordinary nursery stock, two years old when set. In each plot there are four varieties: Gravensteins, Baldwins, Roxbury Russets and R. I. Greenings.

The differences in growth and in the appearance of the trees has been marked. One of the first points is the average circumference of the trees. On the plot to which nothing has been applied, the average circumference is 27.9 in.; where barnyard manure, 38 1-4 in.; wood ashes, 33 1-4 in.; bone and muriate of potash, 32 1-4 in.; bone and low grade sulphate of potash, 37 in. The smallest circumference with no fertilizing, the largest with the barnyard manure..

The question naturally arises, whether the quality of the soil was similar to begin with, and to help you to judge of that point, I can only say that it appeared to be uniform as shown by crops raised there previously. The plots are about square and I should have said that if there was any natural difference, it seemed probable that the soil was a little richer at that end of the orchard to which the manure has been applied. This is a little lower than the other end of the orchard. The surface is a little higher at the bone and sulphate of potash end, still I would expect larger crops of hay at the manure end but it is possible that the soil at the bone and sulphate of potash end may suit the trees better. I don't think there was any essential difference in the natural qualities of the soil.

Quite as important as the size of the trees is the question of how much fruit the trees have produced for the fruit is what we are after. The total number of barrels of fruit per acre from the time they first began to bear down to 1909 is as follows: Where there was no manure. the total yield is at the rate of 88 barrels per acre; wood ashes, 286 barrels per acre; bone and muriate of potash, 322 barrels per acre; bone and sulphate of potash, 488 barrels per acre; barnyard manure, 556 barrels per acre. The bone and sulphate is not so very far behind the barnyard manure.

We have found considerable individual differences be-

tween the trees. This is a matter of common experience. If I were to plan an experiment of that sort and start it from the beginning, I should wish to use similar stock from the same lot and take the scions all off the same tree. That was not done in this case.

You will be interested with the relative results with different varieties. There were four varieties and we find that these different varieties react somewhat differently to the different manuring, the yields being as follows:

Gravensteins, with no manure, 89 barrels; with wood ashes, 170 barrels; with bone and sulphate of potash, 267 barrels; with bone and muriate of potash, 319 barrels; with barnyard manure, 325 barrels.

I think the explanation of the bone sulphate plot not giving as great a yield is that the chestnut grove towered above them and thus injured the apple trees. The chestnuts were at first cut back, but in the meantime they have been growing and so now it has been cut back some four rods further, and think that in some years the Gravensteins have been injured by these chestnuts but in some years their yield on this plot has been equal to that on the bone and muriate plot.

The yields of the Baldwins according to fertilizing have been:

No manure, 50 barrels; bone and muriate, 175 barrels; wood ashes, 285 barrels; barnyard manure, 630; bone and sulphate of potash, 819. I want to call your particular attention in this contest to the results of the bone and muriate and the bone and sulphate of potash. The amount of actual potash is the same in each and the amount of bone is the same but the chemical combination is different.

It seemed to me that the different varieties show characteristic differences in respect to the returns they made in regard to the fertilizer applied, and I found in that respect that the russets were the varieties that apparently had the power to get out and hustle for themselves. With no fertilizer applied the yield of russets was 114 barrels, with bone and low grade sulphate, 566 barrels.

The yield of the Greenings was: No manure, 97 barrels; bone and muriate, 328 barrels; bone and sulphate, 341 barrels; wood ashes, 347 barrels and barnyard manure, 730 barrels.

The quality of the fruit has shown very characteristic

differences under the different treatments. In the earlier years of the experiment, the fruit ranked in size in this order; Largest on the bone and low grade sulphate of potash; next in size on the bone and muriate; next on barnyard manure; next on wood ashes and the smallest where there was no fertilizing. At the present time the rank is a little different the manure giving at the present the largest fruit.

As to the color and appearance of the fruit, that has taken the highest rank that was raised with the wood ashes. ---next the bone and sulphate of potash; next the bone and muriate of potash; next the barnyard manure, and last where there was none.

Some experiments in keeping qualities have been made, not every year however, and from this point of view, the fruit which took the high rating was from the bone sulphate and bone muriate plots; next the manure and next the wood ashes. I presume some of you will be surprised at the rating of the fruit raised with the wood ashes, but I believe it to be due to the fact that the fruit on the trees with the wood ashes always ripens considerably earlier than on the other plots, but we have followed the plan of taking off the apples at about the same time. Of course, if you take fruit and put it into ordinary cellar storage, that which is over-ripe cannot be expected to keep as long as that which is not so ripe. I don't know that it will prove to be true that fruit raised with wood ashes will always ripen earlier, but I think this may be true.

The fruit produced where no fertilizers were used did not have good color or finish, and would not sell, as it was unattractive.

We have made some efforts to determine whether there was a difference in the quality in the fruit as shown by the appearance, of sugar and acid, in the fruit taken from the different plots, but we have found far less differences than I had supposed we might find. The difference in quality was a difference in color and appearance and finish, not a real difference in flavor depending upon the amount of sugar and acid.

The soil of this orchard was kept under cultivation for about 5 years and then seeded down, but for a number of years circles about the trees were kept free from grass. After about 1896, however, the grass was allowed to spread

in. For a number of years we cut the grass and made it into hay and carried it off. We took two crops per year. In 1897 the second crop of hay was cut with the machine and left on the ground and since 1897 that plan has been followed.

The question of cost, relative profit, etc., always comes in when you consider anything of this sort. A ton of wood ashes varied in price from \$10 to \$12 per ton. Bone meal is sold from \$22 to \$26 per ton. Muriate of potash is about \$40 a ton. Low grade sulphate is sold for about \$25 or \$26 per ton. You will find that the bone and potash will have cost about \$12 per acre; wood ashes, \$10 and \$12. For the manure you can reckon 10 tons per acre, about 4 cords. If you bought that it would cost more than the other fertilizers, probably not less than \$20 per acre against \$10 or \$12 for the fertilizers, but I conclude that the use of so much manure continually on the orchard causes the trees to make an over-rank growth and the fruit has a poorer finish. As an experiment I shall use it. The fertilizing material, \$12 per acre annually for 20 years, you must consider over against the yield of fruit. \$240 worth of fertilizer has been applied to an acre of Baldwins and we have obtained 819 barrels of fruit and the cost of the fertilizer has been close to 30 cents per barrel. But I told you that we cut the grass and made it into hay and carried it off and unfortunately in the early years the record of the hay was not kept. I have had it kept for a number of years. It is fair to assume that for the period of experiment under this management, the hay has gone a long way toward paying the cost of fertilizing. The fertilizer cost of a barrel of Baldwins has not often been more than 10 or 15 cents.

I want to speak of the results obtained with Baldwins from using bone and muriate of potash and bone and sulphate of potash. On the bone and sulphate plot, 819 barrels; on the bone and muriate plot, 175 barrels. We don't yet know whether the sulphate of potash or the muriate of potash is the best. There is first the difference of the acid in combination, sulphuric and muriatic and then the low grade sulphate of potash contains magnesium and the muriate of potash does not and so we don't know just what causes the difference. I am inclined to think that the high grade would prove superior to the muriate, but I do not feel at all certain that the magnesia is not of value. Wood ashes

would supply considerable magnesia. Magnesia increases the fertility. I mean to find out, if possible, what is the difference between muriate of potash and the high grade, sulphate of potash, and we are now carrying on experiments which will in time show a light on the three points: (1) As to whether the difference in results is due to natural differences in the soil, (2) whether it is due to the magnesia, or (3) due to the different acids.

In conclusion, you will want to know, is this system to be recommended, is it the best? That does not necessarily follow. I have told you the results of an experiment that was planned by someone else, but in view of results that have been obtained by myself and by others by the use of basic slag meal, I am inclined to highly recommend the use of basic slag meal in the place of bone meal. It is not so expensive. I recommend the slag meal for several considerations. Not only because it is less expensive but because it contains a lot of lime, not much free lime, not enough to sweeten up sour soil, but lime is highly important for apples, so if I were to start an orchard and there was any question about the soil being sour, I should lime it, but because it is limed it does not necessarily keep sweet and here slag would help out. Acid phosphate would not do it, bone meal would not do it, but slag would do it. This is worth while for other crops, too. Slag furnishes you with a lot of magnesia and it also contains a large amount of iron and iron is largely associated with better color both of foliage and fruit. Slag has the advantages of lower cost, a supply of lime, a supply of iron, a supply of magnesia, but the slag will have one disadvantage, it does not contain any nitrogen and on some soils some nitrogen is desirable. Fruit may not attain sufficient size without some nitrogen. I want to call your attention to this point. Where you use lime and potash in abundance, having first limed the land and keeping it sweet, you have the essentials that are necessary for the production of legumes; lime and put on potash and clover will grow in abundance and I think you will not have to buy nitrogen except in some cases where the soil is very light. In this particular orchard there seems to be an abundance of nitrogen and clovers thrive in an astonishing manner; even last spring when the season was dry. I found great mats of white clover so thick that you could not get your foot through them. I know that the combina-

tion of slag and potash will give you just the same results with clover and I want to strongly commend to your favorable consideration a combination of slag and the low grade sulphate of potash in manuring of orchards. I believe it will give you as good results as in any other way.

You may want to know about apples in sod as compared with those under cultivation. This I do not know about as my experiment has been with an orchard in sod. I believe it is primarily a question as to whether the soil can supply both the trees and the sod with the moisture it needs. In this case I believe it does, but these conditions are not uniformly met with and I don't think it would be possible in the lighter soils. It is an easy enough matter to supply both with food. That you can do and you can raise both hay and fruit in the same orchard. There are many finding a great deal of difference in the color of the fruit and it seems to be in favor of the sod system.

DISCUSSION

Q. How much slag would you use?

That would vary with the soil.

Mr. Race. This talk has been worth all that it cost me to come here. I have an orchard that was set in 1879. It is a well-kept and well preserved orchard. It is a good one. The matter of fertilizing has been a question with me. I am in favor of cultivation for some orchards no matter what the age is, so 2 years ago I put on a dressing of muriate of potash, sowed it broadcast, let it get into the soil as it could, then put on barnyard manure, about the amount that you spoke of. I put it on in piles in the winter and in the spring I spread it out but I did not like to leave it in that condition so I put on muriate of potash and harrowed it just as soon as the frost was out, then sowed down to clover and the results have been that I had the only good crop of apples in South Berkshire this last fall. Now, what would you think of that treatment?

I would advise, I think, that you would better use sulphate rather than muriate of potash and use slag.

Would say that everything that we have put on this orchard (experiment) we have spread on uniformly over the ground. I think clean circles should be left around the trunks with no manure right near. This does moer harm than good for it makes homes for insects and mice. We

keep the circles around the roots of the trees for the feeding roots are not near the trunks.

Q. Is the marl that is put on the market now, desirable to use?

It may be. The relative value of limes depends mostly on the percentage of calcium oxide that it contains for this is what you are after, not carbonic acid. Marl is carbonate of lime, a combination of lime and carbonic acid and sometimes contains insoluble matter.

We propose to try to help you in relation to intelligently buying lime. We have a law before the legislature now that will require the dealer to guarantee the per cent. of actual calcium oxide, also whether it is combined as carbonate or not, also telling if the lime is in part magnesia. He shall state the percentage of magnesium oxide.

This raises a question because certain companies are interested in selling lime which contains about 2-3 as much magnesia as lime and they claim that the magnesia is just as good as lime. That is a point upon which there is some difference of opinion. If not much magnesia, it probably is just as good, but where the percentage of magnesia approaches that of lime or is equal to it, it is not certain that it is equally valuable.

Q. We want lime for spraying purposes and we want to know where it can be purchased.

It is a subject that I have not thoroughly investigated. You want the pure lime and you want lime that has no magnesia. I think that if you go to a reliable dealer you will have no difficulty in finding it.

Q. How much basic slag would you recommend for an old orchard that has been kept in grass and that you wish to keep in grass?

Well, three years ago I took the deed for a farm that had an old orchard on it. I was told that the trees did not produce anything. 6000 pounds of slag were placed on the sod, 1000 lbs. to an acre, and the first two years I so stimulated the trees that they made an annual growth of 3 feet or more. I wanted to spray them with soluble oil, but they retained the leaves until winter set in and prevented.

Q. Can you cultivate that orchard?

Not at first but I did this last year. The apples have become enormous in size. I have overcome it.

Q. Don't you think the size of those apples came from pruning as well as from other causes?

The russets did not get much pruning. Still it may have helped.

Q. You have not said anything about the pruning of that orchard.

It was not a part of the subject. We have had such intelligence as the College offers in the shaping of the trees.

Q. How many trees do you grow in that experiment orchard?

I think those trees are 35 feet apart. I am not sure just how many there are.

The President then announced the following committee to make arrangements for exhibition at the New England Fruit Show: Prof. Sears, M. A. C.; John W. Clark, North Hadley; John E. Thayer, Lancaster; E. Mortimer, Grafton; F. Howard Brown, Marlboro.

Motion was made that a vote of thanks be extended to the Worcester Horticultural Society for their hospitality, and also to those speakers who have been so instrumental in making the meeting a success; also for the excellent work done by the officers for this meeting. Voted.

Mr. Clark: I would like to say in regard to the Fruit Show next fall, we shall need fruit for the exhibition, and we want the best fruit you have. It should be gathered when it is well turned and stored in a proper place, and arrangements will be made for any fruit than anyone wishes to exhibit, so please bear this in mind and send us your fruit and we will put it all together and put it in the show.

Meeting then adjourned. The afternoon session was under the auspices of the Worcester County Horticultural Society.

MASSACHUSETTS FRUIT GROWERS ASSOCIATION

ORGANIZED • MARCH • 21 • 1895



J. K. SHAW

REPORT OF THE
18th Annual Meeting
HELD IN
HORTICULTURAL HALL
WORCESTER
1912

OFFICERS OF THE Massachusetts Fruit Growers' Association, 1912.

H. L. FROST, President,	Arlington
F. C. SEARS, Vice-President	Amherst
F. HOWARD BROWN, Sec-Treas	Marlboro
H. WARD MOORE, Auditor,	Worcester

DIRECTORS

ESSEX COUNTY: E. A. Emerson, Haverhill; John Barker, North Andover.

SUFFOLK COUNTY: A. Warren Patch, Boston.

NORFOLK COUNTY: George N. Smith, Wellesley; Chas. A. Wilson, Medway.

MIDDLESEX COUNTY: C. L. Blake, Ashby; E. Garland, Groton; E. R. Farrar, South Lincoln; Wilfrid Wheeler, Concord; R. A. Hittinger.

HAMPSHIRE COUNTY: John W. Clark, North Hadley; J. T. Geer, Three Rivers, A. J. Norman, Amherst.

HAMPDEN COUNTY: L. W. Rice, Wilbraham.

BERKSHIRE COUNTY: R. H. Race, North Egremont.

FRANKLIN COUNTY: E. F. Copeland, Colrain; Wm. Davenport, Colrain; Charles A. Smith, Ashfield.

WORCESTER COUNTY: S. J. Emerson, Lunenburg; W. D. Ross, Worcester; H. R. Kinney, Worcester; Edmund Mortimer, Grafton, H. A. Cook, Shrewsbury.

OUT OF STATE: J. H. Putnam, Litchfield, Conn.

EIGHTEENTH ANNUAL MEETING

—: OF THE :—

Massachusetts Fruit Growers' Association

March 13th and 14th, 1912

Horticultural Hall, 18 Front Street, Worcester, Mass.

In spite of the down pour during the night and its resulting washouts and the continuous rain there was even a larger audience than last year when the meeting was called to order at 10.15 a. m., President Samuel T. Maynard, presiding.

The President: Ladies and Gentlemen: At the opening of this, the 18th Annual Meeting of the Massachusetts Fruit Growers' Association, we have with us the Mayor of the City of Worcester, and he will give you a few words of welcome. Mayor O'Connell of Worcester. (Applause).

Remarks of Mayor David O'Connell of Worcester

Mr. President and Members of the Massachusetts Fruit Growers' Association: It is indeed a great honor to the City of Worcester and a great honor to me personally to have the privilege of greeting you today. Worcester feels honored at your assembling here, and I extend to you on behalf of all the people of this good city a hearty welcome. I trust that you will enjoy yourselves and enjoy your visit most thoroughly and that your deliberations will be such as will insure to the benefit of all. I only wish that we could control the god of the weather so that we might have brighter skies with this day, but that, of course, is impossible, but on all other things we will do what we possibly can to make your visit here a pleasant one, a pros-

perous one and of advantage not only to yourselves, but to all the people of this city and the people of the entire commonwealth.

If during the week you can find occasion or a little time within the next few days to visit City Hall I should be pleased to extend you further courtesies, if possible. We would like to show you the building and make your visit here as pleasant and as agreeable as we possibly can.

We all realize the good work that you are doing for the people, that you are doing for the Commonwealth. A gathering together of this kind is of great benefit not only to yourselves individually, but to the entire community. The exchange of ideas, co-operation one with the other, tend not only to good fellowship, but tend to better citizenship and tend to the uplifting of the people in whom you and I and all of us are interested. I did not come here to make a speech to you gentlemen, because I could not intelligently discuss with you the matters of the various subjects that will be under discussion during the next two days; but I give to you simply and solely the greeting of the city of Worcester and tell you how glad we are to have you with us. You manifest the true spirit; you manifest the old New England system, which is the best system the sun ever shone upon; you manifest a system that is for the good of all, a patriotic system; and I have no doubt that at great expense and great inconvenience to yourselves, you have come here today for bettering the cause which you love so well and which you are all so anxious should be successful. Now, nothing is better for a system of this kind than unity of action. The raising of fruit is one of the greatest, the most laudable objects I can think of, and I trust that some time in the near future we may have here in the heart of the Commonwealth a municipal market where your fruit can be exhibited, where the curb man can be eliminated and where the people can deal with you face to face, examine your goods and buy them at a reduced cost, which would have a tendency to reduce the high cost

of living that exists in this country and in this community at the present time. There is a move under way looking to that, and there is a bill before the Massachusetts Legislature, which has passed, I think, the House of Representatives and also the Massachusetts Senate and is now in the hands of the Governor, which gives to the city of Worcester, on a petition that was filed at the beginning of the session, the right to purchase or hire land or erect such buildings as may be suitable or adaptable for the purpose of carrying out the wishes of the great mass of the people; and I think the great mass of the people in Massachusetts will do all they can—and I certainly will do all I can, if that bill passes, as it undoubtedly will, and be signed by the Governor in a few days—will do all we can to have something done here towards the establishment of a municipal market.

It is better for the producer and it will make it all the better for the consumer, because the third man is entirely eliminated. Of course, this may strike home with some severity, because it will strike that third man, but that should not be considered in the tendency that now exists that the great mass of the people should be considered first. The laborer, the producer, is worthy of his hire and it is for the consumer to buy in such places as he can buy with the greatest advantage to himself and the greatest advantage to his family. That order, as I said before, has passed the Legislature, and I don't know but that when you come here next year, as we want you to—you must come to Worcester; we like to have you with us, because it is an honor to the City of Worcester to have a gathering of this kind here—when you come again next year to visit us I trust that we will have made some move in Worcester towards the establishment of a municipal market. Those markets are established in various cities in the West and are conducted with great success, not only for the consumer but for the producer and there are various ones in the southern cities, Richmond, Baltimore, Philadelphia, New Orleans and many other cities; and if it was suggested in any of those cities that the municipal

market should be discontinued there would almost be a riot. The people could not get along without them.

The only one objection that is made to them is that the ladies who lives in this Commonwealth wouldn't go to the market to purchase that which might be necessary for their families. I don't believe it has come to this that the women of Massachusetts have so far forgotten themselves, so far forgotten the interest they have in the community, so far forgotten the interest they have in the people generally, that they wouldn't go to a market with a little basket on their arm or a hand bag, and purchase things for their own families. That was one of the simple arguments used against the municipal market at a hearing held some time ago, that the good ladies wouldn't go to the market and purchase from the producers so that they might take it home to their immediate families. One man who made a speech said he wouldn't like to see his wife floating around with a large vegetable basket buying fruit and vegetables. If there are such men in this community let them pay the high prices, but the poor people, the common people, should not. (Applause).

Now, my friends, there is nothing further I can say to you. I fully appreciate the true spirit which guided you here; I fully appreciate the manner in which you look at these things, the manner in which you are building up and rebuilding for the best interests of this community. I want to thank you, Mr. President, for your cordial invitation to be present, and if I can do anything for you, sir, or for the members of your organization while in Worcester, please call on me in my office in the City Hall and I invite you all cordially to come to the City Hall some time and I will see to it that you have a chance to make an inspection of that beautiful building that we all admire and love so well. (Applause).

The President. Mr. Mayor, I want to thank you heartily for the kind words which you have spoken and for

the interest you have shown in the cause of agriculture and horticulture. We will try and carry out the ideas and suggestions that you have made to us.

Now, we have a very full, large program for today, and I shall take but a very few moments of your time. The details of the year's work you will find in the secretary's report, therefore I shall simply deal with the other cases.

ADDRESS OF THE PRESIDENT

Ladies and Gentlemen and Fellow Fruit Growers:

We have a very large and varied program to offer you at this our 18th annual meeting and I will not detain you long with my address as the details of the years work will be found in the report of the Secretary and Treasurer.

The past year has been one of the most prosperous for our association financially and in the number of new members. For this condition we are indebted largely to our energetic and efficient Secretary. More field meetings and institutes have been held than ever before and a greater interest manifested in the growth of fruits of all kinds, but especially that of the apple.

We have upon our program today many specialists who will answer our questions and give the latest facts in relation to the many problems that confront us.

There are problems to which we should give especial attention, upon the solving of which depends largely the success of eastern fruit growing. Some of these are given in our question list but may be mentioned here.

1. The first covering the whole field is How to grow fruit.
2. When and with what shall we spray to keep in control the insect and fungus pests
3. What fertilizers and methods of cultivation will give the best results
4. How can we get our products into the hands of the consumer at the least cost.

5. What varieties can we grow that will compete successfully with western grown fruit.

I thank you for your attention.

SAMUEL T. MAYNARD

President.

The President. We will begin the program today with the report of the Secretary.

Secretary F. Howard Brown. The proceedings of our last annual meeting have already been published and my report goes on from that stage.

REPORT OF SECRETARY

Mr. President and members of the Association :

Mr. Brown. We have now some 36 members or more coming from surrounding states, going as far west as Ohio, and we have 14 down in Connecticut. All the New England states are represented and it seemed wise to suggest that perhaps one director be appointed from Connecticut to represent the out-of-state people.

It might be suggested that a standing committee on exhibitions be appointed to develop this department. We have not done very much in the exhibition line (Applause.)

Institutes

Two weeks after the annual meeting the joint institute with the Middlesex South Agricultural Society was held at Marlboro. March 22, 1911 and the report of Worcester meeting delivered to members present. The attendance equalled that of previous annual meetings and the following attractive program was given :

Stereopticon lecture, Wilfred Wheeler, Concord: Money in Strawberries; Secretary Lewis Ellsworth, How to Prepare for the New England Fruit Show; Stereopticon lecture, George N. Smith, Wellesley; Spraying for Insects Attacking Fruit and Shade Trees. Dinner at 12:30 by Marlboro Grange. Afternoon session at farm of Elmer D. Howe, Pruning and Spraying Demonstrations were given by Prof. S. T. Maynard, Northboro and H. L. Frost, Arlington. Many local power and hand outfits were shown in action.

The first institute of the 1911-12 season was held at West Springfield, Grange Hall, December 6th. Prof. A. J. Norman on Pruning was followed by Prof. F. C. Sears on Orchard Management. After dinner by West Springfield Grange, Vice President Frost spoke on Spraying, and the meeting adjourned to the farm of Ex-Treas. Ethan Brooks where a pruning demonstration was given by Prof. Norman.

On Thursday, January 25, 1912 at Ashby, the 2nd institute was held; the members from a distance used automobiles to get from Fitchburg. Wilfred Wheeler, Concord, spoke on Small Fruit Culture at the morning session, and A. J. Norman, Amherst, on Orchard Diseases, after a dinner by Ashby Grange.

At Great Barrington, February 13th, Dr. George M. Twitchell of Maine, spoke on An Old Orchard Reclaimed, and at the afternoon session H. S. Frost spoke on Spraying. This was the first Fruit Growers institute held in Berkshire County so many new members were obtained.

At Colerain, February 16th, Dr. Twitchell spoke on Profits in Orcharding, and after dinner by the Woman's Relief Corps, John W. Clark of North Hadley spoke on What to do with our Apple Orchards.

At North Andover, February 28th, many new members were obtained when Vice President Frost spoke on Spraying, and Prof. Jarvis of Storrs, Conn., spoke on Orchard Renovation.

The institutes have been successful in that they have been largely attended by interested people, and many new members have joined the Association.

Field Meetings

The seasons' field meetings began June 17th, with the strawberry meeting, when the members only, met at the farm of Wilfred Wheeler, and a most profitable and enjoyable afternoon session was held. Another meeting, for members only, was held at Littleton, August 5th at the Drew-Munson Fruit Farm. The idea of keeping the invitations within the membership was to impress upon outsiders the advantages of becoming members. Messrs. Wheeler, Frost and Munson showed the members every courtesy, as did those who entertained at the other meetings.

August 10th found us at the peach orchards of Mr. Munroe Morse Medway for the early peach meeting. Mr. L. W.

Rice, having been in the hospital for some time, was unable to have us with him, and Mr. Morse came to the rescue. The other peach meeting was also open, and at West Berlin with Albert A. Jacobs on Labor Day and was the Elberta meeting. Not so many attended this meeting, as perhaps would have, if they had known that both the airships passed over the Peach Hill orchards in the Tri-State Contest. At both peach meetings were seen fruit which would be a decided credit any where, and the idea of having these meetings open, as well as the later ones, was to get as many as possible to come in hopes that they would join the Association if not already members.

The Fruit Growers Excursion at Newbury scheduled for Saturday, Sept. 16th, did not come off as planned on account of the very heavy rains. The three who braved the weather however felt more than repaid, and Mr. Perkins has kindly invited us to try again this year.

The last field meeting was at Amherst, October 9th, and after an inspection of the orchards and new cold storage plant at the Massachusetts Agricultural College, and a box packing demonstration by Mr. John B. Castner of Hood River, Oregon, the trolley was taken to the Bay Road Fruit Farm of Profs. Waugh and Sears, and we roamed among the thousands of trees of varying ages.

These field meetings have a definite place in the Association work, as they bring the members together more informally than at the Annual Meeting, and there is more time to get acquainted and to develop the spirit of "get together."

The special thanks of the Association are tendered to all those who contributed to the success of these institutes and field meetings, as well as the annual meeting and other Association activities.

Invitations to hold field meetings this year have been received from Mr. Frank Perkins at Newbury, to try again, Mr. Edmund Mortimer at Grafton, Mr. Fred A. Smith at Turner Hill, and Mr. E. Cyrus Miller at Haydenville. One was also received from Mr. L. N. Rice at Wilbraham, but cancelled on account of loss of crop. The Secretary will be glad to hear of any member with a sufficient peach crop to warrant a meeting with him.

The exhibit at the New England Fruit Show won second prize for Massachusetts, and a special note of thanks is due Prof. Sears for his labors in this line which resulted so

favorably.

A Directors meeting was called at Horticultural Hall Worcester, Dec. 19th, with a large proportion present. The following business was transacted:

Report of Committee on New England Fruit Show read and a vote of thanks extended to Professor F. C. Sears, chairman. Suggestions were made as to speakers for the annual meeting. Date of the annual meeting discussed and following committee appointed to report: H. R. Kinney, Dr. F. E. Gilson, F. Howard Brown.

County Fruit Association, institutes, field meetings, charges for list of members, and extra reports were discussed. Vote of approval to State Board of Agriculture and Senator Gates for work in defeating bill for ten year close season on deer.

Considerable discussion regarding movement to get a state appropriation for the Association. Ways and means presented and the following committee appointed to take the matter up in the new session of the legislature, Vice President Frost, President Maynard, S. J. Emerson, Lunenburg.

Committee on hall for trade exhibit, President, Secretary, H. R. Kinney.

The Vice President and Secretary attended the Rural Progress Conference at the State House, March 8th as delegates. It was the largest gathering ever held in New England of representatives of the rural life, and much good should result.

At the session of the State Grange at Worcester in December a resolution was endorsed which approved of the Association receiving an appropriation from the State, and the amount reported by the legislative committee was \$500.

A month ago a circular letter was sent out stating the standing of each member as shown by the books. An advance list of probable speakers of this meeting was also incorporated so that two birds were killed with one stone. While the purpose of the letter was particularly to notify those members who were more than two years in arrears, many of those who were paid to date responded with their dues for 1912 and the new button was forwarded with receipt.

At the later institutes also the members have been eag-

er to pay their dues and bring in new membs. At one institute the Secretary remembers seeing a row of seven members with the 1912 buttons on. This attitude is certainly appreciated by the Secretary, though please don't follow the action of the member from Fitchburg, who has just sent in a dollar bill and omitted to fill in his name or address on the slip, and the post mark is our only guide. Two more dollar ledgers are now necessary for increased membership accounts.

It seems advisable to have a special membership committee who could furnish directors with the list of the members in their vicinity, handle the membership desk at the annual meeting, and report on advisability of establishing a life membership for \$15.00 or over. As a member of this committee, the Secretary can recommend the Director, who has just had printed at his own expense and sent out, postal notices of this meeting to persons not reached by the regular notices.

Nearly two-thirds of the dues have been collected by the Secretary's office since last Annual meeting. In apportioning directors according to the membership in each county we find the following for this year: Berkshire 1, Franklin 3, Hampshire 2, Hampden 1, Worcester 6, Middlesex 6, Norfolk 1, Essex 2, Suffolk 1, and with our large out of State membership it might be well to have it represented from Connecticut which furnishes 14 members of our Association.

It might be suggested that a Standing Committee on Exhibition be appointed to develop this department.

Respectfully submitted,

F. HOWARD BROWN,

Secretary.

The President. The next report will be that of the treasurer, who is also the secretary.

The President. Will the Treasurer tell us how many members there are in good standing?

Mr. Brown. According to this report we have received \$553 for memberships this year; but that does not mean we have 553 members. It does mean that some have paid for 1911 and some have paid for 1912, so that the two years overlap, and it means that we have taken in since the beginning of the last annual meeting \$553. Last year some members had paid in advance, the same as some members

have at the present time, so that it almost seems as if very soon after this annual meeting we will have an organization of 553 members. I certainly hope so.

TREASURER'S REPORT

Mr. President and members:

The report of the treasurer is as follows:

Balance on hand, March 8, 1911	\$ 56.23
Membership dues at annual meeting	194.00
Membership dues since annual meeting	359.00
Office of Secretary received	4.02
	<hr/>
	\$613.25

Expenditures

Annual meeting 1911	\$ 185.33
Postage	89.79
Institutes and field meetings	83.44
Salary Secretary-Treasurer	50.00
Miscellaneous	21.51
Annual meeting 1912 Buttons, programs, etc.	37.05
Balance in bank	146.13
	<hr/>
Balance in bank	146.13

Respectfully submitted

F. HOWARD BROWN,
Treasurer.

The President then called for the Auditors report which was given.

Worcester, Mar. 13, 1912.

I have this day examined the books and accounts of the Treasurer, F. Howard Brown, of the Massachusetts Fruit Growers Association and find them correct, with the balance properly deposited or accounted for.

H. WARD MOORE,
Auditor.

It was voted to accept the reports of the Secretary, Treasurer and Auditor.

The President. The next item on the program is the report of committees. The first is on the New England Fruit Show. Professor Sears is chairman of that committee and I had hoped that he would be here to make that re-

port. The Secretary has the report.

Secretary Brown. This is the report of the Committee on the New England Fruit Show. I will now read this report.

REPORT OF THE COMMITTEE ON NEW ENGLAND FRUIT SHOW

Your Committee begs to submit the following report of its work in preparing the Massachusetts State Exhibit for the New England Fruit Show:

We began early to canvass the state for good fruit, but it was not until the very last moment that we finally made up the required amount, viz. 100 boxes and 20 barrels. The principal reason for this difficulty was the San Jose scale, which, unfortunately, was found on several lots which had been counted on as a part of our exhibit.

Your Committee wishes to acknowledge most gratefully the assistance of those who furnished the fruit for this exhibit. Several orchardists came forward at the last moment, when we had been disappointed in fruit we had expected to get, and brought in fruit without which we should have found it impossible to enter the competition.

The following is the list of those who furnished fruit free of charge for this exhibit:

H. J. Wilder, Washington, D. C. (from his orchard at West Leyden, Mass).

Munson & Frost Company, Littleton, Mass.

A. A. Marshall, Fitchburg, Mass.

Geo. S. Knapp, Groton, Mass.

Alden Derby, Leominster, Mass.

F. A. Smith, Turner Hill Farm, Ipswich, Mass.

Chauncey D. Brewer, Boston.

Fred Illsley, Newbury

F. A. Hastings, Sudbury

L. F. Priest, Gleasondale

E. M. Bruce, Leominster

In addition to this, we bought 30 boxes of McIntosh from Mr. A. A. Marshall, of Fitchburg, which were re-packed into barrels.

Your Committee wishes also to express its most sincere

appreciation of the unremitting efforts of Mr. Wilfrid Wheeler in our behalf. Although not a member of the committee, Mr. Wheeler did everything in his power to assist us.

We believe that in general the Massachusetts State Exhibit was very creditable to the state, to the society, and to the men who furnished the fruit. While we were successful in capturing only the second prize, we certainly had some very fine fruit shown, and we are in much better position to make an exhibit in 1913.

We feel that we made one serious mistake in our general plan of handling the matter, and mention it here for the benefit of future committees who may have this work in hand. A good part of the fruit was sent to Horticultural Hall and there packed for the exhibit. We believe that it should all have been packed at the orchards of those furnishing the fruit. It is practically impossible to repack fruit in the way we did and still have it perfect.

The following is an account of our expenditures and receipts:

Expenses

30 boxes McIntosh from A. A. Marshall, at \$3.50	\$105.00
Boxes and barrels for exhibit	19.60
Carting fruit	1.20
Cloth for covering exhibit	6.60
Sign	4.00
Freight and express	7.50
Expenses A. R. Jenks	12.41
Expenses J. Openshaw	19.57
Expenses F. C. Sears	34.36
	\$210.24

Receipts

Apples sold	\$55.91
Mass. State Board of Agriculture	15.35
Friends in Massachusetts	138.98
	210.24

All of which is respectfully submitted,

F. C. SEARS, Chairman.

For the Committee

Secretary Brown. At the last annual meeting we also had a committee appointed to see what could be done about additional inducements to join the Association, though that committee is not named in this program. Professor Sears was chairman and is unable to be present today so I will read it. I will now read this report.

REPORT OF THE COMMITTEE ON ADDITIONAL INDUCEMENTS TO JOIN THE ASSOCIATION

Your Committee has considered the question of means by which we may make membership in our Association of more value to the fruit growers of the State and would make the following suggestions:

First—That some horticultural publication be selected and offered to members at a reduced rate. We have taken the matter up with the publisher of "Better Fruit" of Hood River, Oregon, and "The Rural New Yorker," and have secured offers of a rate of 50c for the former and 75c for the latter. As many of our members are already subscribers to Rural New Yorker and as the rate is so exceptionally low for "Better Fruit" (just half price,) we should be inclined to recommend the latter. But that, of course, is for the Association to decide.

Second—We would recommend that, if possible, some arrangement be made with the management of the New England Fruit Show whereby the members of our Association might be granted tickets of admission to the Fruit Show at reduced rates.

These are the only specific recommendations that we have to make at the present time, but we believe that the general question of making membership in our Association of greater value cannot be too seriously considered by this organization. At the present time, our members receive the bound reports of our annual meetings and notices of all field meetings as a reward for joining the Association. And while the energy and business methods of our good Secretary have done wonders in increasing our numbers, we cannot expect to gain and hold a large membership without additional inducements. And your committee feels very strongly that if the Massachusetts Fruit Growers Association is to have the influence and power that it ought to have,

this large membership is absolutely necessary.

Respectfully Submitted,

F. C. SEARS, Chairman for the Committee.

It was voted that these reports be accepted and adopted and placed on file.

Pres. There was a committee appointed to look after a trade exhibit at the annual meeting. It was found, however, that there was no space in any hall in the vicinity, and the space in this hall is very limited, so nothing was done to increase the trade exhibits at this annual meeting.

At the Director's meeting last December a committee was appointed to consider the question of change of date of the annual meeting. This Committee is represented by Mr. Herbert R. Kinney, as chairman. Will Mr. Kinney report?

REPORT OF COMMITTEE ON DATE OF ANNUAL MEETING

Mr. President and Members of the Fruit Growers' Association: We find that in the report of last year, on motion of Mr. Wheeler, that it was moved that the constitution of this Association be amended by stating that the annual meeting shall be on the third Wednesday in January at such place as the executive committee shall decide. Now, article V of the Constitution, Section 1, is to the effect that the association shall hold at least two regular meetings each year, the annual meeting for the election of officers to be held in the City of Worcester on the 2nd Wednesday of March at 2 p. m. Section 2, on the election of officers and transaction of other business, states that 20 members shall constitute a quorum and a majority vote shall constitute election. All officers are to hold over until their successors are elected.

In Article VI for special meetings, it is stated that the president and secretary shall have power to call special meetings of the Association or of the directors or upon the written petition of 15 members they shall issue such a call.

That is the way it stands now. This committee find that the third Wednesday in January was liable to conflict with other meetings and it suggests the second Wednesday or

second week in January. The directors do not call the meetings anyway and so, without changing the constitution, it would be necessary that the president and secretary or 15 members have charge of calling our meetings. We have not done anything more than to investigate this matter. There is no doubt but what the date of the meeting should be changed from this time, which is very apt to conflict with spraying, to an earlier date, and, as I said, the second week in January would appear to us to be better than the third.

In regard to the other part of the question that the calling of the meeting be left with the president and the secretary, that is a matter for you to consider and that was left open to be brought up today and be acted on tomorrow, so that the members would have time to consider whether it was desirable to change really the place of holding the annual meeting. I don't want that you should feel that I am prejudiced in favor of Worcester, but I feel that under the circumstances it is a good idea, as representing the Horticultural Society, to say that we should like to have you stay here with us. This organization was formed in this hall and while the leading spirits at the time it was formed have many of them passed away, still we feel as though it is a kind of home and that many of you, I think, who have been coming here for 18 years feel that it is home, and we hope that you will consider this matter between now and tomorrow and see whether it is desirable to change this. Of course, it is necessary, if you leave it with the officers, to change this first section of Article V which, as I said, reads that the meeting shall be held in Worcester.

The President. You hear the report of this committee. What will you do with it?

Mr. Wheeler. Do I understand there is a motion made in the report? I thought I understood that.

The President. The recommendation, as I understand it, from this committee, is that the date of the annual meeting be changed to the second Wednesday in January; and I believe that is all the change that is necessary. The Constitution provides for the calling of meetings by the President and Secretary.

Mr. Wilder. I should like to inquire if it is to be considered a requisite that an exhibit shall be held at the time of the annual meeting?

The President. No, I don't know that it is; but it is probably desirable if we could find a hall to have a large exhibit of appliances. It certainly would be very instructive.

A Member. I move that the recommendation on the whole subject be laid on the table until such time as it shall be acted upon tomorrow. It was so voted.

Secretary Brown. I move that the report of the other two committees be postponed at this time and that we proceed to the first address of the morning.

The President. The program continues with an address by Dr. Burton N. Gates, Amherst State Inspector of Apiaries: "Bees in relation to fruit production."

THE VALUE OF BEES IN FRUIT GROWING

Dr. Burton N. Gates, State Inspector of
Apiaries Amherst, Mass.

It may be read in the oldest of writings how complete countries were divested of their bees by a raging epidemic. Aristotle has mentioned this for the classical period. In more recent times in America, marked depressions in apiculture have been observed. For instance, in New England, including also New York State, Langstroth mentioned in 1852 the low ebb which bee-keeping had obtained. Just what this was due to is not certain, but in all probability, a bee disease had swept through the country and reduced the number of colonies to a minimum. It would not be unreasonable therefore, to assume it possible for all the bees in a given locality to be completely annihilated.

It may be assumed that an agricultural country becomes entirely destitute of bees. What is the result? Would it be possible to grow vegetables, squashes, cucumbers, melons; would the strawberries blackberries, the currants, the raspberries, the apple, pear and plum bear fruit? Moreover, if the fiat included the bumble bee, would the clover set seed? In fact, should the bee fauna be entirely reduced as might be under most adverse conditions, it is safe to say that it would be utterly impossible to produce the majority of fruits and vegetables and horticultural seeds.

In a certain locality in Massachusetts through the agency

of bee disease, the honey bees had been completely wiped out for an area of at least three or four miles on the radius. It is not necessary to detail the proof of these conditions, but to emphasize the results upon general agriculture. The writer inquired of the farmers, they not knowing what was being aimed at, how their squashes and apples and other vegetables and fruits were setting. The topic was hardly suggested, when they replied that it was an off year. It was easy to see, therefore, that with the absence of the honey bees, notwithstanding there had been present the various solitary and other wild bees, the appreciable effect upon the community.

In discussing the value of bees in horticultural work, whether, in market gardening or the growing of fruits, it is not necessary to prove the process or agency of bees in transmitting pollen. This has been too often demonstrated. For the sake of brevity, it may be assumed as a hypothesis that bees, not only the honey bees, but the solitary bees, are the means of transmitting pollen, which is the male element of the plant, to the stigma which is the female organ. This is accomplished as is known, by a multitude of intricate contrivances. The process is so common and general that it escapes thought or observation. But the importance of bees in horticulture lies in a deeper, more fundamental law which will be emphasized.

It is doubtless a common experience with practical growers that a part of the orchard may set fruit more fully and better than the more remote part. Probably if conditions were examined carefully, it would be found that that part of the orchard which bore fruit abundantly, was protected perhaps from the prevailing winds, was nearer to an apiary, was not obstructed by a hedge row or buildings, so that the bees had an easy access to the trees. Moreover, it is a common experience during fruit bloom that the weather conditions consist of cold or intermittent sunshine and showers. In a word, the weather conditions are adverse for the best setting of fruit. It therefore becomes evident that the natural obstructions and adverse weather are a check to the best possible work of the bee.

One concrete illustration of this is reported by a gentleman in Rhode Island who observed that part of an orchard bore apples abundantly while the more distant part did not fruit. Upon examination, it was found that the fruiting

portion of the orchard was protected from the prevailing winds on the north and west by a hill while the more distant part of the orchard was windswept. Furthermore, three or four hundred feet from the fruiting part of the orchard were six or seven colonies of bees. The season was adverse while the trees were in bloom: spring showers prevented the bees from constant activity. It may be seen then, that between showers the bees had an opportunity to fly forth and visit only the nearest and protected part of the orchard. Showers came up, the bees were driven back to the hives; thus they alternated between the hives and the nearby trees.

Among cranberry growers it has been observed that certain portions of a bog sometimes bear heavy crops while a certain corner of the field bears only partially. Inquiry has shown that that part of the field which bears only partially is obstructed by a windbreak or undergrowth which hindered the bees from visiting it. The flight of the bees is steered away. It is common experience of bee-keepers, that a hill or shelter belt frequently acts as a barrier to bee-flight, materially changing their course.

Similarly, the writer has observed a large cherry tree adjacent to or beneath which were bees. That part of the tree which was shielded in the west by a house, invariably fruited while in years when adverse weather conditions prevailed during the blossoming, the upper part of the tree, unshielded, did not bear so freely. Here enters another factor, also. Cherries, and sometimes other fruits, hold their petals only for a short interval. Hence, an importance of bees to accomplish quick work.

A significant observation comes from the west. Two apple orchards were isolated in potholes or valleys. During several years the owner was baffled to know why one of these orchards under exactly similar conditions as the other, fruited heavily, the other not bearing fruit. The contrast was so marked and the reason for failure so obscure, that the orchardist called in the state entomologist. A thorough examination could not reveal why there should have been failure in one case and an ample crop in the other. Upon leaving one of the orchards and without having satisfactorily accounted for the success or failure, the entomologist came upon a fallen log on the edge of the orchard. In this log was a colony of bees. It is needless to say that it was this orchard which bore fruit abundantly; the oth-

er pothole containing no bees and being isolated beyond the reach of bees, was a failure.

Of course, this is an extreme case and in New England we have different conditions. We have a less wild country to contend with. Our population is more dense or scattered. There are more beekeepers to a given area and there are more escaped colonies in the woods, than in some western localities. Nevertheless, these observations show the decided importance of maintaining bees for successful horticultural work. It is not merely the agency of the bees in the transmitting of pollen which is the key to the situation; it is a far more important and fundamental biological and economical factor.

It is a well known fact that all animal as well as plant life under wild or natural conditions is subject to a fluctuation; one year a given species of animal is prevalent, the next year it may be more prevalent or less prevalent. Take for instance the house fly; some years it is more troublesome than others. The mosquito also is a pest some years and almost unknown in others. The fish in the sea become abundant or lacking; the birds, for instance the quail, has been more common during given periods than during others. So it is with all life under wild or natural conditions. This variation of fluctuation between prevalence and scarcity, has been described as periods of ups and downs. It may be illustrated by a horizontal curved or wavy line: the crests of the waves indicate prevalence: the depressions indicate scarcity. So it is with bees, especially those without man's control. The wild solitary species, under adverse wintering conditions, or during a period of scarcity of food, become depressed and few in number. The wild honey bees which have escaped to trees and ledges, during an adverse season or succession of seasons are less numerous than when favored by environment. To a certain extent this law applies also to the honey bees in the apiarist's yard. Certain years are unsuccessful; the bee keeper says there is no "increase," he says he has a poor year. This has been especially true with the prevalence of infectious brood diseases.

In a word, bees, like all life are subject to natural forces; favorable ones bring increase, unfavorable ones, as enemies or ill weather, as in the case of bees, cause a reduction of the species, that is a depression or drop in the

wavy curve. This law of "ups and downs" of life, the prevalence or scarcity of a species is as fundamental for the orchadist, as was Newton's discovery for physics, upon observing the fall of an apple. As all matter is subject to the law of gravity, so all life is subject to a biological law or laws governing its prevalence or scarcity.

Here then is the key to the horticulturist's need for and utilization of bees. His problem is not merely that of securing fertilization of his fruit or vegetables. It is more grave. He must meet a natural force, overcome the tendency of nature to reduce an overplus of the insects which he is so dependent upon. Large blocks of fruit trees mean an inestimable number of blossoms. If it happens that bees are few, or the weather unfavorable, how, though the trees are masses of bloom, is the grower to secure a crop?

It is only too evident that the orchadist in particular has been trusting out the most crucial factor in his fruit raising. He has been neglecting or if preferred, has been chancing his crop against the freaks and fluctuations of weather and nature. But it is quite possible to subject this most vital of factors in producing a crop, successful fertilization, to man's control. The crop may be practically assured, other conditions being favorable, by maintaining honey bees to do the work. In the cucumber greenhouse, without bees for a day or so, a material loss is sustained. During fruit bloom the same is experienced only, too frequently, it has been charged to "bad luck."

It would appear desirable, even though it may be considered that there are plenty of wild insects, to maintain bees also; it is a small investment, considering the possible returns. Furthermore, the orchardist who owns his own colonies, is independent of his neighbor bee-keepers, he is independent in the broadest sense of the word. It is better to flood the orchard with bees than to find after the fruit has set that too few were present to have accomplished a heavy set.

The writer has in mind a melon grower who annually hires one or two colonies of bees to assure a maximum setting of his melons. It is not with the idea that he secures a better grade of melons, but that he secures a melon from each female blossom. It is more or less so with the orchadist who has become aware of the benefits which he can derive from maintaining a few colonies of bees to protect himself against a possible loss under adverse climatic

conditions or when the wild bees have become depressed. Just how many colonies are necessary for a given acreage of trees or vegetables has to be ascertained by the grower, but the fact that remains that in order to secure a maximum crop, to be independent of the neighboring bee-keeper, or of uncontrollable weather conditions, under the acute competition of western production, it has become necessary not only to grow more fruit and vegetables, but to be assured of a maximum crop.

The game is to produce fruit, not merely to cultivate plants or trees. The producer prunes, cultivates, fertilizes with carefully compounded mixtures, sprays for scale and codling moth and rears splendid tree specimens. But how many have really subjected to control the one factor which insures the crop, the control of the transmission of pollen? It is this opportunity to control fertilization which as insurance is seized by progressive growers today. (Applause).

A Member. How far apart were those two orchards you speak of where one was not bearing and the other did bear?

Dr. Gates. I can't answer that definitely. It is reported that they were exactly comparable. They may have been a mile or two apart but in the same immediate locality.

A Member. Do you think bees would go a quarter of a mile?

Dr. Gates. They will go three or four miles. The ordinary range of traveling is two miles. Under pressure, when there is a scarcity of nectar, the same as last year, they will go three or four miles, and cases are on record where they have gone seven miles across a country; but those are extraordinary. In all probability, being in a pothole and having plenty to eat in this hole, the colony down there did all the work.

Mr. R. H. Race. I would like to ask the speaker if he would like to have us understand that we would have no fruit if we didn't have insects of some kind to gather pollen?

Dr. Gates. I don't want to preclude the possibility, the bare possibility, that pollen is transmitted by the wind, to a certain extent; but there are any quantity of experiments on record which show that they are only very small in number and probably accidental.

Mr. Race. Would that apply to the strawberry?

Dr. Gates. The strawberry is not so susceptible to the work of the honey bee as to the wild, solitary bee.

Mr. Race. What is the effect of the spraying on this work of the bees in carrying the pollen.

Dr. Gates. That is a problem we are not prepared to go into in detail just at present. I am perfectly frank to admit that under confinement in a big tank, like this stage, as it were, enclosing an apple tree, for instance, which had been sprayed with arsenate of lead, it is found that the bees taking food from that tree would be killed. That is as far as I can go as an actual statement.

Mr. Wheeler. I would like to ask what method you consider best for wintering bees in an orchard. I think we all agree that the bee is essential in fruit production, but we all have a great deal of trouble in wintering them. I noticed in Amherst yesterday that the bees were living right out, with apparently no protection. I cover mine and I find that practically two hives out of three have been killed.

Dr. Gates. The problem of wintering is one which the Department of Agriculture is taking up right now. There are advocates on this side and advocates on that. From my own experiments I found that the temperature just beneath the cluster of bees and the hives is precisely identical with the temperature outside the hive and consequently I have concluded that the packing of bees around the bottom at least is of no value. It merely acts as insulation, so that when the rays of the sun strike on that insulation they are repelled and do not enter the hive. That is the ground on which I have been working. On the other hand, there are those who advocate wintering bees in chaff packed hives with an air space; that is, a false air space. Another way is to have several coats of paper and fold it over and pack it down. All those different methods seem to work with certain individuals, although no one method for wintering bees at present is absolutely safe for everybody, barring, perhaps, the method of wintering bees in the cellar. For the northern climate it is unquestionably perfectly possible, with twenty or twenty-five colonies, to winter bees in the cellar, maintaining, however, a temperature averaging 43. If it goes above 43 to 48 they begin brooding; if it goes below 40 you find that they do not winter so successfully.

Mr. Race. I would like to ask one more question: If

spraying of trees with arsenate of lead is killing the bees and yet we can have no apples without spraying, what are you going to do about it?

Dr. Gates. I think it is a good horticultural rule that to spray fruit trees when in bloom is not only dangerous to the bees, but also kills the blossom. That is, it affects the tender functioning part of the blossoms, the male and female part of the blossoms, so that the spray when your tree has petals on it, when it is in bloom, is as fatal to production of fruit as it is to the bees. Consequently the rule is to spray either before the blossoms open or after the petals fall, and the custom is generally the petals fall.

Mr. Wheeler. What would you say is the ideal location in respect to the position of the bee hive? Which side should they be, above, or below?

Dr. Gates. It would vary with the individual orchard. I should presume it would be preferable to place it to the east or where the sun would strike them, where they would get some sun, the east and south. I should prefer to have them below, I think, rather than above. If your orchard is on a hill I should prefer to have them below, because the tendency of the bee, of course, is to rise. They don't go down as well as they do go up. I should like out, too, if the orchard went around a hill, perhaps to divide the apiary into two parts, because there is that tendency of the hill to act as a barrier and shut them off in this direction (illustrating) so that under those circumstances if the orchard went around I should divide it and have them on two sides.

Mr. Wheeler. In a large, continuous orchard, how much ground will one hive cover?

Dr. Gates. That is something that will have to be ascertained by experiment. We are at a loss. We estimate that two or three colonies will take care of five acres, as I believe Professor Franklin has found with cranberries. But the point in an apple orchard or in fruit growing is that the blossoms hold such a short time and we should much prefer to have bees on hand to actually flood that orchard during its fruit growing. It is better to have too many than too few.

Mr. G. W. Sprague. I would like to ask in relation to experience with poisoning the bees. In our orchard there are currants and it is almost impossible to spray the orchard

without spraying the currants, while in bloom. We have done that for two years past and of course we haven't bees enough and haven't used the honey enough to know whether we were in danger. The bees work the blossoms and there is arsenate of lead on the blossoms. Do you think we are getting into danger from that?

Dr. Gates. Well, there is no question but that the bees work currants. They do; they are very active in currants, so that if your arsenate from the apples falls on the currants I should presume there might be some slight danger. There is only one thing to be done in regard to the killing of bees by spraying, so-called, and that is to do the best you can to overcome all the difficulties. I don't see how you can avoid spraying under those conditions.

Mr. Sprague. Are there different kinds? If so, what kind would you have?

Dr. Gates. The Italian bees have been favored and the tendency all over the country is to Italianize. They are proving perfectly remarkable. It is due not only to the fact that the Italians are gentle and prolific and gather the honey and stay at home and mind their own business and do not go out roving like some of the other races, but at the same time it is found that in dealing with the infectious brood diseases which are found in Massachusetts and elsewhere, particularly the European type of foul brood, it is found that the Italian are greatly resistant to the European foul brood; consequently bee keepers are everywhere Italianizing.

Mr. Race. There is another side you haven't touched on. I don't know much about it, though. When I was a boy my father used to keep bees and I used to get stung. Of late years they have been exterminated in our section and I never had a heavier growth of apples than last year and I don't know that there was a dozen bees in the whole field in that section. What is the bee on the flower for; what is the bee there for? He has to get the sweet out of it. Is that the germ?

Dr. Gates. No indeed.

Mr. Race. It isn't? Doesn't he do more damage than he does good, by taking away something from the blossom that should be left there to protect the fruit? What sort of a situation is that? The bee is there to get something and he robs the blossom of something. He has to. He doesn't go

away hungry if there is anything there for him to eat. He may take a little pollen, perhaps, and may be place the pollen on some other variety of fruit and he may do more damage than he does good. The aroma from the orchard comes into our nostrils, and we say, "How sweet that is." Well, that is the pollen, little globules, like little balls of oil going around and fertilizing everywhere, even the nasal cavity. I never took much stock in this bee fertilization. Still, it may be a good thing, but I think they do more harm than good. Now, let's see what you can get out of that. (Laughter).

Mr. H. A. Cook. Two years ago I was told that I couldn't raise clover unless I had lots of bees. In '74 I had a brother living in Missouri. He raised acres and acres and thousands and thousands of clover seeds, and I wrote and asked if they were in any way dependent on honey bees for fertilizing the clover. He said they had very few; no bumble bees at all. They were talking then about carrying the bumble bees to Australia, and I asked him particularly to notice in regard to the honey bee or any insect visiting the clover, and he wrote back and said, "There isn't a honey bee in Missouri that I know of, and that was back in '74, soon after the war, and the state was sparsely settled. He said he didn't believe there was a honey bee visited one blossom, one clover head, in ten thousand. He had acres and acres. He would have to be a pretty lively bumble bee or honey bee to get around over that acreage of clover and there would have to be a great many of them. So I don't take much stock in this bee fertilization.

A few years ago they said we couldn't raise cucumbers unless there were honey bees there. I placed some late in July or August for that very purpose. They blossomed in October. The frost held off that year, and the honey bees and other insects were gone to roost or somewhere else. I went to those more than ten times a day, thinking that the bees or insects would be on those cucumber blossoms, and never did I see one of any kind of insect about those blossoms, and they gave me as pretty a crop of cucumbers as you want to see. I don't think an insect ever visited one of those blossoms. If they did, they did it when it was too dark for me to be there. (Laughter).

As to apples or peaches or plums I don't doubt that they are instrumental and of use in aiding under certain conditions, when the weather is right; they might get a little on them, some of the pollen stuck to their legs; but they don't work when the weather is unfavorable very much. They do sometimes and I don't doubt that they do some good, but to say that we are dependent upon the bee or insect for fertilization I doubt very much. I believe, as Mr. Race does, that the pollen is floating through the air. We know that it is imperceptible, but it is there and it is doing its good.

Dr. Gates. In regard to the fertilizing of clover I don't suppose that any insect would be necessary for fertilizing it much longer. We have got something better; we have got a machine now to fertilize clover, so that we needn't worry about that. We can set our clover seed by machinery. That is one of the latest improvements.

In regard to the fertilization of cucumbers I want to say that I have personally bagged cucumbers over and over again with a paper bag or other bag which will keep out insects, and I have had the cucumbers blossom and the fruit drop off almost before the petals opened; while those blossoms which were artificially fertilized, either by hand or by bees, and then bagged, fruit perfectly. I think, too, that under some circumstances the English variety of cucumber is self-fertilizing; that is, fertilized from its own pollen. I haen't seen that; that is merely from hearsay, but if there is a chance of cucumbers fertilizing without the agency of bees it is this English variety.

Also in regard to the question of why bees go to the flowers and take away the sweet, it is pretty fortunate that we have sweets in the flower. If it were not for the fact that it is there the bees wouldn't bother them very much. That is the bait put there for the purpose to attract the bees and other insects to the flowers; so that while they are stealing this nectar as the gentleman says, taking it away for themselves, getting tangled up in the pollen, on their visits to other blossoms they deposit some other pollen, which accomplishes the growth. If it were not for this nectar the bees would probably disregard them and stay away.

If there is any question in the mind of some of those here as to the process of fertilization I may say that the

process of fertilization in plants is exactly the same as in animals. It is a sex problem, the male and female element, the egg and what corresponds to the spawn in animals. Transfer is made and growth is made just exactly as it is in animal life, and in that way the perfect fruit is brought forth.

Mr. Race. I think that it is a strange idea to affirm that a bee has got to attack a blossom in order to have it fertilized. The idea of saying that in ten millions of blossoms in a large orchard, ten millions of blossoms in a strawberry or currant bed, you couldn't have that fertilization without bees! Why, you couldn't have bees enough to cover the plants if you had all the colonies there were. It looks absurd to me.

Mr. Cook. I should like to make a statement in the matter of English cucumbers. They flower just the same as ours. It is positively necessary on squash and melons and cucumbers that we should plant the field where there are bees, for without bees there wouldn't be a cucumber. We have grown cucumbers under glass and know that very well. How far that goes on fruit trees I don't know, but I know that it is necessary in a good many crops.

Mr. Race. I suppose it is like a man with 2,000 hens who doesn't keep a rooster and the eggs don't hatch worth a cent. (Laughter).

Mr. J. W. Clark. I would like to relate a little experience I had in regard to keeping bees in an orchard. Two years before I had about three thousand barrels of apples. The second year after that they blossomed fully were very full of blossoms, more by at least a third than there was two years before. This year that they were so full, while they were in blossom there was a cold, cloudy week, very little sunshine, but not much rain, and if they had set as well as they did two years before I would have had at least four thousand barrels of apples; but with this cold, dull, cloudy week, with very little sunshine—that was that week I speak of, once in a while I would go out for an hour, perhaps, during the day and walk through that orchard and it would be just like death. There wasn't the hum or b-uzz of an insect while the sun didn't shine. While the sun shone they would come out for a few moments and buzz; it was alive with insects. Instead of having the amount of apples I thought I should have, I had 167 barrels. Now, what was

the reason? Then, after that, the next year or so the trees didn't blossom remarkably full—but during the blossom time the weather was fine, just as sunny, without any wind, everything warm and nice, and the blossoms were not thick on the trees at all, but it seemed as if every blossom produced three or four apples; the trees were loaded. It was nice weather while they were in blossom and I am more concerned with the week that the trees are in blossom, in regard to my crop, than I am any other time in the year. If I have good, mild weather, sunny, while they are in blossom, the fruit sets; if it is dull, rainy, it don't.

But we have one thing in our favor: All the blossoms don't open at once, and one lot may be killed and not set and the next lot will come out all right, so that I think that without the agency of the insects we would have very little fruit. That is my experience. That is what I say from what I have seen.

The President. Might I ask Mr. Clark how many hives of bees he has in his orchard?

Mr. Clark. They vary; there are 18 or 20 there now, or there were last fall.

The President. About two thousand trees?

Mr. Clark. About that.

Mr. Race. Couldn't the weather do just what you claim for the bees, because the weather being damp the pollen couldn't fly? Couldn't you apply that the same as you apply it to the bees?

Mr. Clark. I will answer that by stating what occurred three or four miles out of where I live. I have had bees there for years, and I found one year when there was a cold week, very little sun, the trees right near the bees bore a good crop. Those just outside, say half a mile, had nothing, but around where they were the apples set well and had a good crop. But the bees wouldn't fly the distance away from the hive to fertilize the other trees.

The President. I hardly like to interrupt this interesting discussion, but we have another paper. The next speaker is Mr. H. J. Wilder, Soil Expert of the National Department of Agriculture who will discuss "Soils and their relations to varieties."

Mr. Wheeler. Before Mr. Wilder speaks I think there

is a matter that should be brought up at this morning session. It has been the custom generally at the first session of the association to select a committee on nominations of officers: I therefore move that a committee on nominations be nominated from the floor, and to start it myself I will nominate Mr. Hittinger of Belmont.

The President. We have a list of directors by counties, and they will consider the county arrangement. We have a motion that Mr. Hittinger be one of the committee to nominate officers for the ensuing year. All in favor of Mr. Hittinger serving, please manifest by raising their hands. Contrary minded. It is a vote. Five members are to be appointed. Is there another?

A Member. I nominate Mr. Wilfrid Wheeler of Concord. (Messrs. Hittinger, Wheeler, Cook, Race and Clark are selected a committee on nominations).

The President. This committee will bring in a list of officers at the opening of the afternoon session. Officers are to be elected the first thing after the opening of the afternoon session.

Mr. Wilder, Soil Specialist of the Department of Agriculture. (Applause).

Mr. H. J. Wilder: Ladies and Gentlemen: I have prepared a paper, all of which I will promise not to read to you, but only some parts of it.

SOILS AND THEIR RELATION TO VARIETIES

HENRY J. WILDER

Bureau of Soils, Department of Agriculture,
Washington, D. C.

From the practical viewpoint there is just one reason why we should try to know as much about the soil as possible, and that is that we may know best how to make it yield us good crops. This involves two things, viz: to know the crops the different kinds of soils are best adapted to produce, and then how to handle those soils so that the best possible yields may be secured. To solve the latter problem much time has been spent. Experiment Stations, farmers, scientists, agricultural students and fertilizer manufacturers all have sought this, and great advances have been made. But a given method of farm prac-

tice or fertilizer use has brought a great variety of results depending upon the soil conditions under which it has been tried. Does it not seem strange, then, that we did not earlier learn to study the first half of the problem of successful crop production, namely, the soil conditions under which we were trying to grow crops, and then to adapt our methods of practice to our varying soils? A cropping system well carried out on land to which it is adapted, generally means prosperous farmers, whereas the same system pursued on soils that are not adapted to it may mean that "farming doesn't pay."

Why is it that certain farming sections acquire a reputation for producing some crops especially well? In the first place because climatic conditions are favorable. Sugarcane grows along the Gulf Coast but not in Massachusetts. Apples thrive in Massachusetts but not where sugar cane grows. Onions are grown from seed in Massachusetts but not in the states from Maryland south where the bulbs mature too early and so the crop is grown principally from sets. Pennsylvania illustrates the same thing with the onion crop within the climatic range of a single state. These cases of crop adaptation are due to climatic conditions which for the purposes of comparison it is easily possible to group.

The influence of soil variation on crop production, in distinction from climatic influence, is best illustrated, perhaps, by the development of special crops in different sections of the country having the same or closely similar climatic conditions. In many cases the highest development of such crops has taken place under a definite and restricted range of soil conditions. We are inclined to look at special crop districts already developed as examples of agricultural adaptation that were bound to appear in the natural course of events. We are also inclined to forget the many individuals who have fallen by the wayside in helping to develop such districts. Yet it is exceedingly doubtful if any section or locality in this country has earned a reputation for producing some crop well without having its course to that success marked by many failures of the individual farmer.

In many cases careful experimentation is necessary before safe conclusions can be drawn and it is the endeavor of the National Department of Agriculture together with

various State organizations to solve as many as possible of these diverse farm problems. It is the province of the field work of the Bureau of Soils to solve one of the several important factors of crop growing namely: how to select soils so that the different crops, and where possible the different varieties of the same crop, may be grown with most profit. It is for this economic reason that the study of soil adaptation to crops is of so much importance.

It may be said that the so-called "corn-belt" states owe their title largely to the character of one soil type which occurs in relatively large extent. The type is a black clay loam and Iowa is the state that happens to possess the highest percentage of this kind of soil. In Illinois, Indiana and Ohio, it also occurs largely, and other kinds of soil in the same climatic locality do not equal, and rarely approach this in yield of corn.

It may be worth while, to note here that our natural forest growth also indicates clearly that many varieties of trees succeed best on certain kinds of soil. The local name "black walnut land" is still used where that hardy tree grows to indicate a heavy type of soil. In southeast Michigan this is the Miami clay loam. The hickory thrives in the northeastern states on the heavier soils. Black walnut and hickory are both deep rooted trees. In the same region "hemlock land" always indicates a sandy soil and the hemlock is not a deep rooted tree. In the orchard districts of West Virginia the leading peach growers will not tolerate "White oak" land but a mixed growth of "rock oak and chestnut," about one-third of the former and two-thirds of the latter, indicates a soil which has been instrumental in making one of the most famous fruit districts in the world. The rock oak and chestnut growth indicates a soil somewhat stronger than that of chestnut alone, as a better supply of moisture is maintained, newly cleared it is more productive, and even on old ground better results are secured from fertilization. The subsoil is finer textured, that is more clayey, than the chestnut subsoil, but soil is not so heavy as the white oak soil. Yet on the latter some varieties of apple thrive. Carrying a step further the matter of soil adaptation to the different varieties of oak, it is a matter of common observation that poor and thin soils often support only the dwarfish black jack oak and post oak.

Shreve has found in his forestry studies in Maryland

that "the general distribution of the Lobolly Pine is determined by historical and climatic factors, yet its relative abundance at different localities within its area is determined by the character of the soil."

I want to call your attention at this point to the fact that the character of the soil upon which a crop is grown is only one of several factors necessary for successful crop production. Climatic conditions embracing not only absolute temperatures but also the rainfall, air drainage, soil drainage as effected by topography—the only kind considered until recently—elevation above sea level and with reference to topography, fertilization, and care are all important. No one of these factors may be studied effectively unless the other factors influencing production can be balanced. So soil comparisons can only be of value when the other conditions are equalized, and to do this a large number of field comparisons is essential.

Let us now go a step farther and consider not the adaptation of soils to a given crop, but rather the adaptation of soils to different varieties of the same crop. For some time, the Department of Agriculture has been especially interested in working out the conditions of soil on which each variety of apple does best, and to some of these soil adaptations I now ask your attention. Later I shall welcome any discussion pertaining to them.

BALDWIN SOILS

If soils are thought of as grading from heavy to light corresponding to the range from clay to sand, then soils grading from medium to semi-light fulfill best the requirements of the Baldwin. Following definitely the classification standards of the Bureau of Soils with reference to the proportions of clay, silt, and sands, this grouping would include the medium to light loams, the heavy sandy loams, and also the medium sandy loams provided they were underlain by soil material not lighter than a medium loam nor heavier than a light or medium clay loam of friable structure.

From this broad generalization it will be seen that the surface soil should contain an appreciable amount of sand. The sands moreover should not be all of one grade; that is, a high percentage of coarse sand would give a poor soil, whereas a moderate admixture of it with the finer grades of

sand, together with sufficient clay and silt, would work no harm. In general the sand content should be of the finer grades but soils also occur, though comparatively rare, which would be too heavy for this variety were it not for a marked content of the coarse sands, the effect of which is to make the soil mass much more friable and open than would be expected with the presence of so much clay. Such soil dries quickly after a rain, and is not to be classed as a moist soil. It will never clod if worked under conditions at all reasonable. The subsoil on the other hand must never be heavy enough to impede ready drainage of excess moisture, yet sufficiently clayey to retain a good moisture supply; that is, plastic, not stiff. If the subsoil be so clayey or heavy that moisture does not percolate down through it readily a Baldwin of poor color with a skin more or less greasy is the usual result.

The ideal to be sought is a heavy fine sandy loam, or light mellow loam, underlain by plastic light clay loam or heavy silty loam. It is fully realized that many will not possess this ideal, but the soil that most closely resembles it should be chosen. If corn be grown on such soil the lower leaves will cure down before cutting time, giving evidence of moderately early maturity. This is one of the safe criterions by which to be guided in choosing soil for this variety.

Mention was not made in the above description of the color of the soil. The desirability of a surface soil of dark brown, the color being due to the presence of decaying organic matter is unquestionable and generally recognized; and if the soil be not that color the successful orchardist will so make it by the incorporation of organic matter through the growth of leguminous crops, or otherwise. It is often cheaper to buy soil with a good organic content, or humus supply than it is to be compelled to put it there after purchase before good crops can be secured. Hence this is purely an economic feature. The warning should be stated, however, that a soil should not be purchased or planted to apples of any variety because it is dark colored and rich in humus. The soil should be selected because of its textural and structural adaptation regardless of the organic content, then if such soils happen to be well supplied with vegetable matter, so much the better; if not, it may be supplied.

To modify, however, by the addition of humus, the physical condition of a sand until it resembles a sandy loam as far down as tree roots ordinarily extend, is unquestionably an expensive process, and as orchards are grown for profit the soils on which they are to be planted should be so selected for the different varieties as to furnish the most favorable conditions possible before going to the additional expense of trying to change their character artificially.

While soils so deficient in humus as to be leachy in the case of sands but stiff intractable and cloudy in the case of clays, clay loams, and loams, should have their humus content increased until these unfavorable conditions for crop growth of any kind be overcome so far as possible, it is utterly futile to maintain that by the addition of plenty humus, the physical characteristics of any given soil may be so changed that its inherent physical character is negligible so far as its adaptation to crops or to different varieties of the same crop is concerned. The agricultural practice of the eastern United States is replete with instances of special soil-crop-variety adaptation.

While the hills of Massachusetts include a great deal of ideal Baldwin soil, or soil that resembles the ideal closely enough for practical purposes, they also include a great deal of soil that is not well adapted to the Baldwin. The greatly superior color of the fruit from some orchards when compared with that from others on a different kind of soil—elevation, slope, methods of culture and fertilization being virtually the same—gives striking evidence of the importance of the soil factor. On just this basis the fruit from some orchards sells for a higher price than that from others. This illustrates the economic advisability of selecting the orchard site with soils adapted to the variety to be planted.

RHODE ISLAND GREENING SOILS

As the best prices for the Rhode Island Greening are usually obtained in New York City, the general aim of the commercial grower will be to meet the preferences of that market. The demand there for a "green" Greening has usually been stronger than for one carrying a high blush, and while individual buyers may be found, it is said, who do not discriminate against the latter, most of them do to the extent of 25 cents a barrel or more in favor of the "green" Greening. Of even more importance sometimes, is the fact that a "green" Greening will move on a "slow"

market when a "blush" Greening fails to do so. There is also a trade objection to the "blush" Greening from the fact that the consumer is rarely able to distinguish it from Monmouth Pippin—a red-cheeked green apple which is inferior to Greening and does not serve at all well the purpose for which Greening is bought. In view of these trade conditions, the writer has especially sought those soil characteristics which best contribute to the production of a "green" Greening and in previous writings or in meetings addressed, the soil adaptations for the Rhode Island Greening have been described with the green type of apple as the standard sought. Bearing this ideal in mind, the soils adapted to this variety are distinct from the Baldwin standard. In fact, these two varieties, considered as standards, differ so markedly in soil requirements that the soil adaptations of other varieties may well be compared with either the Baldwin or the Rhode Island Greening soil standard. A surface soil of heavy silty loam or light silty clay loam underlain by silty clay loam excels for the "green" Rhode Island Greening. Such soil will retain sufficient moisture to be classed as a moist soil, yet it is not so heavy as ever to be ill-drained if surface drainage is adequate. The soil should be moderately rich in organic matter, decidedly more so than for the Baldwin. In contrast to the Baldwin soil in the growth of corn, it should keep the lower leaves of the plant green until harvesting time, or at least until late in the season. Such soil conditions maintain a long seasonal growth under uniform conditions of moisture, and thus produce the firm yet crisp texture, the remarkable juiciness and the high flavor for which this variety is noted when at its best. If grown on a soil too sandy, the Rhode Island Greening lacks fineness of grain, flavor, if judged for its full mature season, and the juicy quality in greater or lesser degree depending on the extent of the departure from those soil characteristics which contribute to its production. If a high blush is desired, however, to supply other market conditions, a soil somewhat warmer than that described should be selected,—a deep, light, mellow loam or productive fine sandy loam being favorable. To secure a "finish" of this character, soils approaching more nearly to the Baldwin standard are best adapted.

The Rhode Island Greening is more restricted in area than the Baldwin, not adapting itself to the climatic conditions as far south as the Baldwin, even though suitable soils

occur there. In fact, its southern boundary may be roughly estimated as 1-4 degree north of the 41st parallel. South of that it becomes a fall apple and keeps very poorly.

HUBBARDSTON SOILS

Compared with the Baldwin soil requirements, the heaviest soils desirable for the Hubbardston lap over for a little upon the lightest soils desirable for the Baldwin, while at the other extreme the Hubbardston will utilize to advantage a more sandy soil than most other varieties of New England. This does not mean that it will succeed on poor light sands, for on such soils the apple will not attain sufficient size to be of value, nor is the tree vigorous enough, but the soil should always be very mellow. A rich fine sandy loam to a depth of at least a foot is preferable, and the subsoil may well be of the same texture. The Hubbardston does remarkably well on a rich fine sandy loam in the Connecticut Valley fertilized highly enough for tobacco, onions, or garden crops. The fruit is of good size, well colored and inferior in both flavor and keeping quality. This is undoubtedly due to the high humus content and richness of the soil, as the same soil in much poorer condition brings a better Baldwin. A subsoil containing enough clay to make the fine sandy material somewhat coherent, or sticky, is not objectionable, but there should never be enough clay present to render the subsoil heavy. If the soil is too heavy or too clayey the fruit is liable to have greasy skins and a deficient color, while the flavor is insufficiently developed.

NORTHERN SPY SOILS

This variety is one of the most exacting in soil requirements. To obtain good quality of fruit, i. e., fine texture, juiciness, and high flavor the soil must be moderately heavy, and for the first two qualities alone the Rhode Island Greening soil would be admirable. The fact that the Northern Spy is a red apple, however, makes it imperative that the color be well developed, and the skin free from the greasy tendency. This necessitates a fine adjustment of soil conditions, for the heaviest of the soils adapted to the Rhode Island Greening produce Northern Spies with greasy skins and usually of inferior color. The habit of tree growth of this variety, moreover, is such as to require careful attention. Its tendency to grow upright seems to be accentuated by too clayey soils, if well enriched, and such soils tend

to promote growth faster than the tree is able to mature well. On the other hand, sandy soils while producing good color and clear skins fail to bring fruit satisfactory in quality with respect to texture and flavor, especially if the fruit be held for very long. The commercial keeping quality, too, is inferior to that of the Spy grown on heavier soils in the same district. Hence the soil requirements of this variety are decidedly exacting, and are best supplied apparently by a medium loam underlain by a heavy loam or light clay loam, that is, a soil as heavy as can be selected without incurring the danger of inferior drainage, for a poorly drained soil should in no case be used. It is surely best not to plant Northern Spy on a soil lighter than a very heavy fine sandy loam, underlain by a light clay loam, or possibly a heavy loam. Good air drainage is also very essential with this variety.

WAGENER SOILS

In northeast Pennsylvania where the climatic conditions are not greatly dissimilar to those of this state Wagner is one of the most profitable sorts for filler purposes. It gave remarkable results, too, in northeastern Massachusetts last year at a very low altitude, and in the western part of the state at an altitude of nearly 1200 feet it is doing very well indeed. The tree is weak in growth, hence a soil that is deep, strong, mellow and loamy should be selected. Stiff subsoils are especially objectionable with this variety, and thin soils, also light sandy soils should be avoided. The Wagner thus fits in nicely with Northern Spy in soil requirements, and its habit of early bearing makes an effective offset to the tardiness of the Northern Spy in this respect.

McINTOSH SOILS

This is a sort of high quality that is now very popular. As McIntosh trees of sufficient age for safe comparisons are rarely available in this state, over any considerable range of soil conditions, no positive statement is made concerning the soil preferences of this variety. The indications are, however, that the heavier of the Baldwin soils as described are desirable for the McIntosh.

TOMPKINS KING SOILS

The Tompkins King is fully as exacting as Northern Spy in soil adaptation. The tree with its straggling tenden-

cy of growth does not develop satisfactorily on sandy soils, but succeeds best on a moist yet well drained soil, i. e., the light Rhode Island Greening soils a soil capable of maintaining such supply of moisture that the tree receives no check at the approach of drouth. But the fruit grown on soils so heavy lacks clearness of skin, and the appearance of the apple is marred by the greenish look extending far up the sides from the blossom end, and the lack of well developed color which makes this fruit at its best very attractive. Hence the problem is to balance these two opposite tendencies as well as possible, and the soil of the following description seems best to do this. Light mellow loam, the sand content thereof being medium rather than fine, thus constituting an open textured loam rather than a fine loam. The subsoil should be of the same texture or only slightly heavier, in no case being heavier than a very light plastic clay loam. The soil must be brought to a productive condition. Subsoils inclining toward stiffness in structure should be carefully avoided.

FALL PIPPIN SOILS

Soils adapted to the Fall Pippin are somewhat wider in range than those described for Northern Spy and Tompkins King. In fact, this variety may be very successfully grown on the soils described for both the Tompkins King and the Northern Spy. It is preferable, however, that the surface soil be a fine loam rather than the open textured loam described for the Tompkins King.

GRIMES GOLDEN SOILS

The Grimes is so similar to the Rhode Island Greening in soil adaptation that a separate description of the soils best for this variety will not be given. The Grimes has been so profitable in some districts under certain conditions of soil and climate, however, that its desirability for general planting has been widely heralded; and as a result this variety is now being planted in some sections with too little discrimination, with reference to both soil and climate.

The best general guide is to plant Grimes where the Rhode Island Greening tends to become a fall apple. This would eliminate it as a Massachusetts sort. That is, the Rhode Island Greening soil, located far enough south for that variety to be undesirable for extensive planting, is well adapted to and may well be utilized for the Grimes.

It is recognized that some growers as far north as New York may dissent from this view, but I have yet to see the Grimes grown at its best in the Rhode Island Greening region. The tendency for a considerable percentage of the fruit to be undersized when grown there is one of the prime reasons why it can not compete commercially with that grown under more favorable conditions. Besides, it is often not up to the standard in color.

The tendency of the tree to make unsatisfactory growth may be overcome in some measure if planted in soil to which it is adapted. It should never be planted on a light or thin soil, neither on a stiff soil. The tree maintains its best growth on a well drained fertile, moist soil, and under such conditions is a very desirable variety in its region. Good air drainage is essential. Lack of it makes necessary the elimination of many soil areas that would otherwise be desirable. Its excellent dessert quality makes Grimes a favorite sort both for family and for commercial use. For a special box trade it is especially valuable.

Even as far south as Pennsylvania the Grimes is less hardy than some other sorts. It is very susceptible to collar rot, and the feeling prevails that a block of Grimes will show many "skips" as early as 15 to 20 years from planting.

ROME BEAUTY SOILS

Rome Beauty bears the same relation to the Grimes in soil requirements as Baldwin does to the Rhode Island Greening in their respective regions. There is, however, something of an overlapping of regions. That is, the Baldwin extends farther south in adaptation than the Rhode Island Greening; and the Rome Beauty extends as far north as the Grimes. But this intra-regional overlapping of Rome Beauty and Baldwin is largely a matter of dove-tailing due to variations in elevation. Thus in southern Pennsylvania as to Baldwin in its southerly extension seeks its soil at higher elevations to offset the climatic changes, so does Rome Beauty in its northern extension seek the same soil at a lower elevation for the same reason.

The Baldwin tends to become a fall variety with increasing distance south, and where this tendency is sufficiently pronounced to materially lessen its desirability

it may well be replaced by the Rome Beauty which is adapted to the same kind of soil.

Rome Beauty is grown with fairly good success in the lower Hudson Valley and at low elevations in western New York, but there is some question whether it will become a leading commercial sort in either region.

BEN DAVIS AND GANO SOILS

These varieties are mentioned not to encourage their planting in Massachusetts, for it is believed they should not be planted here, but rather to show their relation to other varieties better adapted to conditions in this state.

Both Ben Davis and Gano show less effect from variations in the soils upon which they are grown than any others observed. Their well-known quality is probably somewhat indicative of why this is so, yet there are differences to be noted in the character of the fruit as affected by soil and climate. The latter feature is believed to be of great importance, for while there is no gain-saying the fact that in the Ben Davis will grow anywhere and produce fruit of some description, it requires a good deal of warm weather for its best development.

The mere fact that the Ben Davis may well be called the "apple of neglect," because it will probably stand more neglect than any other commercial variety and still bear fruit, accounts for the commercial growers' dictum that it is "a good barrel filler and a good shipper;" while they may follow this saying with the words, "and that is all." No other varieties are so cosmopolitan with regard to climate, and from New York to Alabama these apples have numerous advocates.

Soils as heavy and moist as described for the Rhode Island Greening are not desirable for either the Ben Davis or Gano. The tree is naturally of strong growth, hence this characteristic should not be intensified by planting on an excessively rich soil on account of the growth of tree and the poor quality and color of the fruit. At the same time, the opposite extreme is not desirable, for if the soil be too sandy the tree grows straggling.

Both of these varieties as planted in New York, Pennsylvania and states farther south in the Appalachian Region are bound to prove profitable but they are not altogether satisfactory. Soils adapted to the Baldwin, York Im-

perial or Winesap will grow good trees and fruit of both Ben Davis and Gano. Hence there are extensive soil areas, particularly in Pennsylvania, Maryland, the mountainous areas of Virginia and West Virginia that are well adapted to these varieties and they are also profitable varieties in western New York and in the Hudson Valley. But many orchards have been planted, especially in West Virginia, on thin shale hills where the soils are so poorly adapted to apple growing that not even the cosmopolite Ben Davis can bring satisfactory results. This is not the fault of the variety, and in fact the Ben Davis will probably bring better returns from such soils than any other variety. In the southern Piedmont region the Ben Davis drops so early in the season that it is not of commercial importance. In the southernmost Appalachian districts it may be grown, but only for the late fall trade in the extreme southern markets, as there is no call for it farther north.

From careful observation it is believed that the Ozark Ben Davis is a little larger than the Appalachian grown fruit, and that under the same conditions the Ozark fruit is sufficiently superior to the latter to bring a slightly higher price in the market. As a commercial proposition, however, the greatest number of crops secured in the Appalachian region in any considerable period, such as a decade, enables that section to compete successfully in the production of these varieties. A potent point to be considered, nevertheless, by the eastern growers is the outlook for future markets.

While the Appalachian region is admirably adapted to the production of varieties which yield well and are far superior to the Ben Davis and Gano in quality, the Ozarks have yet to find an apple of high quality which approaches the Ben Davis in prolificacy. And although varieties may, and probably will be developed which will replace the Ben Davis even there to some extent, except possibly for exacting shipment, it is certain to be grown there in enormous quantities for a long time. Hence there is and will be, so far as competition with that region is concerned, excellent opportunity for the Appalachian districts to grow varieties that do not have to compete with the Ben Davis, provided such varieties are grown, packed and marketed in accord with the most advanced methods. But this extra profit which may be obtained from such fruit will never be

realized by the slack average grower. For these two reasons, then, the Ben Davis and Gano are bound to remain as they are now, strong commercial varieties over a large area but New England can just as well grow varieties of much better quality that will also bring good yields. Hence, it would seem ill-advised to make further plantings of these sorts within her boundaries.

GRAVENSTEIN SOILS

This variety has given growers much trouble, but its general excellence, the high price the fruit brings and the strong demand for it in some markets makes the Gravenstein a tempting sort to plant. Its susceptibility to winter injury, however, is often a serious matter. There is good evidence to show that Gravenstein should not be forced in growth at least until it is 15 years old or older. On rich moist ground or with heavy fertilization with nitrogenous manures its growth is rarely matured early enough in the season to avoid more or less winter injury. It continues to grow until freezing weather and thus is very susceptible to injury. On a medium soil neither too moist nor too rich, its growth may the better be held in control, early annual maturity may be forced and the color of the fruit is satisfactory. The sub-soil should never be so clayey as to prevent ready downward percolation of any excess or free soil water. Annual applications of the mineral fertilizers such as basic slag and potash seem desirable on such soils, and a moderate amount of humus should be furnished but nitrogenous fertilizers should be used sparingly.

Fruit of good color is especially desirable with this variety, the color adding materially to the selling price. This has led to its being planted on thin or light sandy soils in some cases, but on such land the Gravenstein is on the whole unsatisfactory.

Gravenstein is a variety for the specialist and for such is a very profitable sort when grown near a market—especially if within driving distance. In the eastern part of the state where the early “drops” can be marketed to advantage—early dropping being a tendency of the Gravenstein—this variety is highly profitable.

ROXBURY RUSSETT SOIL

This variety is now seldom planted but there are some commercial orchards of it in Massachusetts; and many of

the old orchards contain a few trees. It is most extensively grown in the Oldtown district of Newbury, near Newburyport. The Roxbury Russett is a gross feeder, the growers believing that it will use heavy applications of stable manure to advantage.

In one of the most successful orchards the surface soil consists of a heavy loam from 10 to 15 inches deep which has been highly fertilized with stable manure and kept well supplied with humus for at least 50 years—the very antithesis of the soil conditions desired for the Baldwin. The sub-soil is lighter—a fine sandy loam or a gravelly sandy loam. The soil of another excellent orchard consists of a light silty and fine sandy loam underlain by fine sandy loam.

A deep rich loamy soil with the upper sub-soil of at least medium porosity seems to be essential, though a heavier sub-soil at a depth of 4 to 6 feet is apparently not objectionable. The first orchard mentioned is underlain by a retentive sub-soil of clay loam to clay, at a depth of about 6 feet. The Roxbury Russett thrives on a much richer soil than the Baldwin which does not color well on the best Russett soils. The Rhode Island Greening soil on the other hand is somewhat too clayey for the Roxbury Russett.

Grown on the soil conditions described the Roxbury tree is prolific, the fruit attains large size and good quality, its keeping characteristics are excellent and it brings a good price, especially for export trade. Young trees of this sort are now so rarely planted that there would seem to be a good opportunity for it in a limited way to supply the small yet definite demand for it.

We have seen how several of our important crops have reached their highest development on certain kinds of soil, and in the light of this experience it seems inevitable to conclude that soils may be selected for different crops in accordance with their relative adaptations to the growth of such crops. In fact, there is nothing new or startling in this statement. It is simply summing up a long line of experience in the best farm practice of the country. Only the best farm practice the most perfect soil adaptation and the most effective soil-crop management can long survive because no other kinds pay as well. We have been forced by competition to recognize soil adaptation to different crops. It is a matter of economic efficiency.

Attention has been called to the further fact that the

best results from certain varieties of some crops have been obtained on definite soil conditions, and this is especially well illustrated by different varieties of apples. Other fruits such as the Peach and the Pear show a similar range of soil adaptability as to the individual variety, but these will not be considered at this time. It has seemed best to use my time this morning in the discussing of such adaptation principles rather than in discussing Massachusetts soil in detail. In the latter individual locations are of absorbing interest and are best brought out, perhaps were there time for it, in open discussion.

Excellent opportunities for fruit culture in Massachusetts are abundant. No other state can grow a greater number of really good varieties of apples, and very few states can equal her in this respect. Yet choice fruit is constantly being brought into the state to supply her wants while cheaper fruit is as constantly being exported because it is not grown as well as it should be. In common with other northeastern states, Massachusetts possesses a climate in which a large number of varieties of apples thrive. Her soils vary greatly, but include large areas in the aggregate which are well adapted to produce all the choice apples the State can consume. This land may be bought, furthermore, at a low price—in fact at a lower price than in many states that now ship large quantities of apples a long distance to markets. Massachusetts markets are unexcelled, and there are plenty of favorable soil areas within the state on sites suitable for orcharding that are adapted to productive varieties of high quality and such lands may still be bought for \$10 to \$30 an acre. It seems strange that such opportunities have not been taken advantage of more fully, yet I would not advocate that those without experience, or at least careful study, plan orchards extensively even under the favorable conditions that Massachusetts affords. Orcharding is a business requiring a high degree of skill and much patience, and there is danger lest some be led by the present popular wave of enthusiasm for the business to engage in it without due consideration of these matters. This applies especially to urban dwellers who are unfamiliar with crop growing, and for them in particular it may be said that orcharding is an easy business to engage in, but success is never easy in any line of business. Large plantings of orchard are now being made in various parts of this country. Many of these will be profitable and many others

unprofitable. I would suggest that no one plant orchard unless determined to be far above the average orchardist in skill of management. One must at least be somewhat above the average if any reasonable profit is to be secured for any considerable term of years. Stress is laid upon this point because so many without experience, having become over-enthused by the "back to-the-land" agitation now so often heard, are contemplating the planting of orchard. Unfortunately, such are rarely able to attend meetings of this sort. Notwithstanding this suggestion that the uninitiated begin orcharding only after a reasonable and careful consideration of its various details, I may say that there is always a good opportunity for anyone who will so study the business as to master it thoroughly; and for such, conditions are highly favorable in Massachusetts (Applause).

A Member. I should like to ask the speaker in regard to Wealthy apples. Will they thrive on the same soil as the Baldwin?

Mr. Wilder. Yes, I should say so, very similar. They may under the same conditions that I have described.

The President. How about the McIntosh?

Mr. Wilder. The President asks about the McIntosh. Those in the district where I have been working have been always young ones. It is almost impossible to see trees old enough, of course, to draw any large experience from it, but its general character of growth is such that I have seen quite a good many trees of this sort that have reached such an age that I wouldn't hesitate to draw a conclusion. I feel, however, that the McIntosh needs a somewhat little stronger soil than the Baldwin. On the other hand, if you want to take the Baldwin, it will stand a little bit more humus in the Baldwin soil. It should be mellow and deep. I think the root system is not so strong as it is for the Baldwin, which happens to be strong. Any stiff sub-soil on a weak growing variety of that sort is undesirable. Where shale rock underlies the soil only two or three feet the McIntosh curls up its toes, so to speak.

A Member. I would like to ask the speaker if he knows any place in Central Massachusetts where he would recommend the Greening?

Mr. Wilder. From what view point? Referring to soil, or as a general proposition?

A Member. As to soil.

Mr. Wilder. I think so far as the soils are concerned the Greening should grow successfully in Worcester County. Did you have in mind the clear green Greening, or a high blush Greening?

A Member. I didn't think of that particular.

Mr. Wilder. For the green Greening the heavier soil is right—these broad top hills of which you find so many in Central Massachusetts, are perfectly good for Greenings. The lighter ones I would utilize for the Baldwin, unless you desire to utilize them for something else. I think, considering the life of the Greening, it is a tender variety to grow as compared with the Ben Davis, or something of that sort; it is much more tender, has to be handled more carefully and we must learn to use it with a good deal of care if we are going to place it in the market in this country. There have been very few Rhode Island Greenings brought into the large cities like New York that haven't been more or less bruised, particularly in such seasons as this, when the fruit has matured quickly.

A Member. What is the condition as to the Gravenstein?

Mr. Wilder. That is another variety which is fastidious as to soil requirements. I have treated that at some length in this paper. Now, I like a medium soil. It can't stand too much ammonia or a soil which is too moist, which will hold its growth away into the winter. I should always use care to keep away from that sort of soil, to avoid winter injury to the trees, to which they are susceptible.

A Member. I would like to ask the Professor one question: For Western Massachusetts do you think there is anything ahead of the old Baldwin as a commercial apple?

Mr. Wilder. I will say No at once, with this possible qualification: If you can learn how to control that brown spot, which is prevalent now in some other parts of the state. Generally speaking I think as a statement that is safe. The Baldwin apple is going to be grown in the north-western United States and while we know it is grown everywhere, there is nobody that can compete with the northeastern United States in its production. It grows well in northern Pennsylvania, at an altitude of 1,500 to 2,000 feet; from Wellsborough north to the New York line, in northeastern New York. It is all high land, and the Baldwin does pretty well when you get it at high altitudes. It will

hold through, but in southern Pennsylvania it is the fall apple and of course it is a spongy thing, with not a great deal of juice or flavor and you can't hold it in open storage after Christmas. I say without hesitation they have got plenty of other varieties down there—I have told them the same thing—I have said to them, "Shut down on the Baldwin" and I always say, "Don't try to grow Baldwins in competition with somebody who can grow them better than you." The York Imperial is their standard variety and succeeds remarkably well, in the northeast corner of the state, where the Baldwin does not.

A Member. How about the Stark?

Mr. Wilder. I don't know. I have seen it grown in scattered places. I know that its color is not quite white enough to attract the public in the market. That is the only objection to it, so far as I know. Yet I find people who are finding it profitable. In some places it is very prolific and bears young and would be desirable only for that, as a commercial fruit.

The President. There are two committees to report. Shall we hear them before the dinner hour, or postpone it until the afternoon session?

A Member. I move we have them after dinner.

A Member. Second the motion.

The President. A motion to adjourn is in order. (Adjourned to 1.30 p. m.).

AFTERNOON SESSION

Meeting called to order at 1.45 p. m. Mr. J. Lewis Ellsworth, presiding.

Mr. Ellsworth. Gentlemen: Your president, Prof. Maynard, has asked me if I would preside. Now, you remember that this is your meeting and I will do the best I can to carry on the formal part. I will say that it is a pleasure to me, being a Worcester man, to see the large attendance and the great interest taken in the Massachusetts Fruit Growers' Association. Of course, a great deal of credit must be given to Mr. Brown, who is in all places at all times and everywhere at once. (Applause). Another thing, on account of the great interest that is being taken in fruit and on account of the fact that Worcester is so centrally located, we believe that a few years from now we will have to have Mechanics Hall.

We will finish up the work of the morning by hearing two reports that were laid on the table until after the lunch hour, first, the report of the committee on State Appropriations, by Mr. Harold L. Frost of Arlington.

REPORT OF COMMITTEE ON STATE APPROPRIATION

At a meeting of the officers and directors of the Massachusetts Fruit Growers' Association, held in Worcester, December 19, 1911, a committee of three consisting of the president, vice-president and S. J. Emerson of Lunenburg, were appointed for securing state aid for your Association.

Immediately upon appointment, your chairman conferred with members of the present Legislature and also Messrs. R. H. Race and Wilfrid Wheeler, who are both members of the State Board of Agriculture and the Massachusetts Fruit Growers' Association. It was found that the secretary of the State Board of Agriculture had put in the following Act:

"An Act for the Encouragement of Agriculture. Be it enacted, etc., as follows:

Section 1. There shall annually be allowed and paid out of the treasury of the Commonwealth the sum of five thousand dollars, to be expended by the State Board of Agriculture in the holding of special shows devoted to the products of special lines of agriculture, such as fruit growing, corn growing and dairying, either by the Board or by other organizations, acting under the direction of the Board and under such rules and regulations as the Board shall determine, but no part of the sum herein appropriated shall be paid for such exhibitions held by the agricultural societies receiving bounty from the Commonwealth; in the holding of demonstrations illustrating the best methods in agriculture; in payment of the salaries and expenses of agents who shall instruct the citizens of the Commonwealth in the best methods in agriculture; or in such other manner as the Board may deem best for the encouragement of agriculture.

Section 2. This act shall take effect upon its passage."

After conferring with the above-mentioned gentlemen and Secretary Brown, it was decided best for the Association to combine forces with the State Board of Agriculture and work for their Act for the encouragement of agriculture.

If this had not been done it would have been necessary to put in a separate act and antagonize the State Board. As

there were no funds for carrying on the fight and pushing the bill through the House and Senate, a verbal agreement was made with certain members of the State Board of Agriculture. Although it was impossible to get any definite agreement in writing, it was verbally understood that a number of the members of the State Board of Agriculture would use their influence toward giving our Association a certain amount of the appropriation made by the State for the encouragement of agriculture. The Act was drawn in such a way that some of this money can be paid to our treasury for the purpose of promoting its interests, and we feel that we can work with the State Board of Agriculture for the mutual benefit of both organizations, as has been the case in the past.

Your committee at the same time looked up the advisability of our owning some property and being represented on the State Board of Agriculture, but we found that all of the State aid must be paid for premiums or prizes. If this should be thought advisable by the Association it will only be necessary for us to incorporate and own one thousand dollars' worth of property. Your committee at the present time is not prepared to advise this move, but it may be wise at some time in the future. This money would not cover our required expenditures, as nearly all our work consists in the securing of speakers on up-to-date subjects and demonstration work. With the aid which we should secure from the State Board Act and the money which should be forthcoming from the increased membership, we should be able to have the best speakers at our annual meetings that it is possible to secure. Until the Act is passed, we ask every member to use every effort possible toward influencing his representative and senator for the interests of our own Association and the State Board. Respectfully submitted:

HAROLD L. FROST.

Chairman, for the Committee.

Mr. Frost. The act asked for \$5,000 for the promotion or encouragement of agriculture, and that act was drawn so loosely that some of the money could be given for the use of the Fruit Growers' Association.

Mr. Ellsworth. You meant, drawn so broadly?

Mr. Frost. So broadly, yes. That was a slip of the tongue. (Laughter). I want to say that the act called for

an appropriation of \$5,000, which has been cut by the committee to \$2,000; but I am authorized by Secretary Ellsworth to say that that bill for \$2,000 has been reported by the Ways and Means Committee. It has gone through two committees. I think you could help this go through if you would ask your representatives and senators to vote for the bill. We feel that we can have plenty of support if we will work with the State Board in this matter. I don't know that there is anything more that can be done at the present time, as your committee was given full authority to act in any way that it saw fit. They did not act individually until they had conferred with a number of members of the association.

A Member. Can you give us the exact name of the bill?

Mr. Frost. "An act for the encouragement of agriculture, and especially shows and otherwise." I haven't the number of the bill, but I think your representatives will understand what the bill is.

Mr. Ellsworth. In regard to that bill that is referred to. I am a little at sea as to the exact number, but it is somewhere around 523, and it is drawn to encourage the fruit industry and the corn industry along the show line and it is drawn, as Mr. Frost has already told you, so broadly that it can be used,—a certain portion of it can be used for this association, if it goes through; and I hope that all you gentlemen will speak to your senators and representatives to favor that bill, and if you think it wise, all other bills that the Board of Agriculture have introduced. That would be very acceptable. Anything to be said upon that report? If not, a motion to accept will be in order.

A Member. I move that the report be accepted and adopted.

A Member. Second the motion.

Mr. Ellsworth. Moved and seconded that the report be accepted and adopted. Those in favor say "Aye." Contrary minded "No." It is a unanimous vote.

The next business is the report on "Co-operation," by Mr. J. H. Putnam, of Litchfield, Connecticut.

REPORT OF COMMITTEE ON CO-OPERATION

If I correctly understand the duty of this committee, it was intended that we should investigate and report upon the advisability of co-operative selling of the products of

New England orchards.

Some of the advantages of such selling that have come to our attention in studying the subject are as follows :

1st. By advertising, to encourage the use of fruit and educate the public regarding its value as a staple article of diet, and so increase consumption to keep pace with increased production.

2nd. By advertising, to acquaint the public with the superior quality of New England grown fruit, and thus hold our own markets against the much vaunted products of the west.

3rd. To satisfy this stimulated demand with uniform packages of standard grades of quality, that the market can depend upon to be as represented.

4th. To more evenly distribute the fruit so that all markets would be supplied at all times and yet all gluts avoided.

5th. Properly worked, this should be to the advantage of the consumer as well as to the producer. It would prevent wastes, give better goods of guaranteed quality, and by reducing cost of distribution, should lower the cost to the consumer without reducing the profits of the producer. This should increase consumption to the advantage of all.

The Connecticut Pomological Society has appointed a committee to make a survey of the orchards and a census of the fruit products of that state, and we would suggest that if this could be done in all of the New England states we would have a much better understanding of the possibilities before us.

We believe, however, that the time has already arrived when co-operative buying can be made of great advantage to all our members. Fertilizers, machinery, spray materials etc., can be purchased at a saving, thus reducing the cost of production. There are now farmers co-operative associations at work through other organizations with which every fruit grower can get in touch, and we recommend that you investigate the opportunities they afford for the following reasons.

This co-operative buying will effect a substantial reduction in cost of production without sacrificing their individuality as growers.

It will be better to make use of and strengthen existing agencies rather than to start competitive ones. Admitting they have made mistakes, it is only by correcting our mistakes that we advance in anything.

We may thus become accustomed to co-operation, to pooling our interests, to the methods of organization necessary for its success, and when the time seems ripe, for the co-operating in selling our fruits, if we find our purchasing agency is not suited for this purpose, we should then be prepared, with the experience gained, to form an organization, that, from the start, will fulfill successfully all the functions, that, we believe such an organized movement capable of, in the co-operative selling of our New England fruits.

J. H. PUTNAM,
C. A. SMITH,
G. S. KNAPP,

Committee

(Applause).

Mr. Ellsworth. You have heard the report on cooperation.

Mr. Wilder. I move that we accept that report, but that we do not discharge the committee, that they be continued in force to carry on so far as possible their recommendations.

Mr. Ellsworth. Very good. Mr. Wilder moves that you accept the report but continue in force the committee to study up that problem. Those in favor say "Aye;" contrary minded "No." It is a unanimous vote.

The next business is the election of officers, a report by the chairman, Mr. Wheeler, of the nominating committee.

Mr. Wheeler. Mr. Hittenger has declined to serve as chairman, and the committee appointed me. As chairman of the nominating committee I beg to submit the following list of nominations: (See Page 2).

Mr. Wheeler. I notice that we have no delegates from Plymouth, Barnstable and Bristol Counties. The Secretary's books show that we have no members in any of those counties and therefore can't have directors on the board unless we have membership in those counties. It seems rather a pity that we haven't membership in those counties so that the whole state can be represented in this Fruit Growers' Association.

Mr. Ellsworth. You have heard the report of your committee on nominations. Unless it is called for I won't read the nominations. If it is called for I will read them again. Motion is in order to accept and adopt this list and elect the gentlemen that have been nominated by your committee.

A Member. I move that it be adopted.

A Member. Second the motion.

Mr. Ellsworth. It is moved and seconded that we accept the report and adopt the recommendations of this committee. Now, everybody wants to vote, for this is very important, as you know your offices are filled by most excellent men. Vote one way or the other. All in favor say "Aye;" those opposed "No." It is a unanimous vote, and you have elected the gentlemen named by the committee.

Is there any other business before we take up the program? It is my pleasure to introduce to you Mr. A. T. Henry of Wallingford, Connecticut, on the subject of "Practical Details of Spraying." I introduce to you Mr. Henry of Wallingford, Connecticut. (Applause).

PRACTICAL DETAILS OF SPRAYING

A. T. HENRY

Wallingford, Conn.

Mr. President and Friends: I am glad to be with you here in Massachusetts today and to see so much interest in fruit growing. When we used to come to call our meetings in Connecticut—and I have attended those in other states in the past years—the attendance was not anything like what it is at the present time. Our own society has increased in membership and I understand that yours has, too. One of the principal points in going to the meetings is not so much what the speakers say from the platform as in meeting and making new friends and seeing new implements and knowing new people and talking with people at the hall, at the hotels and other places. That is fully as important to me as what the speakers may say from the platform.

This spraying subject is an old one. We all know more or less about it and I have nothing startling or new to offer. It has all been said and written many times over. Perhaps I can give it to you in a little different way and perhaps there may be a few practical points which I may be able

to give you. I want you to feel perfectly free to ask questions and stop me at any time, and we will go over any point. Oftentimes when I go to these meetings and a person gets up and speaks I wonder if he is really in the business or if he is receiving his money from some outside source. Now, personally I will say that we are in the fruit business on a strictly commercial plan. Our farm is run to pay, has got to pay its own way; no money coming in from any outside sources. I live on the farm myself and I have always worked on a farm and always hope to be able to. I think there is no business in which a person derives so much pleasure and at the same time can have a reasonable income as he can from the fruit business. We came from the west to New England to raise fruit because I had previously worked in New England and I believed in it. We could have gone west just as well as come east, but I believe the east has certain advantages, namely, in the markets, in transportation and in the soil, which place it far ahead of anything in the west. (Applause).

Well, we will have to get at this spraying problem. I don't know of any better way than to follow it through, than to go on the fruit farm and start in the spraying and follow the seasons right on, all the way through. Perhaps we will get all the spraying in that way and hit most of the important points. The thing that brought this spraying before the country perhaps as much as anything was the San Jose scale. This came into the country from eight to ten years ago, perhaps longer, and killed a good many trees. If I had old apple trees or pear trees or peach trees and they were badly inerusted with scale I should use oil on them. There are several good oils on the market and also several which are not good and which have done a lot of harm; and the harm which the poor ones have done has hurt the reputation of the good ones. But, as I say, if the trees are old and rough bark and covered with scale I should certainly use oil on them for the first spraying. If the trees are in good condition perhaps a dose of lime-sulfur will keep them all right. Most of the fruit growers are familiar with the regular old-fashioned lime-sulfur or, as it is sometimes called, the 15-20-50 formula, so I don't think it is necessary to go over that as most of you are familiar with it. Something that has come on the market rather lately is the commercial lime-sulfur. It has a good many advantages over the old-fashioned; it can be kept indefinitely in barrels,

it can be applied cold oftentimes, which enable a person to go out and get in an afternoon's spraying when he wouldn't have the old-fashioned on hand or when he wouldn't feel like going out and boiling it up. It is good for that purpose. There is this commercial lime-sulfur, and lately there has come out the home-made concentrated, in which there seems to be a good deal of interest. This is practically the same as the commercial, except that most of us make it so that it is not quite as strong and cannot be diluted quite so much. This is perhaps not so familiar as the old-fashioned, so perhaps I will just go into the manufacture of this home-made concentrated. There are several formulas given out for it. One that we have used personally is 60 pounds of good stone lime, with a high percentage of calcium and a low percentage of magnesia. If there is much magnesia in it, it forms quite a heavy sediment. Then to that 60 pounds of lime, after you have got it started slaking with some warm water, put in from 100 to 130 pounds of sulfur, which has previously been made into paste form. After this sulfur is added to the lime, a very high degree of heat is generated and it goes into combination with the lime. This is boiled for an hour and if properly made will give you a mixture which will test from 26° to 28° with the Beaume hydrometer. Now, the commercial mixtures test from 31° to 33°, and they are diluted about 1 to 9. The home-made isn't quite so strong, so you can't use it with quite so much water added. We put from 6 to 7 parts of water with this home-made. This can be kept indefinitely if it is stored in a tight barrel. The barrel ought to be filled full, and if the barrels are not filled entirely full, if you have put it in an open barrel and can't cork it up, pour a little oil on, or anything to keep the air from it. If properly made there won't be hardly any sediment in it, and it can be stored from one year to another or can be used cold.

There is a great deal of difference in the different forms of sulfur. There is the flowers of sulfur and the crude powdered brimstone. We tried all these forms and found that the cheapest was the best. The flowers cost about \$2.50 a hundred, while the crude powdered sulfur only costs about \$1.50 a hundred. I have a sample of it here if any one of you are interested, and it is very fine, as you see. It is simply the sulfur which has been ground up, so that it is the cheapest form, but at the same time it gives the best results with us in the manufacture of any of the lime-sulfur

products.

One of the difficult things about making this lime-sulfur is the straining of it, to get all the sediment out. Of course in 60 pounds of lime there is bound to be some particles of stone and the "Rural New Yorker" has several times shown pictures of a strainer which we used, and I am sure that some of you have used it and find it to be very handy. Yesterday afternoon I made a little model of it. The principle is different from most strainers. Most strainers strain downward and when the sediment collects on the strainer, it stops the strainer up and that makes a lot of trouble. This strain upwards. (Mr. Henry explains the working of the model to the meeting). At night or whenever you are done you can take the strainer right out and fasten it on a board and the box can be turned upside down and flushed out with water; and we find that is a very practical and handy form of strainer; in fact it is the only one that gives us any satisfaction at all. The others always get clogged up and bother us a great deal. This can be made by anyone out of a wooden box and a few pieces of board and a strainer, but it always wants to be loose so that it can be taken out. I will leave that here if anyone is interested. It is a very crude form, but perhaps will show you something of the idea of the thing.

Now, before you start to spray you have got to have some kind of an equipment. The first thing is a good pump. Don't try to buy some little bit of a cheap pump, with about eight feet of hose and expect that you are going to spray big apple trees or peach trees with any satisfaction. You want a good pump and plenty of hose. An equipment with at least one hundred pounds of pressure is good and 200 will save a great deal of material and more time. It is time which is precious. You all know what time is worth when you are having a good spraying day. You can't postpone it, and high pressure will do more to save time than any other thing perhaps. It is surprising how much more material can be applied at two hundred than at one hundred.

A Member. How are you going to know what the pressure is?

Mr. Henry. Put a pressure gauge on your pump. There was never a pump made but what you can put a pressure gauge on it if you want to. If you haven't got any other

way, get a quarter-inch drill, tap it out and put a gauge on. Any plumber can put a gauge on. It is easy to put a gauge on a pump and I should certainly never use a pump without a pressure gauge on it, because oftentimes if you have three or four going you can easily pick out the men that are doing the hard pumping. It is the pressure that helps in the spraying. So I say have a gauge on the pump and have plenty of good hose. In spraying peach tree rows eighteen feet apart we use at least twenty-five feet of hose, and we have found the wire-wound to be very satisfactory, especially on stony land. It prevents the hose from kinking. Where the hose is wound with wire it is impossible for the hose to kink, and it is kinking that breaks it. When wound with wire you can't turn it short; it has to make a loop and it can't kink and bend and be broken in that way. We like the wire-wound hose. It only adds about 1 1-2 or 2 per cent. to the expense of the hose and it lasts a good deal longer, especially on stony ground.

We use angle nozzles entirely. They save a great deal of walking especially on young trees. Where a person can turn the extension rod from one side to the other and so on, on small trees and large ones it saves a lot of walking. If you have straight nozzles and want to use the "Y," here (indicating) is what is called an angle Y, a very handy thing; but putting an angle nozzle on a straight Y, sometimes you have them working at each other and your sprays hit together at the center; but with the angle Y and solid nozzles, the nozzles have to be in the proper position and your sprays will never interfere. I think that the disc nozzles are coming into use a good deal. They are all right if you change them often enough. It is just a hole in some cast metal and it has got to be changed. When you use lime-sulfur sometimes you have to change the disc every day. They only cost a couple of cents apiece and it doesn't pay to fool with the old ones. If you use oil you don't have to change so often, because the hole is small enough so that you get the oil pressure. In your shutoffs see that there is a good opening. Oftentimes I have seen a shutoff on the market and when you looked through it it was all filled up from the casting and that left a very small hole through. While you may have good pressure in your pump you will have very small pressure in your nozzle. See that they are clean all the way through. If there is any obstruction from the casting, take a file and

ream it out and keep it smooth and clean on the inside. It will help a great deal.

One of the most important things of all is to clean out the pumps every night. That is the base, the work which counts the most in the whole day, and a half hour or fifteen minutes spent on the pump, pumping clean water through your pump every night will save you a whole lot of time. You never have any trouble in the morning then, and everything is ready to go ahead with. If you leave sediment there you find that the valves and everything are all clogged up and it will make you a whole lot of trouble. Have a good outfit all the way through.

The cost of a spraying outfit isn't very much and it doesn't pay to try to save on that end of it. Now, this lime-sulfur I spoke of a few minutes ago can be made with live steam, and in Canada at the present time they are using direct fires under it a good deal. They are taking big wooden boxes about two feet deep and four by six in dimensions and nailing a piece of sheet steel on the bottom of them, making a brick or concrete arch and putting the fire directly under. This makes a very satisfactory and cheap outfit. We are installing a boiler to cook eight barrels at a time and use log wood. It doesn't take such small wood as does a steam plant, and any person that can build up a fire can go ahead and make up your spray.

The next spray for apple trees used to be for the codling moth, but now the experiment stations are recommending an early spray. I noticed in a talk this morning on bees one man said that a wet, rainy season he hadn't got the apple crop which he expected, and he laid it to the lack of bees. Now, this may be another question. When the weather is rainy and bad at this time of the year, which is before the blossoms pollenate, just before they open, they stand for several days with the stems all exposed, and if the weather is rainy and bad at this time there is a fungus which attacks the small stems of the apple and kills them. All this, of course, will prevent the apple blossoms from pollinating and it is often called lack of pollination and it is blamed on to everything else but it is caused by this fungus disease which kills the blossoms before they are open. I know you can go in orchards and find them in handfuls under the trees, with this fungus disease plainly showing on the little stems of the apples, and this is a very serious thing. The stations recommend a good

spraying with lime-sulfur or Bordeaux at this time just before the bloom opens and before a rainy time, before the infection can take place.

Then, of course, the next spray after this is when the petals have dropped or are just starting to fall off and are ready for the coddling moth. You are all familiar with them, so I won't take any time on that. Two or three pounds of arsenate of lead I believe is being most generally used or the Bordeaux is used and a good many are using the commercial lime-sulfur, which is diluted 1 to 40 in the case of strong trees or 1 to 30 or 35 depending on the strength of your home-made. This makes a black, bad looking mixture, but it isn't quite as bad looking to us as it is to the coddling moth and it doesn't ruin the fruit so much as the Bordeaux does in some seasons. If the canker worms are bad we apply another spray about ten days later of arsenate of lead and Bordeaux or lime-sulfur, and for the apple scab. We have to be very careful in this spray. There are some varieties of apples, like the Ban Davis, which are very easily marked with the Bordeaux injury and so these varieties will require a weaker mixture than some of the others, and this can only be determined by experiment in your own locality. If the weather is rainy and damp it seems as if a very weak solution will cause injury. If the weather is clear and sunshiny it can be used stronger.

Perhaps we will go through with the apple spraying. The last spraying is about eight or nine weeks after the blossoms have opened, for the second brood of coddling moths and any other leave-eating insects and some of the later fungus troubles. That is the last spraying on the apples.

Now, the peach spraying: We have already sprayed them in the spring with lime-sulfur or oil, for the San Jose scale and the peach leaf curl. In damp seasons the peach leaf curl is very serious and fully as important as the scale. We spray every year, regardless of any scale or any fungus, just to catch the peach leaf curl. When the buds are open the little peach blossoms begin to drop away perhaps ten days or two weeks after the bloom is open and we spray with what is called self-boiled lime-sulfur or Scott Mixture named after Mr. Scott of Washington. That is really not a boiled mixture. It is made by taking eight pounds of the same cheap form of sulfur eight pounds of lime,

starting your lime to slake and adding this sulfur in the form of a paste. Don't try to get all the heat of the lime, especially if it is a hot lime. Just try to get up a kind of whitewash out of your lime and sulfur. After it is thoroughly slaked it is drowned with cold water, so that we say that all it is really is whitewash. This requires extra good agitation. I have seen in the bottom of a barrel this stuff pretty near as hard as cement, where they had to take a sharp instrument to get it out, so that it requires extremely good agitation if you are going to apply it to peaches. This is applied again three weeks afterwards, and at this time, if you have any cureulio add two or three pounds of arsenate of lead. The last application of this same spray of eight pounds of lime and eight pounds of sulfur is made about a month before the peach ripens. I know that year before last we were a little late on our spraying and we applied it only about three weeks before they ripened and they looked as if they had all been whitewashed. The peaches were all white with it but there wasn't very much complaint, there wasn't any complaint, in fact, and they kept fine; but I wouldn't advise it so late as that; it shouldn't be applied within four weeks of the ripening, because it forms a white coating and is hard looking. You can add the arsenate of lead with this material at any time. This is not harmful to the leaves of the peach trees nor to the blossoms.

Mr. Morse. Could the concentrated lime-sulfur be used on the peaches?

Mr. Henry. I was just coming to that. We tried that in connection with the Connecticut Experiment Station, and I guess we had a dozen different mixtures there last year. We tried everything we ever heard and a lot that nobody else ever did, I guess, and all of them hurt the peaches. We used a concentrated mixture as weak as 1 to 150 and with us it simply seared the leaves and the peaches dropped on the ground within three or four days after. They took all the peaches off the trees, and they were a heavy load. Some other people have used some strengths and it didn't seem to do any damage with them. But you can use the self-boiled lime-sulfur and I will guarantee it won't hurt, either with or without the arsenate of lead. But be very careful how you use the concentrated mixture on peaches. Use it on one or two trees and if it doesn't hurt them go ahead; but we haven't been successful with it and have found that it did very severe damage on ours.

A Member. I want to say that I have used home-made lime-sulfur on peaches and I saw no perceptible damage, and I used it a good deal stronger than you have mentioned.

Mr. Henry. Yes? Well, there are some who have, and there are some who haven't found danger from it. Perhaps there may have been some material in ours which was harmful, but I have heard of a good many who had serious injury from using the concentrated. This is a lot nicer to use, it costs less to make up and it requires very good agitation and leaves quite a coating on the peach. If it doesn't rain the peach looks as if it had been whitewashed and you have to be careful on that account.

One of the troubles that sometimes attacks young apple trees is the aphid. These are green plant life and on young trees take a pail of soap suds and bend the tops over into the pail and work the top of the tree back and forth. If the leaves on an apple tree are curled up there is no use trying to spray for the aphid, because they are inside and you couldn't touch them if you put a barrel of it on the trees. The only way is to spray before they curl or, in case of young trees, take a pail of soap suds and bend the tops over into the pail and work it back and forth between the hands and force the suds in and kill the aphid. A couple of pails of laundry soap suds will kill them as well as anything.

I think that is perhaps all there is on the subject of spraying, only that in this spraying we have got to remember that fungus diseases are plenty and that when the fungus disease has got started under the surface of the leaf there isn't any spray which you can apply which will kill it unless you kill the leaf too. You have got to get your fungicide on the leaf before the fungus starts to grow, so that when the spore lights on the leaf and germinates it will be killed by the fungicide. That is the principle on which it works. In spraying for insects, for the codling moth there before the worm is hatched, because if you get at it the first week, the first half week, it only takes a very small amount to kill. If you wait and spray when the leaves are half eaten by the canker worm they will finish the tree before they die, but if your poison is all there first it just takes a little bit to kill them and there isn't much damage done.

I have tried to touch upon most of the important points. I have some bulletins here on this concentrated lime sulfur and some of these manufacturers, the self-boiled lime-

sulfur, and if any of you are interested you can get the numbers and can write to the experiment station and get them. If there are any points I haven't made clear I shall be very glad to answer anything on the question of spraying.

Mr. Barber. Is there anything in spraying apple trees that will injure the fruit or prevent the fruit from keeping? Last year I sprayed for the first time and had the best looking apples I ever had, firm and solid, but they never kept so poorly as last year. Was it the season, or the spraying?

Mr. Henry. I think it has been proven that apples that have been sprayed will keep a great deal better than apples that have not been sprayed; at least, it has been our experience that our sprayed fruit has kept a good deal better, and I know that when the buyers come through the neighborhood one of the first questions they ask is whether the fruit has been sprayed, and if it has not been sprayed they say they will have to make a discount, because the spraying has the result of making them keep a whole lot better.

Mr. E. F. Adams. Can you spray so as to catch the browntail when they first hatch out, and not injure the fruit.

Mr. Henry. I am not familiar with the browntail. I am glad to say we haven't got that. We have enough other troubles, but we haven't got that. I never saw them.

A Member. Could hydrated lime be used for making the summer spray of lime-sulfur?

Mr. Henry. I have 10 tons and I am going to try it this summer, but I have never used it yet.

A Member. Do you think that the hot season of last year had anything to do with these results?

Mr. Henry. I wouldn't be at all surprised. I know that the apples often ripened up ahead of time and that they were picked really after they ought to have been, and that may have had a good deal to do with the fruit not keeping, and so it was not on account of the spraying. I think it was more the forwardness of the season and the apples perhaps being over-ripe or being put into storage too warm or left out too long before storing.

A Member. I would like to ask if anybody here in the audience has practiced spraying so as to kill the browntails by the last spraying, or whether it is a dangerous treatment to try, in regard to spoiling the fruit, and so forth? I

would like to know if anybody has got as far as that.

Mr. Henry. Perhaps someone in the audience can answer that question: I can't. I have had no experience whatever.

Mr. Sprague. I would like to ask Mr. Harold Frost what experience he has had as to its affecting the fruit. I would like to tell you an experience we have had. We sprayed our young trees and where we had no fruit on the younger trees we have had to pick the browntails this winter, and we are a little bit afraid on some varieties where we had fruit to spray at that time. Personally, I come from western New York where the buyer is very anxious to see the spraying on the apples and I am not so much afraid to spray as they are here, and we sprayed our McIntosh this year when they were badly spotted, so badly spotted that the apples beneath the spray didn't turn red until very late in the season and we successfully controlled the browntail there and I don't think the apple was hurt; in fact, some of those apples took prizes at the New England Fruit Show this fall.

Mr. Frost. What date was it?

Mr. Sprague. The first week in August, from the 7th to the 10th, I believe.

Mr. Frost. What did you spray with, and what strength?

Mr. Sprague. We used arsenate of lead, about three pounds to 50 gallons.

Mr. Frost. What date?

Mr. Sprague. About the first of August, I think. We were a little bit late.

Mr. Ellsworth. Any further questions to ask the speaker or anyone else? We don't want to waste a moment.

Mr. Frost. I would like to state to the gentleman who asked the question about spraying for the browntails on the shade trees we are doing a great deal of work in the controlling of the browntail and we find it cheaper than cutting off the nest; but it is very dangerous, I think, to use it where there is fruit on the trees, although you might not poison anyone. But I know there was a case in Maine where the owner sprayed a crop and the information was spread around that those apples had been sprayed with arsenate of lead, and he had great difficulty in marketing apples. If

you spray thoroughly in May and June, with plenty of arsenate of lead, I don't know whether you will have very much trouble with the hatching of the browntails in August. I have sprayed apples and have used paris green, depending on it to wash right off. The arsenate of lead will do the work well, but I think you do it at your own risk.

Mr. Ellsworth. Might I add a word in regard to spraying when the fruit is beginning to mature, as you would have to do to kill browntails? Two years ago a member of the Boston Board of Health called at my office and said that they were discovering poison on apples in Boston and they were going to investigate it very thoroughly and were going to advise people not eating apples, and I asked him to hold up until they found out whether there was more than one lot on the market. Upon further investigation they only found one lot, but somebody had sent some apples to the market with poison on them. So you see the risk you people run if you go to putting poison on the apples late in the year against the consumption of the apples. You don't know how the Boards of Health are looking out for the health of you individuals, and they are liable to do something that would turn the tide from eating apples if they started on this line.

Mr. John B. Castner—Hood River, Oregon. I don't know how strong you have to use the arsenate of lead to spray in order to kill the browntails, but as to this talk of this spraying with arsenate of lead injuring the apples, I should say it does not. I spray every year the first of September. We have a late brood of worms, coddling moths, along the latter part of August, and I spray along the first of September.

Mr. Ellsworth. You wipe your apples, don't you?

Mr. Castner. No, never wipe an apple. We have been putting hundreds of thousands into Boston and New York and never heard one case of anyone dying from poison yet. When that question comes up as to arsenate of lead injuring the apples, you can take a solution of arsenate of lead as mixed up, two and a half, or three to fifty, and drink it, and it will not hurt you. (Laughter and applause). It is mighty hard on the coddling moths, but it will not hurt you. It does not, to my knowledge; we are doing it every year. That is the remark I wanted to make at this time.

A member. I would like to say that in regard to spray-

ing with arsenate of lead for browntail, last season I sprayed on the coddling moth. The orchard I sprayed the first time hadn't hardly a browntail in the whole orchard, but I didn't spray considerable many of them, so I laid it to the arsenate of lead killing the browntail. Speaking of poison, I keep sheep in one of the orchards. Well, the next day after I sprayed once the grass was all white. A man, not knowing anything about it, turned the sheep in there the next morning. I got home that night and my wife said, "Did you tell that man to turn the sheep in?" And I said, "I did not," and she says "I expect you will have a lot of dead sheep there." But there wasn't a dead sheep.

Mr. Frost. I don't want to be misunderstood from my explanation of spraying for browntails, that the arsenate of lead will hurt the apples. It may simply hurt the sale of them. And in regard to the poisoning of animals, I don't think you will have any trouble except with the cows, but be very careful about letting your cows eat grass that has been sprayed. Horses and sheep and hens can stand a great deal of it, but cows will stand very little of arsenate of lead.

Mr. Brown of Connecticut. We have been spraying down our way for ten years. We have used the usual formula, the Bordeaux mixture and the usual amount of arsenate. We have used this mixture with paris green and have got it on our orchards right now and we have used it at different times. We have our Jersey cows out there, some pretty fine Jersey cows, and every year we take our Jersey calves at the first feeding and tether them out in the orchard, tying them to a post, and they eat all that grass and we never keep them out in the spring. They are there every day and they have been feeding on that for the last ten years.

A Member. I have sprayed in pastures where they were young cattle, right underneath the trees, and never had any trouble yet from using four pounds of lead to a barrel of water. I have put on a lot, so that the trees were dripping with it.

Mr. Ellsworth. I notice that your President has come into the room. President Maynard, if you will come and take the chair.

I don't wish to cut off any discussion or any experiences you have had with poison, whether it will kill or won't; but be a little careful, at the same time.

A Member. I would like to ask the latest date you

could spray without danger of hurting the sale of the apples.

Mr. Castner. I have sprayed as late as the first of September, and we are getting a larger sale every day.

Mr. Ellsworth. You let the Massachusetts State Board of Health find any arsenate of lead on your apples and then you will see.

Mr. Frost. Send them out to Oregon and you will get it.

Mr. Race. It don't seem wise to have the word go before the public that you can have poison on anything and it will not do any harm. Simply, the poison isn't good for anything, or else it will do harm.

Mr. Wheeler. I would like to ask, Mr. Henry, if you get 200 pounds pressure from a hand pump, or gasolene.

Mr. Henry. No. I have to use gasolene for 200 pounds I would hate to have to pump a hand pump and get 200 pounds pressure by hand.

Mr. Wheeler. I didn't know but you had.

Mr. Henry. I never. I wish I had. I wouldn't use the power if I could help it, because gasolene engines are rather cranky concerns.

A member. Is it advisable to use a hand pump if you could get the pressure?

Mr. Henry. Yes, yes. You can do fine work with a hand pump; only you musn't try to run too many leads or to many nozzles. You want to get up a good pressure and it is better to have that good pressure with two nozzles than poor pressure with four nozzles. Keep up a good pressure and do well what you do, rather than try to put out a lot of stuff. Use a good pressure and a lot of hose. You can do fine work with a hand pump.

A Member. How many trees can you have and profitably use a hand pump?

Mr. Henry. Up to the present time I can answer that I have knowledge that Mr. Lyman of our state has 400 acres and uses hand pumps up to the present time.

A Member. How many?

Mr. Henry. I couldn't count them. I don't know whether he can or not. (Laughter).

A Member. How much acreage would you go over with

one hand pump?

Mr. Henry. It depends on the size of the trees. With peach trees I suppose the reason he hasn't had power is because he has only sprayed on the spring with that lime-sulfur; and of course he can start early and there is no foliage on to bother. It is a lot different from spraying big apple trees for the coddling moths.

A Member. You spray as fast as possible for apples?

Mr. Henry. Yes. You have got to have enough pumps to go all over the whole orchard within four or five days, and really you ought to be able to get over it within three, because while you have more than three, you are apt to have bad weather, and if you have a couple of days of rainy weather out of the week when you cannot spray for the coddling moths, if you haven't got enough to spray, some orchards will loose a lot of money right there quick. You have got to have enough to spray quickly.

Mr. Stone. I have some trees in an old orchard, but they are high up. What can I use for nozzles?

Mr. Henry. Instead of trying to get it from a nozzle which will drive it against the wind—I have never been able to do that yet—you have got to use a long extension rod. We have some very high pear trees, branching out near the ground, but very tall old trees, and so we got 20 feet of quarter inch pipe and put the nozzle on top of that and sprayed the trees. You can get a pressure up there easy enough. There is no use in driving the stream. You ought to use an extension rod; and, by the way, use plenty of extensions. We use 10 feet on peaches, and more, if necessary, on apples. But you can get the spray up high by an extension rod and not by the nozzle.—Everything at our cooking plant runs by gravity. We don't lift a pound of material through the whole season. It runs into the cooking tank and the spraying tank.

A member. How far do you haul it? Does your pipe run through the orchard?

Mr. Henry. We have the spraying plant right in the middle of the orchard. Locate it right; put up your tank and substitute that for hose and pipe, use two inch pipes into the spraying outfit.

Mr. Castner. Wouldn't it be a saving of time to have the pipe and have the filling system there? The time lost in

spraying is going back and forth and filling up. It isn't while you are spraying.

Mr. Henry. No. It is the time lost in going around. It might pay. I wouldn't be surprised if it did.—If any of you haven't used this form of sulfur I strongly advise your looking into it, because it is a very nice form and will save lots of money.

A Member. What is it made from?

Mr. Henry. Powdered brimstone, commercially pure. The best is the cheapest, and the cheapest is the best.

Mr. Davenport. Do you do any special spraying for the curculio?

Mr. Henry. These other sprayings ought to take care of that. The curculio isn't very serious with us.

Mr. Davenport. In our section the curculio is the worse pest on apples we have.

(Professor Maynard Presiding)

The President. We will consider the next question. Owing to death in the family Dr. Whetzell is unable to be here and therefore we can give the time to discussion and ask further questions of the present speaker, or we will discuss any on the back of the program.

Mr. Frost. Before we go to the question, I understand that Mr. Henry has saved quite a number of his fruit buds this year, and I would like to ask him if he can describe his method of cultivation during the past year, for his peaches.

Mr. Henry. I see there (pointing them out) some peach buds, and there are quite a good many live ones on them. Some of our varieties show a very good percentage and some of them, the Crawfords are poor. These are not my buds. They are some that were brought here; but you see there is enough there for quite a good sprinkling.

In regard to cultivation, Mr. Frost asked me about that: I think that the speaker dropped one point this morning that paid me for coming up here when he spoke in a way that I never heard the expression used before, and I think it is a little bit the best. He said that the trees use the water that comes up and not the water that goes down. Now, that to me was a very important point and was certainly worth the whole trip up here, and it explains why cultivation is so important. You cultivate the top of the ground, you just stir

it a little bit, and it doesn't look as if it amounts to much; but it forms a blanket over the top and the water comes up through the ground—he didn't explain it—but it comes up through the ground by capillary attraction, follows up the same as oil follows a lamp wick up, and it has a regular course up between the solid part. When you plow and when you cultivate, especially when you cultivate, you break up that crust and that prevents the water from escaping. It comes up and when it gets up to where the little courses are broken it has got to stay right there, and there is where our plants are able to use it, and that is why cultivation does so much good.

In regard to cultivating peaches, we try to plow the ground twice in the spring and we seldom plow over two inches deep, just as shallow as we can hold the plow in the ground, just enough so that it will turn the top layer of soil over anywhere from 1 1-2 to 3. We don't like to get over 3 inches if we can possibly help it. We plough it twice and harrow the ground within an hour after it is plowed. In no case let it stay over longer than is absolutely necessary. We try to have a rough gang plow and have the harrow follow so that there is not over ten minutes between the plow and the harrow. We cultivate every other day through the entire season, about twice a week we try to go over the ground with the weeder. We don't use the harrow then. Frequent, shallow cultivation is what we believe in. We don't cultivate over an inch or two deep, but by doing it all the time the weeds don't get a chance to sprout.

Mr. Frost. What is the lowest temperature you have had in your home this winter?

Mr. Henry. There are places near us where they got down to 25 degrees below. On top of the hills they didn't get down to more than 10 degrees or 15 degrees, but we found with us it made a great difference in the levels. I was talking with one man last night who has peaches on the hill and his peaches are alive. Just as soon as he begins to dip off eight or ten feet the peaches are all dead, but when he gets on top they are all alive.

Mr. Frost. What do you consider is the limit on peaches?

Mr. Henry. It makes a great difference about going into the winter. That is where the cultivation helps out. Trees go into the winter in strong, fine shape, and the buds are able to stand a good deal. I think condition and eleva-

tion will determine whether or not the buds are successful.

Mr. Frost. How late in the fall do you cultivate?

Mr. Henry. A good deal later than we used to. We used to cultivate deeper and start early; now we do it shallow and a longer time. It isn't really cultivation, but it simply scratching the top, moving it and cultivating it just as many times as we can.

Mr. Frost. How late?

Mr. Henry. Until we can't get through the trees any more.

Mr. Frost. What sort of implements do you find best for your purposes?

Mr. Henry. We use weeders entirely. We have never had a spring tooth. Our land is so stony we can't use the cutaway. We use the weeder.

A Member. What is a good gang plow?

Mr. Henry. I don't like to advertise tools before a meeting like this, but if you ask me personally I will tell you. I think it is a pretty poor plan for a speaker to get up before a meeting and run down one and boost another.

Mr. Carr. Do you prefer the cutaway, to the plow?

Mr. Henry. I should like to use it, but the land up there is so stony we can't. The cutaway is a fine tool.

The President. Are there any other questions? Now, on the subject which was to have been presented by Dr. Whetzell, "Substitution of Lime-Sulfur for Bordeaux," Mr. Castner has consented to speak a few words on the question.

SUBSTITUTION OF LIME-SULFUR FOR BORDEAUX

Mr. Chairman: I am merely going to open the subject of the substitution of lime-sulfur for Bordeaux. I don't know what the eastern ideas are on this question, but I will give you a little history of our use of both in Hood River. Years ago, up until about five or six years ago lime-sulfur was practically unknown as a fungicide. Everybody was using the Bordeaux mixture, known as the 12-12-50. There are some fungus diseases that lime-sulfur will take the place of Bordeaux, and some on which it won't. You take, for instance, the apple scab, that fungus which works in the summer time and which practically works in the winter, too, lime-sulfur will have some results the same as Bordeaux, but

when you come to anthracnose or canker, lime-sulfur will not do the work. We have to use the Bordeaux, 6-6-50, and I really believe you would get better results by using Bordeaux in that proportion in the fall after the fruit is picked and before the leaves have dropped. You get more canker and scab at that time than at any other time, especially in the country where you have a rainy season. The season last fall was a very good time for the apple scab to thrive. I don't know how it was with you, but with us it was bad, especially on the green apples and the Yellow Newtown. We sprayed for the apple scab in the fall just as soon as the apples were picked and before the leaves fell. We put it on as a preventative. The fungus doesn't start to work until after the rain; the leaves fall and if they are not sprayed the fungus starts up and works all winter and is in fine shape to start in the spring and it is a good deal harder to control with lime-sulfur than with Bordeaux. I don't believe that fall spraying of Bordeaux has ever been practiced here, but I believe it would be a mighty good thing if it should be started. We find that it does away with the scab and makes it not so hard a campaign in the spring. The question of using Bordeaux in the spring is a hard problem and one well worth looking after for this reason: You will spray at the time of the year when it is damp and moist, and that is the one time when it will do injury; in a wet season, with lime-sulfur, we use the mixture of one to thirty without any damage. One damage you will get, though, from lime-sulfur and which we had two years ago was using it in extremely hot weather, because you get damage from that in the hot weather the same as you do from Bordeaux in damp. I would advise being careful about the lime-sulfur spray in summer time, when it is hot. Two years ago we had considerable loss in Hood River, especially in the hot days. I quit spraying at noon, made up my mind that something would happen if I didn't, and I looked at it a couple of days afterwards and the apples were scorched. A good many neighbor's apples were ruined by continuing spraying in the hot weather, but at the same time I had another neighbor who didn't use lime-sulfur but used the straight arsenate and he burnt his, so that you couldn't lay it to that entirely. No doubt he would have had some of the same damage, but not to the same extent, if the Bordeaux had been used. Water or lime-sulfur going onto the apples forms a mixture and burns. That is the result with

us of using Bordeaux and lime-sulfur.

President. Another chance for questions. I think Mr. Castner will be willing to answer any questions on this subject.

Mr. Castner. I would say this: A good many people don't think that they have got the anthracnose, but I have discovered a good deal since I was here this spring. They may not know what it comes from, but if they look around they will find a dead spot, canker; that is what is known as anthracnose.

Mr. Carr. Will lime-sulfur help that?

Mr. Castner. No, it has no effect. It takes the Bordeaux in the fall. It is a disease that works in the winter, after the rain starts.

Mr. Carr. You spray immediately after picking the apples?

Mr. Castner. Before the rains come.

President. May we hear from Mr. Frost on spraying with both lime-sulfur and oil and Bordeaux?

Mr. Frost. I would rather hesitate to say anything on this subject because I feel rather at sea myself in regard to a substitute of lime-sulfur for Bordeaux. As you know, in 1910, we had a very wet season in the spring and a good deal of injury to the fruit and the plan was to put it on Bordeaux largely for that injury; but it was found in a great many cases that in the valleys and near the seashore the injury was much worse than on the top of the hills, where there was a free circulation of air. It was also found that many trees not sprayed at all had injured fruit almost as much as the sprayed trees. I made a great many notes in 1910; I thought that I would correct myself in 1911; but during the past year a great deal of fruit has been given to me that was sprayed with lime-sulfur and it was quite as seriously injured during the past year. Also I saw a great deal of fruit that was what I should call sun scalded. We have had two exceptional seasons, 1910 and 1911, and I think it is very difficult to state just what the lime-sulfur does here in Massachusetts and what the Bordeaux mixture may do. I am inclined to think, though, that you will use both materials and that you will use Bordeaux for some varieties of some diseases and lime-sulfur for other diseases. I am also convinced that the mixture of lime-sulfur with the arsenate

of lead, which is made in the east, is very dangerous to handle and I am advising many of the people that if they want to spray with lime-sulfur and arsenate they should do it in two applications. Spray first with arsenate of lead alone and then lime-sulfur afterwards.

There is a brand of arsenate of lead made on the Pacific Coast which I understand is not affected by the lime-sulfur when mixed. If you are getting good results from arsenate of lead and Bordeaux, I am inclined to think it is wise for you to use it in the future. If not, try lime and sulfur and arsenate of lead and try it both ways, in a mixture and separate. It may be that the injury this year was all due to climatic conditions. In my own case I will spray late in the season, will not spray in the hot sunlight or in the middle of the day.

President. Any further questions of the speaker?

Mr. Wilder. I would like to ask Mr. Frost which he uses for the San Jose, the oil or the lime-sulfur, in the early spring?

Mr. Frost. I always use the oil until I get the scale under control, and then I use the lime-sulfur part of the time; but I feel that the oil is the much better insecticide for the scale than the lime-sulfur and I know it is much easier to handle.

Mr. Morse. I would like to ask Mr. Frost if it doesn't make a difference what kind of trees he puts it on, as to its effectiveness. On a peach or some others lime and sulfur may do the work, but when it comes to the young growth of apple trees it is a little different and there I think oil will do better.

Mr. Frost. I believe that lime-sulfur will kill every scale you hit, but I find it very difficult to get the men to do thorough work, and even if there are only a very few scales left, they breed very fast in a dry season and there is a good deal of danger; but I think it is immaterial on small trees as to which material is used, so long as every part of the tree is covered.

Mr. Adams. I would like to ask if oil is as effective, as a fungicide, as lime-sulfur?

Mr. Frost. On the fungicide effects of oil I am hardly prepared to make any statement, but a great many of us do feel that oil acts as a sort of tonic to the tree. We know it

kills some things. I don't think it is as good a fungicide as lime-sulfur.

Dr. Gilson. Mr. Frost said that it was pretty difficult to get men to do the work thoroughly. I would like to know whether he knows anything that can be put with the commercial lime-sulfur so that you can see it. If there was anything mixed with it so that it would be visible you could look after your help a great deal better and see that the work was being done properly. Some say to use starch, but I don't know.

Mr. Henry. You can use lime; you can mix lime with water.

Dr. Gilson. I have done that once or twice on some commercial, and I didn't see any difference.

Mr. Henry. That is one of the serious disadvantages of the commercial lime-sulfur, that you cannot see it well enough on the tree and I don't know but that personally I shall have to discontinue the use of it on account of that, because sometimes the wind will change and blow it away, and there are all sorts of different conditions, and when you can't see you don't know whether the whole of the trees have been hit. It is a serious thing. You have got to see whether it is thoroughly sprayed, and where you have hired help doing practically all the spraying you have got to have something that shows.

Dr. Gilson. I have been informed by druggists that I could add starch, but I never did and I never heard of it being done and I would like to find out if any one knows about how to use it.

Pres. Has anyone had experience with mixing starch.

Mr. Smith. I would like to confirm what Mr. Frost says. Oil will spread and crawl, and in an apple tree I think that one application of oil will do as good work as three of lime-sulfur. With lime-sulfur it is difficult to cover the trees thoroughly, and in order to kill the scale every individual scale must be covered with the material and on windy days it is practically impossible. You can't get the men to spray against the wind. But the oil will crawl, where the lime-sulfur won't, and take a twig on a small tree, as large as a lead pencil, if you spray it with a strong solution of oil it will crawl around on the other side. You don't have to go around the tree and spray against the wind, but it

crawls around, just where the lime-sulfur will not. That is the beauty of oil. Am I not right, Mr. Frost?

Mr. Frost. The soluble oils do that, they have that property which all crude petroleum has, of spreading or creeping on the wood.

Pres. This question will bear further discussion.

Secy. Brown. In regard to adding lime to the commercial lime-sulfur, in my own peach orchard when I get through spraying the trees look as though a snow storm had struck them. I cook my own concentrate or use the commercial adding about four pounds of a very fine hydrated lime, as a milk of lime which practically makes a whitewash, and the trees, after the first rain look as though they had been snowed on.

Dr. Gilson. I have tried lime. I don't know that it is the latest improvement, but I saw no difference in the color on the trees; I couldn't discern any. I don't know how much I used, but I mixed up quite a lot. What I want is something to add so that you can see distinctly where they have been.

Secy. Brown. Mine look like a snow storm and you can see them half a mile away.

Dr. Gilson. Whose lime?

Secy. Brown. At first I used ordinary stone lime, such as I used in making my lime-sulfur concentrate but I found considerable sediment and grit and it was much easier to use the hydrated form Limoid. I bought a few bags specially for that purpose. I added about four pounds, already mixed up in a buttertub to each barrel when the spray barrel is nearly filled. A good agitator does the rest.

Mr. Morse. I got hold of a bulletin somewhere that said you upset the whole chemical combination of the commercial lime-sulfur. I think it was the Arkansas Experiment Station Bulletin. They said it upset the whole thing by putting in more lime.

Dr. Gilson. That is one reason I asked, whether you could add more lime that would cover it and not injure the combination.

Mr. Castner. I don't believe there is enough added to make any chemical change.

Secy. Brown. I know that as far as I am concerned

there is now practically no scale in the orchard, although some three years ago every single tree was more or less infested. There is practically no scale in the orchard now, so apparently I haven't added enough lime to destroy the insecticide effect and the fungicide value is certainly there as to leaf curl, etc.

Dr. Gilson. I am not an agent for any company, but I will say that what I have comes from Vermont. But there was grit. I don't think there was a quart or two in the whole batch but what there was a lot of grit.

Mr. Frost. In eastern Massachusetts you can get Vermont Marble Lime which contains very little grit. There are several very nice brands for that purpose.

Mr. Castner. What time do you use lime-sulfur in the spring?

Pres. Any time before the buds swell, from the first of March to the 1st of May.

Mr. Race. I understand, Mr. Henry, that you make lime-sulfur and use it right away, putting in 15 pounds of sulfur and 20 pounds of lime to 50 gallons of water. When you make the concentrated you put in 60 of lime and 120 of sulfur. Is that right?

Mr. Henry. Those proportions are practically right, only for the concentrated that formula varies from 40 pounds of lime and 80 pounds of sulfur up to 60 and 130. There are a good many different formulas right along in there, and that has to be controlled by experiments. We only use a high grade calcium lime, and very little magnesia.

Mr. Race. Will that show when you spray the trees, or is it like the commercial?

Mr. Henry. No. It will show a little better than the commercial, because it has a sediment. In the commercial the sediment has been taken out, and the commercial doesn't show up very well, and that is very serious. Of course, if you have only a few trees and you are going to do it yourself and know just what to do, then it is all right, but where you have a big orchard the wind will change, blow heavily down the rows and the spray will blow away in the orchard and the help have got to spray against the wind, we know they won't know where they have sprayed and where they have not.

A Member. I should like to ask what kind of a noz-

zle you use.

Mr. Henry. Personally, we use the Friend. Gould also makes a very good nozzle. The Mystery, Jr., is a good nozzle and there is one called the Angle Mist, made in Rochester, giving a very good spray. There are a good many good nozzles. There are a whole lot of good ones.

Mr. Race. Do you always use the Y?

Mr. Henry. Yes; always an angle nozzle or Y. I have never had any use for the straight nozzle. You can't afford to walk around the tree when you can get a nozzle to do it by turning your hand. We just got hold of this angle-Y the other day, and it is very handy.

Mr. Race. Mr. Henry told us that some oils would be good and others not good and he didn't want to tell which. He has told about the spray nozzles and perhaps he has got so open minded that he will tell us which are good and which are poor oils now.

Mr. Henry. There are several good oils on the market and there are several poor ones, as I have said. I have never heard anything against Mr. Pratt's Scalecide or Mr. Frost's Arlington Oil; but I have heard a good many things against one made in Martinsburg, Virginia, and I know men that condemn all oil because they used that. It is made in a dozen different ways. They have switched around all the time and some lots has been good and some lots have been poor and it has given oil a bad name and it is a very unfortunate thing, because oil is a good insecticide and the Pratt and Arlington and several others, I don't think have done any harm. But you want to go mighty slow, because whole orchards have been killed just as though a cyclone went through them; every tree killed.

Dr. Gilson. Does the experiment station state some that are valuable?

Mr. Henry. Perhaps. I am not familiar. There are several oils that have not been tried. Oil is very dangerous unless it is made properly.

A Member. I should like to ask about the Baldwin spot. Is there any control for that?

Mr. Henry. I don't know a thing about it. I don't think any oil should be used when the weather is freezing. If you apply it when it is cold or freezing, when the oil dries it will injure the trees and some good oils have been

reported as doing damage because they have been applied too early when it was cold and freezing, or too late when the trees were out too far, and that is what caused injury from some good oils.

Mr. Stowe. I understand you that before the cold weather comes you have got to use the oil.?

Mr. Henry. Yes, any time up to freezing, but I wouldn't apply oil or lime-sulfur at any time when it is freezing, there is no fun in it at all. There is no use in spraying when you have the freezing nights.

A Member. What do you think about scraping apple trees?

Mr. Henry. I should scrape the roughest of the bark off, because it gives a good hiding place.

A Member. And all that you scrape off is dead?

Mr. Henry. Yes. Scrape it off and give a chance for the oil or the lime-sulfur to get in. If you have a rough bark, use oil.

A Member. What would you say was a proper price to pay for a gallon of oil?

Mr. Henry. I don't make it. (Laughter). You set the price of your apples and let the oil man set the price of the oil.

Pres. We would like to hear from Mr. John W. Clark, in his experience in spraying.

Mr. Clark. I never use any oil in spraying. I have always used lime-sulfur that I boiled myself, that's all. And until last summer we had very little scale indeed. I have followed it up for five or six years, and where the scale would appear I would extend the spraying, but until last summer it never extended over the whole orchard, being only in spots, but the dry weather of last summer made it spread wonderfully and we have considerable spraying on our hands to do now. I have little of the Baldwin spot on the Baldwins, hardly enough to notice it. I don't know anything about it.

Pres. Any further questions? There is a question list on the third page of the program. Shall we take up the questions?

A Member. Can we take up No. 26?

Pres. If there is no objection, we will hear it. What is to be said on the question, "What is the best method of

protecting young trees from deer? Will arsenate on the leaves keep them off, or lime-sulfur on the twigs be too much of an appetizer?"

Mr. Parker. My experience with the deer is such that I believe that if the state passed a law that we could use a rifle it would be the best protection for an orchard. Day before yesterday there were three lying around my orchard all day. I don't think they did any damage yesterday, but they have done damage before; they broke down those apple trees, and in a young orchard of 80 trees they nipped the tops of every one. If the state will give the farmer a right to use a rifle we can soon get over the deer question. A man that gets within 50 or 75 yards of a deer in an orchard has got to creep pretty close and I think the state is showing blame poor business management in putting in demonstration orchards and turning herds of deer in to eat them up. That is my opinion. (Applause).

Mr. Wheeler. The state does allow a farmer to use a rifle on his own land at the present time to shoot deer doing damage, with any gun; it makes no difference whether it is a shot gun or a rifle. The law reads at the present time "kill" and I know that several deer in a few weeks have been shot in orchards and the game wardens have all justified the shooting and allowed it.

Mr. Copeland. I have wintered some deer for two years. I know them decently well and I have had them doing damage for me and if I could kill them I would not care whether I used a shot gun or a rifle or a stone, but I should kill them. In the next place, get a good game warden. We have got some up our way and they will stand back of us, and that is the way you want to do too. (Applause).

Mr. Race. I think that it is getting to be a very serious question in southern Berkshire county.

Pres. The law seems to read if you discover the deer injuring trees you can shoot them.

Mr. Race. That don't cover it at all. The state protects the deer.

Pres. The state will pay the bill, will it not?

Mr. Race. The state has got a lot of what they call game on hand—on our hands, not on theirs.—and we have got to support them for some fellow to shoot. A year ago and last year I fed 16 on my farm and there were 16 on a

neighbor's farm, fed all summer that I know of. Now, there are twenty-five in that same park and only a mile away there were forty seen in one meadow day before yesterday. That is sixty-five deer on the premises, and I know that three miles south of me is another herd where there have been over 150 feeding and harboring there and going down into the valley to feed at night and destroying the farmers' vegetables and vegetation. Ten years ago there wasn't a deer there, hadn't been one seen. What are we going to do with the deer?

Pres. Buy a shot gun.

Mr. Race. Shoot them?

Pres. Yes. Use a rifle or anything.

Mr. Race. You can't catch them to shoot them. You have got to shoot them nights. Out of these 16 deer there were 7 shot on my premises. There wasn't one shot in the day time. They were shot from seven o'clock at night until two o'clock in the morning, and as it was a week of dark nights it was pretty dangerous business. Three hunters lay out in the cold and shot them, that I know of. From my own personal experience I wish they had shot the whole herd. The state of Massachusetts would do a wise thing to do away with the game and the game wardens and save money, and the farmers would be better off.

Mr. Clark. I think we had better do the same as a friend of mine did. He wrote the Governor to come and get his dam deer and take them home. (Laughter and applause).

Mr. Wilder. In addition it is suggested that the Association could persuade the Massachusetts sportsmen to buy the fruit orchards (Laughter and applause).

Mr. Copeland. We read that the deer don't do any damage, but two years ago this winter in the town of Ashfield a herd was discovered with 32. My daughter took snapshots of them and if I remember she got 18 in one picture. You put in 32 sheep in an orchard and they won't do as much damage as 32 deer will.

A Member. I should like to change the subject. Can we hear from Question 21? The question is, "Has the time come when growers should unite to pack and sell their fruit through an association?"

Pres. You hear the question. Is Mr. Castner in the

room?

Mr. Race. I don't think we are done with that other question. I want to ask this Association to pass some resolution asking the state to do away with the deer nuisance.

Pres. Do you make the motion?

Mr. Race Yes. I make that as a motion.

Pres. Is that motion seconded?

A Member. I will second it.

Pres. The motion is made that this Association ask the Legislature to pass laws for the destruction of the deer; is that it?

Mr. Race. That's it.

Mr. Wilder. If that motion prevails I hope that the Association will go down to the State House when the question comes up and will be prepared to back it up.

Mr. Wheeler. It is practically useless to pass a vote and not back it up by our presence down at the State House. If all the people troubled or hurt in any way by the deer, will go down and ask for a reasonable law, I think they will get it, but not by simply passing a vote that it is the sense of the meeting that the state should destroy the deer. They won't pay any more attention than if we hadn't done it at all.

Mr. Race. They will know the way we feel about it.

A Member .I think that if the secretary will let each one know the time the bill is expected to come up we might go down and have as much fun as we do here. (New business cannot now be introduced in this Legislature as the limit was early in January. We must now wait for the next Legislature. A bill adding Middlesex and Essex counties to the list having an open season on deer is already in the Senate and will probably pass. Secy.)

Mr. Clark. I think possibly that if we embody in our resolutions a way in which we might get rid of the deer, it might be a help. If we took a leaf out of Mr. Hale's book and asked the Governor to come and get them—why should not we ask for a longer open season and let the sportsmen kill them and pay their own bills?

A Member. Let's amend it to 365 days in the year.

Mr. Clark. At the present time I think our open season is ten days. Why can't we ask for a month for the open

season?

Mr. Black. Hasn't the farmer a right to a shot gun, to shoot his own deer?

Pres. Yes, a shot gun or a rifle.

Mr. Black. Whenever you catch them doing any damage there is no law that prevents the farmer killing his own deer.

Mr. Frost. A man has no right to shoot the deer unless he sees, when he shoots him, that his trees are being destroyed. The fact may be evident that they are being destroyed, but unless he sees the damage being done he has no right to shoot. That is the statement I want to make.

Pres. Must the man that sees the deer see him destroying his property?

Mr. Wheeler. It must be on cultivated land; the law reads that it must be on cultivated land.

A Member. I think that a year ago my town got the most deer of any town in the state and it was estimated there were 150 shot there and they were not all reported. Thank the Lord, there were a lot of them that were not, but lots of them were reported and our game wardens bore us out in killing them. I think our game warden took a different view from some, because he had had lots of occasion to have damage done himself and he knew something about the deer. The trouble with the people that make the laws is that so many aren't acquainted with them. If they would come up and winter with us they would get pretty well acquainted.

A Member. The law reads that if they are destroying any crops, except grass, on cultivated fields you have a right to shoot them. That is, any crop except grass on the cultivated field. I know I shot one and my son one and we had to report it, and the game warden came and that was the end of it. He didn't take the deer. But we couldn't sell it and had to eat what we could of it.

A Member. I merely wish to say this, that I hope the motion will not prevail in the exact form in which it is, because I think that by putting us on record as favoring the destruction of the deer is too radical a measure. I will offer an amendment so that the word "destroy" shall be omitted and the word "control" will be inserted, because I think that if this Association goes on record as favoring the com-

plete destruction of the deer it will seem such a radical measure as to lose weight. I speak as one who has suffered damage myself from the deer.

A Member. Speaking about it being too radical, I would like to tell my little story. I have got two and a half acres of peach orchard up on the hills in the woods. There is a wire fence six feet high and some six or seven years the deer have been eating the young apple trees, chewing them off, gnawing them and eating the buds off and I have had my men in and they have seen the deer, seen them doing the damage, and I have had the men in there to go and look, different men, seven or eight men, to see what the total damage was, and they say it is twenty or thirty dollars like that; and I had the town clerk and the selectmen go and view the premises and there was a gunner that had a talk with this selectmen that they didn't do any damage, that they only ate a little grass down there. He goes down in Maine every year and hunts and brings them home and he says they wouldn't do any damage, wouldn't eat the trees. But the men that work for me say they do and I can see for myself two or three hundred apple trees, three or four hundred peach trees. They keep them nipped off as fast as they grow, until they die. There is a wire fence around there six feet high and you can see where they have gone out, against that wire.

The wire is stapled to the trees around this woods, and they have jumped the staples out for five or six trees right along. You would think some of the hair flew after they went out. They sleep in the day time but they do their damage at night, travel around nights a good deal because I have seen them evenings out around. I have put in a bill down at the state house, the state stocks your farm (you pay the rent and the state stocks it with what game they have a mind to—but I put in a bill for \$25 that these men said was the damage, and I got hold of \$5.

Mr. Sowerby. I have four deer every other day now and I have been hoping that they would not do any damage, and I go every day to see if they do any damage, and up to the present time they have done none. Last year there was a party in Marlboro that had some damage and I was one of the men to go and assess the damage. I think it was \$45 or \$50 and the state paid it without any more talk. He got the money within three weeks. I don't see but what the state is doing its part.

A Member. I would like to say a word. The last speaker said they aren't doing any damage, but I think they are. A neighbor of mine set two thousand trees. Last season he had three hundred young trees eaten off as fast as they sprouted and they went right through there so that he has got three hundred little stubs, like a cane. They are all withered. I was one of the members of the Board of Selectmen, and the three of us were called down and made an estimate, and the state never took any notice. They sent us a little letter, saying our price was too much and they wanted it cut. I, for one, said I would never change the figures to reduce, and if I did change them it would be to increase. We are still waiting. I don't think the state is doing its part.

A Member. There are three or four trees down near our place where they can hear the roosters crow, and those which have never been touched, they are nice trees; but of all the rest, 90 per cent. you might say, are utterly worthless and I wouldn't take a hundred dollars for damage the deer have done.

A Member. I should like to ask the gentleman if he has used a gun on these deer.

A Member. I don't have time. I have other business. It is four miles from my house.

Pres. Any further discussion? Do you accept the amendment, Mr. Race?

Mr. Race. I accept the amendment.

A Member. That the state buy up some of the land and sell the privilege to all of the fellows that want to hunt for the deer so bad? (Laughter).

President. The motion is that this Association petition the legislature to take measures to control the injury by deer, to fruit trees. All those in favor of the motion please manifest by saying, "Aye." Contrary minded. It is a vote.

We will take up question 21, as before stated, and would like to hear from Mr. Frost.

Mr. Frost. I would like to state for the benefit of the gentleman who asked for number 21 that last year a conference was held in regard to this very question, and another meeting will be held as soon as this meeting has adjourned, on the platform; and all of you who are interested in the question are invited to attend this conference, and I think

the whole thing will be brought out. There was a committee appointed last year at our conference to report. You have heard the report today, and I think the members of that committee will have something further to say.

Mr. Barber. I should like to ask where that western system is used, do they transport the apples to a given point that is to say, do the packers go to the orchard and pack and then go ten miles to another, or are the apples transported?

Mr. Castner. In some cases, especially with small growers, who haven't packing houses of their own, there is a large warehouse and they are taken there and packed; but most of the growers have packing houses of their own and a crew of, say, four packers and one inspector or foreman who goes out with each crew. They are packed right on the premises.

Mr. Barber. I wanted to know whether they had to be transported before they are packed?

Mr. Castner. To help some out who haven't packing houses, the association has a large store house and packs them there.

Mr. Barber. If the apples are transported one mile or five miles they will be bruised so that they are damaged apples.

Mr. Castner. Yes. There is always more or less loss in transporting apples any distance more than to be packed on your own premises. I have noticed that when they are brought into the warehouse to be packed the loss would be probably one-fifth, mostly from bruises. If they are put loose into a box and covered up, to keep the apples tight, they will have bruises on them, and unless they are hauled on springs there will be more bruises. We require everything to be hauled on springs. Another thing in our handling apples: I do all my sorting right in the orchard. It saves one handling. I would rather do that and keep the culls out and save one handling and make less bruising. Every time an apple is handled there is some loss, so we try to handle them as small a number of times as we can.

President. I would like to ask if you have rain storms.

Mr. Castner. Well, in the eighteen years I have been there, we never had but one rainstorm interfere with our packing, and that was only two days.

A Member. I would like to ask if they are sorted as they are taken from the trees, or put in piles and then sorted?

Mr. Castner. No, we don't put them in piles. Every apple is picked and handled as though it were an egg. We require all the pickers to wear cotton gloves. If we did not there would be danger from the handling. You see a man go up to an apple and take his finger and poke it, and to do away with that we require them to use cotton gloves; that stops it or does away with a good deal of it. They are picked in half bushel baskets. We have tried picking baskets, buckets, and use in some cases some that have canvass bottoms that you can open and let the apples drop in the box and they are all right provided the pickers will be careful to put them near the bottom of the box when they open that canvass bottom; but a good many come up to the box and open it up and let them go.

I hire expert packers to do my sorting. The pickers pick them in half bushel baskets, take them to the experts and they do the sorting. Every grade and size and quality is sorted by these experts.

A Member. How many grades?

Mr. Castner. Three: extra fancy, fancy and choice. A man will have probably ten or twelve boxes around him; he puts two sizes in a box. The sizes are very similar and very close together. We don't ask a packer to pack over thirty or thirty-five boxes a day, and he must pack them right.

Mr. Henry. How big are the boxes?

Mr. Castner. A bushel.

Mr. Henry. And he does thirty-five a day?

Mr. Castner. All we require.

Mr. Henry. In ten hours?

Mr. Castner. In picking time you can't work much over nine hours.

A Member. Do you use sorting machines?

Mr. Castner. No, we use no machines at all. One came into the valley last year while I was east, but I don't know what the result was. Mr. Marshall at Fitchburg had one and while it did considerable saving, it isn't what it should be yet. I understand they have a new pattern of the same machine which does better sorting. The trouble with apples is that in the sorting you can't sort them as you can an

orange. The oranges are round but the apples are not. It all depends on how the apples hit the pocket. If they all hit the same way it would be different, but they can't; lots hit on edge, and two or three sizes will go through one pocket.

A Member. I would like to ask the speaker if he thinks that we are in shape where we could form an association in this state and do some cooperative work? Are we ready for it? You had a fair chance to see the samples of apples here last year.

Mr. Castner. I think you are. Why not? The apple buyers are all organized against you and why shouldn't you organize and co-operate? It may be some time before that happens, but it is time to start in. Here is an instance in Maine that I came across last year. There are seven brothers who have organized into an association. When they started up they had hard work. They wanted people to join but they wouldn't do it but after seeing the results these brothers got,—mind you, they put them up as they should be, they graded them and sorted them as they were guaranteed,—and they received so much more per barrel for what they shipped that all the people around there later on wanted to join. I think you can do the same thing here, even if you are not organized, if each grower will put his conscience into the boxes, which will go a long way toward helping the other fellow out. It is not the good stuff that is going to hurt, but the poor. Good apples will bring good prices any time in the eastern market.

Mr. Frost. I would like to ask Mr. Castner to answer question 1, "Will not the early bearing of the modern orchard in New England cause a shortening of the life of these trees?"

Mr. Castner. That all depends on how young orchards will bear. I would say in my travels around last fall I saw instances where they were bearing in two or three years. I should say it would with the trees bearing at that age. I would want a tree of mine to be at least six years old. Let the tree make a good, strong growth and then start bearing fruit and I think you will get better results in the long run than you will by letting it bear too heavily when it is young. In my own experience I know I had three Newtowns start at three years while the rest have made a vigorous wood growth. Those three stunted ones bear fruit but it is an inferior grade. I have tried every means imaginable, but I

can't bring them up. They are stunted. That is one trouble in asking trees to bear too young. You can get a tree to bear here as young as we can in the west, but you wouldn't want to have them bear too young. We have had them come into bearing at five or six years, and they are eighteen or twenty now and still producing good crops of fruit, and there is no telling when they will quit.

The President. Question No. 12 is asked for: "Would you dynamite holes for setting young apple trees in ordinary apple soil?"

Mr. Frost. I used dynamite last year and I certainly still should use it if I had a heavy sub-soil.

President. Can you tell the cost per hole of the dynamite?

Mr. Frost. The dynamite costs from fourteen to twenty cents a stick, and it takes but half a stick. The operation is to punch a hole about thirty inches deep, with a crow bar, and if there is a very heavy sub-soil use half a stick. If it is not very heavy a quarter stick will do, and that would make the price from seven to ten cents each, besides the labor.

A Member. I would like to ask, where there is loose soil going down twenty inches or so and then beyond that you know the soil is so that you can shovel for twenty inches and beyond that it is so hard you can't drive a pick in. How deep would you go?

Mr. Frost. I should like to get six or seven inches into the sub-soil. The dynamite to be used is not over forty per cent. gelatin.

President. Question No. 9, is called for: "Is it advisable to set more apple orchards in view of the fact that immense numbers of young trees are just coming into bearing all through the fruit sections of the United States and Canada?"

Mr. Wheeler. It seems to me that this question would take the whole day to discuss thoroughly; but just to give an idea what market there is in the world for apples, I think that if we go to South America in the future and Europe and other places where apples are going to be in demand, at the present rate of starting crops it will take a great many years yet before we are overplanted. I was recently in

Bermuda and saw apples shipped down there from Canada, from Nova Scotia, and the consumption of apples in that land is something enormous, and the population will eat ten times the amount if they can get good fruit. The apples were shipped down in barrels, and I saw one shipment of three hundred barrels taken off a steamer and the barrels opened up, and I wish you could have seen them! I wouldn't give them to pigs on our farm, because they had settled and the barrel was five or six inches slack. If we are going to send them down in those southern countries we should take a great deal of care to pack them right, but if we are going to send good, hard and sound fruit the people will want our apples. The demand seems to me to be unlimited in the south and in Europe. Other parts of the world cannot grow them and they want them. It seems to me just simply a question of developing our market, whether we are going to have more planting, or less.

A Member. The market has been represented as full all the season. I think the price has been lower.

Mr. Wheeler. I think that is brought about in the way I have explained. They have been packed in barrels, and packed poorly. I don't believe, to tell you frankly, that we could ship our apples to go a thousand miles and have them fit to eat. They may be all right to cook, but we have got to get the quantity of eating apples out of the eastern market. I think that accounts for the low price.

President. The time has arrived for the clearing of the hall for this evening, and we must postpone the rest of these questions until tomorrow. It is very important that you be here on time, ten o'clock.

(Meeting adjourned to 10 a. m., Thursday, March 14)

THURSDAY, MARCH 14, 1912

10.00 A. M.

(SECOND DAY)

President. The time has arrived for calling this meeting to order. We all have great interest in fruit growing at present, and we have the western fruit to compete with a beautiful fruit, that will keep up to the first of May. We have no varieties here in New England that are in first class condition after the first of March or possibly the middle of February. Now, we want to know what to plant in order to compete with this western fruit, and we have with us a man who, perhaps knows more about the new varieties than anyone else in Massachusetts. I take pleasure in introducing Mr. Fred A. Smith, of Turner Hill, Ipswich. (Applause).

OBSERVATIONS ON APPLE VARIETIES

Mr. Fred A. Smith, Ipswich, Mass.

Ladies and Gentlemen and Members of the Massachusetts Fruit Growers' Association: If you examine your programs you will note that we are assembled in our eighteenth annual session of this Association. If anyone had come before you seventeen years ago and said anything which in any way could have been considered as undermining all your traditions as to the estimation of the Baldwin apple, I am sure that he would have been called a heretic and would have exposed himself to severe criticism. It is far from my intention to do anything of that sort, but we must pause a moment and notice some of the weaknesses which the Baldwin apple appears to show. We fully recognize what a wonderful variety the Baldwin apple has been and is. Probably, with one exception, the Baldwin range, in this country, it is the largest. Just recall for a moment that this is one of the apples of Nova Scotia, that it is the commercial apple for the southern portions of Maine, New Hampshire and Vermont; it is certainly the standard apple today of southern New England; it is the great commercial apple of New York State. It is a successful apple in Pennsylvania over a con-

siderable portion of the state; it is commercially grown in the mountains of Maryland, Virginia and West Virginia; it is also commercial in Northern Ohio and Indiana; it is commercial in Michigan, and it is grown commercially clear to the Pacific Coast; along the border they all know it and it is highly regarded in the southern Canadian Provinces. I half suspect that the man who has been reputed to have said that if he wanted to plant a part of his orchard to do the best he would plant 99 Baldwin apple trees in of 100, I half suspect that that man is dead. If he is not, I am sure that the present wave of optimism has reached him, for I clearly imagine that this same man is now engaged in planting 1,000 trees instead of a hundred, and that of these thousand I am sure when you look over his planting you will find he is using 400 McIntosh instead of 999 Baldwins, as formerly suggested.

I think we need to pause for a moment and speak of this over planting. It is interesting to notice at the present time what an enthusiasm there is on in the matter of orcharding and orchard planting, and this is manifested in the strong meetings. I have had a chance to notice in the institutes of a county society during the last two months that have been given over to the question of orchards, in a purely agricultural society. It seems hard to get up enthusiasm enough to hold a general meeting. Attention has been manifested in the very helpful meetings of the Horticultural Society at Boston, who have a record of the largest attendance ever held. All of the neighboring state fruit meetings have been largely attended this year, much more largely than in several of the years past. The horticultural section during the present Farmers Week at the Agricultural College at Amherst furnished hardly standing room when the meetings were in progress. All the professors at the Agricultural College are under a severe strain from meeting anything like the requirements for work outside of the class room, for their out of door lectures, for their personal conferences and their classes. Do you know it is a fact that Harvard and Yale and the big classical colleges are turning out more men today who have orchard ambitions than are the Agricultural colleges? I want to make a statement that while I am usually very optimistic, I may say I am gradually getting to the point, of pessimism. I even find that some college professors are getting into the same class, and I want to make a homely comparison. I fear that within

ten years many of us orchardists will find ourselves in the position of the passenger on the vessel that was sinking, and we will find that altogether too few life boats and life rafts are available. That may be a gloomy view, but I think we ought to seriously consider it.

Now, speaking about difficulties with the Baldwin, the most serious thing the Baldwin has today is the Baldwin spot, a little brown spot under the skin, and our scientists all tell us it is nothing they can help and that there is nothing they can recommend to help us out in that respect. Isn't it entirely reasonable that we might expect to see some decadence in a variety even so long standard as the Baldwin? It is within the memory of all of us that we have seen the same thing come about with certain varieties of vegetables; not particularly that they have been superseded by better varieties, but that some serious disease, or something of that kind has put the variety into the background. We very well realize that this is a fact with many of the varieties of small fruits. We feel and we very well understand that very many varieties of strawberries have passed into oblivion on account of some constitutional trouble. Undoubtedly there is a way to remedy this, and how shall we do it? By paying sharp attention to special varieties that offer characteristics in which we can see something more promising than we do in the Baldwin, some desirable features of flavor, texture, or keeping quality, or some other desirable quality, and you may be interested to learn that I know of the existence of some very special plantations in Massachusetts; I can tell you of a two-acre plantation of Tolman Sweets, and they are planted by shrewd, keen, smart planters. They know what they are talking about. I can also tell you of the existence of a young orchard containing several hundred Washington Royal. I know also that the number of inquiries now received concerning the Winter Banana and things of that kind are amazing. It may be that you will be interested somewhat in our varieties planted at Turner Hill, and I am going to tell you, in the first place, that we are not following out the first instructions we received from our Horticultural instructors and professors. Commercially, we are attempting to grow a very wide variety, much wider than you would ordinarily recommend, but we feel that we see some reason in this. If your town tradesman is an energetic person he will aim to turn his stock in his store over several times during the year; if

your nearest miller is an energetic person he will attempt to operate his mill for as many months during the year as possible, believing that in the idleness of his machinery and equipment, in the loss of his labor he will be seriously handicapped. The lesson is valuable, comes home to us, and I believe it is more or less true on the farm. I believe that the farmer, the fruit farmer, is at a great disadvantage when his crop is practically concentrated upon a few varieties and into a short market season. As he can only realize on his crop during the one time in the year, that is a very short time, and you peach growers certainly have my sympathy, when I think that you have to take a vacation until next year before you realize on that, your major crop.

Do not think for a moment that we have abandoned planting Baldwins, for such is not the case. Our four leading varieties at the present time are Baldwins, McIntosh Red, Wealthy and Wagener. Yet, if we carry out our present intentions we shall have, practically, Baldwin orchards, unless we have reasons in the meantime to revise our plan.

It is not my intention usually to confine myself to reading from my notes, but in this case, when we are discussing varieties, I feel the necessity of doing so, for there are some descriptions which I feel very sure I could not carry out unless I had the benefit of notes, from which I will now read, and consider a few varieties in their order of maturity.

Applause.

OBSERVATIONS ON APPLE VARIETIES

YELLOW TRANSPARENT

After your winter supply of Baldwin Apples is gone, say April 1st, it is very pleasant to think that in a little over 100 days or about July 18th to 20th you will be able to pick the first apples of the new crop, from your trees of this variety. Yellow Transparent is of Russian origin; introduced by the United States Department of Agriculture about 1870, and was early and strongly advocated by Dr. Hoskins of Vermont. This is about the first variety I remember in horticultural reading. It has one of the widest ranges of any variety being satisfactorily grown from North

Georgia to the Canadian testing station south of Hudson's Bay. Tree is an upright grower when young, capable of close planting, and an admirable filler. The tree trunks and limbs have a peculiarly strong yellow color. It makes a strong spur and bud system, and sometimes fruit buds form terminally on strong annual growths, thus checking its early tendency to wood growth. The fruit is of a waxy yellow appearance, hence the name, and sometimes carries a beautiful blush on the exposed cheek. It is a fine culinary fruit, and also would class it as a near dessert variety. It has a good clear acid flavor, with conscientious thinning, this variety will be nearly an annual bearer. Succeeds well on an early sandy soil. Clings well, would always include this variety in the home orchard, and under certain circumstances would advise its commercial planting. I think Mr. Frost would endorse this view. The fruit ripens unevenly, and would require successive harvesting. The fruit is tender and shows bruises, even finger marks, and should be literally "Handled with Gloves." As before indicated we made the first picking of this variety July 17, 1911.

RED ASTRACHAN

This is another apple of Russian origin, hence we may expect extreme hardiness and a wide range of cultivation, and in this respect we are not to be disappointed.

The tree is a strong grower; inclined to be too thick headed and requires considerable pruning to open up the tree properly. This variety is a biennial or alternating year bearer to an exasperating degree. All are familiar with its fine red striped appearance over a yellow ground, and the heavy bluish bloom is a most attractive feature. This apple ripens unevenly, goes by rather rapidly, and sometimes drops rather badly.

On older trees it will pay well for thinning. In spite of these few short comings it has commercial specifications, and should of course be included in the home orchard.

It is a cooking apple, and also perhaps a dessert apple, although strongly acid. This variety bears heavily on terminal growths, and on long spurs.

The first picking of Red Astrachan in 1911 was July 27th.

If the women of the household have not tested this variety for its jelly making possibilities both as regards color and flavor a pleasant surprise is in store for them.

WILLIAMS' FAVORITE OR WILLIMS' EARLY RED

It does not seem proper to pass without calling favorable attention to this wonderful variety. I consider it wonderful when we can grow so large and so handsome an apple at such an early date. It is, when well grown, a very beautiful, long, large, dark red apple of the first dessert type. A prime fruit-stand apple, and for table decoration unsurpassed, but is not a cooking fruit.

Williams' Favorite is very popular in Boston, in fact quite at home, for it originated within its present corporate limits. If this is not the market-gardener's apple, it is the apple for the market-gardener's soil, for it revels in a rich mellow humus filled soil.

This apple seldom sets heavy enough to require thinning.

OLDENBURG OR DUCHESS OF OLDENBURG

One of the best of the Russian apples and a successful apple East or West.

Forms a broad, very open head, causing little worry about pruning. An early and prolific bearer, and a variety which will require heavy thinning, although the tree will make a wonderful effort to mature an excessive set of fruit. Fruit somewhat flattened and has a beautiful bright red stripe on a yellow ground. Flesh, crisp and very acid, hence valuable for cooking but of doubtful quality to eat from the hand.

This is a commercial apple and a valuable filler variety. Its keeping quality is good for the season (late August) and far superior to Red Astrachan in this respect. Practice succession picking for best results. The first picking of this variety in 1911 was August 9th.

MAIDEN BLUSH

It seems improper to pass this valuable culinary variety by without mention. Tree a strong robust but homely grower while young. Comes rather early into bearing. Fruit very beautiful fine waxy yellow skin with a full crimson cheek often extending over the full lower or Calyx half. Flesh is very white and very fine quality. This variety furnishes the choicest evaporating stock in Western New York.

GRAVENSTEIN

This old and valuable variety is very popular in all New

England markets. This is the apple which would have proven the strongest rival, in our markets had the fence been broken down between United States and Canada. The main crop of Gravenstein comes in from Nova Scotia usually rather after the local crop.

This apple is too well known by every one to require description. The merits are fine quality, a superior cooking apple, and valuable eating sort, beautiful in appearance and has a long season of ripening for a fall variety.

Faults are; tree late in coming into bearing, a rather biennial bearer a shy bearer and fruit inclined to drop badly, and there are also many under colored strains on the market. It is an extremely old variety being mentioned as early as 1750. We picked our first market fruit August 24th, the past season.

WEALTHY

This is a variety which has been heavily planted especially in Northern New England, and it is well, as the variety is very hardy.

Originated with Peter Gideon in Excelsior, Minn., and is very valuable in the Northwest and Canada. It is a beautiful apple and useful either for dessert or culinary purposes. The season is long, from September to early Winter. This variety needs heavy thinning and also, ripening unevenly, will need succession picking. The tree is open and spreading and is a thrifty grower while young, but soon inclines to become a slow grower. It is an admirable filler.

First fruit picked September 6th, in 1911.

ALEXANDER AND WOLF RIVER

These apples, together with Constantine, Bismarek, and others, belong to the Aport Group. They are all characterized as being rather large and showy, but of from poor to very poor in quality.

The two under consideration are being planted commercially and have value in culinary ways. Alexander has probably rather the better quality of the two, and is being planted more than Wolf River in some sections, notably Western New York, while perhaps this is reversed in Vermont.

These are show or decorative apples. The trees are rather ideal in shape and seem to be extremely hardy.

SWEET APPLES

A wonderful change has come about in this class of apples. Primarily, as we are told in old horticultural books, they were planted to furnish feed for the hogs (and too many of us today have had to send odd sweet varieties along the same line). They were also useful, to a certain extent, in well made ciders and vinegars for their high sugar content made them very useful from a scientific standpoint; for sugars pass to alcohol and alcohol to acetic acid. Then baked sweet apples (and cream) were high in favor and very staple in the farmhouse menu and certainly formed one of the connecting links to the old farmhouse in the mind of the city man or woman.

Now, for baking, the more acid apples have the (call) leading place. Next we find the sweet apples acting as a buffer to keep the boys and city boarder away from the more valuable or saleable sorts.

Seriously, however, two varieties look commercially good at present, if well grown. Sweet Bough for summer use, and Tolman Sweet for a long winter demand. Good prices are being received for these varieties today.

McINTOSH

This is the one apple which is proving a close rival to Baldwin in the plantings of today.

This is the apple for the special grower, and I believe it is a mistake to have such quantities set out as is now being done.

It is impossible for me to imagine a variety which carries more of the requisites of a fine dessert apple than does McIntosh. Color, flavor, size, texture of flesh, aroma, and shape are all good. It is a strong growing tree after a few years and comes into bearing young and is the one apple to consider an annual bearer when the very best methods of care and culture are practiced.

Its great failing is its susceptibility to fungous troubles. When orchards have been planted on the filler system this is the variety which is destined to upset many well laid plans.

We marketed the first apples of this variety September 25, and have with us (March 14) a plate kept in ordinary storage which is far from being too bad.

R. I. GREENING

With a few more seasons' experience like that just past, this variety will be blacklisted I fear, and yet this has been and is a valuable variety. Boston is not a good market for Greening, but New York is, and so if a grower is planting this variety he should plant enough to be able to make a reasonable shipment as 100 barrels, or a carload lot. Greening is prized abroad. The good points of Greening are; good sized fruit, moderate crops annually naturally low headed trees (this characteristic existing almost to a fault). The faults probably stand clear in the minds of all. Early maturity and even premature dropping in a dry season, also a tendency to become too yellow. The most serious fault has been its proneness to scald both in ordinary and commercial cold storage. We have undoubtedly been too tardy in harvesting this variety. The Greening should be planted on lands of the heavier more moist types.

WAGENER

This variety has first come to general attention as a filler variety for which it is most admirably adapted. It is not a new variety by any means as it was known before the year 1800, and was winning prizes in 1850, and yet as with McIntosh it seems strange that so good a variety could have remained in general obscurity so long.

This apple is flat yellow overspread with red. Season from King of Tompkins time to January and even February from storage. It ranges from good for culinary use to excellent for dessert use, and is in many respects a valuable ter sort. Our Massachusetts College of Agriculture is doing much to popularize this variety.

Tree is a weak grower when old and you must expect to practice heavy feeding, cultivation and thinning to make it a good success.

Pres. You have heard this admirable paper, and Mr. Smith, I know, will be ready to answer any questions.

Mr. Race. I would like to ask whether you get good results in planting the Tolman Sweets?

Mr. Smith. I am not a grower of Tolman Sweets, but I know a neighbor of mine in Newburyport, who does get a nice price for them in Boston. There is a decided call for sweet apples in good condition.

Mr. Race. I was in Boston recently and I had a little

experience that I want to give to you. I had 250 barrels in my cellar I wanted to market them, so I went to Mr. Patch to see what the situation was. Mr. Patch was in New York, attending a conference of the United States Commission men, and it was fortunate for me that he was, because the man of the house would be careful about what he said, but his foreman was ready to talk. I don't know his name, but he was a very genial fellow, and told me just what I think was the truth. He had four barrels of apples. One was a barrel of Greenings that had scalded badly as they did this year. All the apples, in my opinion, were over-ripe when they were picked. That is a bad fault. The others were Bellflower, Baldwins and Tolman Sweets. They all looked nice. I said, "Now, what can you do with apples if shipped in here?" He sized me up and said, "If you have any good Baldwins we can handle them." All he wanted was Baldwins. I said, "How about this barrel of Tolman Sweets?" I had a barrel of them so I asked about them.—He said, "I have been trying to give that away, I can't get anybody to take it," and they were nice, too. So I asked "How about the Bellflower?" And he said, "No light colored apple sells well when there are high colored apples around." The sum of it was that if you have any good Baldwins you have got a demand for them. I went home expecting to patronize those people, when I got a circular from Cleveland, Ohio, which sounded pretty good to me, and I got in correspondence with these people out there. I wrote and asked them what varieties of apple they could handle and they said, "If you have any good Baldwins we can handle them. We are all cleaned up on our market for New England Baldwins. They are good sellers out here and we like to handle them for you; but don't under any consideration ship us any Ben Davis, because we can't sell them in Ohio. The consequence was that I shipped my apples to Ohio and I got \$3.50 a barrel. That was in the first part of February.

The speaker referred to a man that recommended 99 Baldwins out of a hundred. I was present at the Pomological meeting in Connecticut when Mr. Platt, the Ex-President of the Society, made that statement. Mr. Barnes of Barnes Brothers got up and asked Mr. Platt if he was going to set 100 apples what varieties he would set. Mr. Platt is a conservative man and one you can rely on, and he got up and he said, "I don't like to answer that," and Mr. Barnes said, "You had better. We want to know." He said, "Gentle-

men, I would set 99 Baldwins." And he sat down. Of course, we all had a good laugh. Mr. Barnes wasn't satisfied and he wanted to know about that other tree, that 100th tree?" And Mr. Platt said "I have been thinking since I sat down, and I guess that would be a Baldwin." (Laughter and applause).

Mr. Smith. I don't take too much exception to what Mr. Race has said, or a great deal of it; at the same time, to bear out my statement I shall have to show some facts and figures on the case, and I shall have to tell you that I can give you specific information concerning the statement about Tolman Sweets, and yet you must realize that is a special variety with a special demand, and also that your Baldwin is the apple for carload lots, for thousand barrel lots. In this case this man told me of one individual tree which last year picked 12 barrels and his later shipments upon the market were \$6.00 a barrel; and this is the same man who had enough results of this sort so that he is encouraged to plant out two acres of that variety, and still he is a good Baldwin and a good Russet grower. That is a specific case and these specific cases ought not mislead us. The Baldwin is the apple and will be as long as apples concern any of us in this audience.

Mr. Race. How about the Baldwin Spot?

Mr. Smith. I think Professor Maynard will tell more about that. I think it existed at the time I was a student in college, 20 years ago.

Pres. Some seasons I think it is very mild, and other seasons it is not, in certain localities.

Mr. Smith. We could get into a long discussion and talk Baldwin Spots for an hour and waste a lot of time. It is not necessarily confined to old trees or immatured trees, because this year we have Baldwins bearing their initial crop and have had just as bad cases, both on the trees and after they came into storage. It is a very annoying and very discouraging thing to think that we had petted them for six years and they developed a good case of Baldwin Spot at the start. It is mighty discouraging. It is a question arising constantly in the meetings, everybody asking about the Baldwin Spot, and yet I suspect that if next year is a cold, damp season it will drop out of sight altogether.

Pres. I would like to hear from Mr. John W. Clark. He says he doesn't have Baldwin Spot.

Mr. Clark. In regard to the Baldwin Spot, I think I know as much as the rest of you know, not much of anything, about it. I never was troubled with it to amount to anything.

Pres. Does the exposure of the orchard have anything to do with it?

Mr. Clark. As far as I have noticed, I have seen it on low ground, where it is more moist than it is higher up, and also where there were more or less apples that have dropped and lay on the ground and collected filth. We seem to find it more in such places as that than on good, high cultivated soil.

A Member. On soil that was pastured or fed with sheep?

Mr. Clark. I don't think I have, so I think that cultivation will help it. In regard to these varieties that our friend Smith has talked about, I am not much of a variety man. Now, of course it depends on where you can run in any day, some of these soft varieties are all right, but if you are where you have to barrel and ship, in hot weather, they don't stand up, and you have to wait until the weather is cold and if it happened to get into the market on a day that is hot and muggy, of course the price drops and you don't get anything for them. So it isn't safe to set many of the soft varieties. In regard to what varieties to set, I won't call any names, but the head salesman of one of the largest apple firms in the state told me that there isn't an apple in the world for an all around apple that is as good as the Baldwin; and he probably handles as many apples as any man in the state of Massachusetts. But of course we are not going to set all Baldwins, but set according to what you can sell in your local market or where you do dispose of them. I can't tell you what to set, but as a rule bank on the Baldwin pretty heavily, and let the other varieties go.

Pres. Mr. Henry of Connecticut has some specimen fruit that he would like to show the audience.

Mr. Henry. I think we had better put Mr. Smith's apples in the background for a few minutes. (Removing apples from table). The rest of the program is only going to take just a minute, but whenever I go away from home I like to take a few apples with me so as to have them to eat,

but I left very hurriedly yesterday morning and I didn't have any time; so yesterday afternoon I went down into the street here and found some very nice looking apples in the window of one of the stores, and I went into the store and I said to the clerk. "I want some apples and he said, "These are some western apples," and I said, "I want some to eat, not to look at," and he said, "Our New England apples are back there." I thought it was rather queer to have the New England apples in the back of the store, but I saw a large sign up there, "Choice Massachusetts Baldwins." I thought that there I would find some apples to eat, and I have brought a few of them along with me. You know that apples haven't sold very well this year and there has been a good deal of complaint. (Exhibits a dozen very poor cider apples). These are just as I got them, "Choice Massachusetts Baldwins," at one of your best stores in town. (Laughter). That is no joke, that is the straight truth. (Great applause and laughter).

A Member. How much did you pay?

Mr. Henry. They were marked five cents a quart, but that is the kind of fruit that a woman buying it is so disgusted with it that she isn't going to buy any more.

A Member. How is it with a man?

Mr. Henry. His language isn't fit to print, very likely. But really, when we complain of the lack of sale of fruit and then you can go into your best stores in town—it is just the same where I am—and these are what they call "choice Baldwins," it is no wonder that people in the cities don't buy more fruit. I guess we had better cover these up.

A Member. Are they Baldwins?

Mr. Henry. Yes, all Baldwins, they grew on a Baldwin tree, I suppose. But, seriously, we have got to grow a better apple at a reasonable price, so that folks can eat them. We can't get six or seven dollars a barrel. We have got to grow cheap apples, but we have got to grow something decent.

Mr. Race. I heard Mr. Henry say yesterday he didn't trim his trees very much.

Mr. Brown of Conn. That is one of the greatest troubles we have this year in the market business. With us in Connecticut, we have got the village of Putnam. We see

several stores that call themselves first class grocery stores, that handle now and then a box of western apples, but otherwise than that there isn't a store I know of that has bought a decent apple this winter. They will pay \$1.50—the best grocery stores paid \$2.00 a barrel—they will ask forty cents a peck for those things, which is what they ought to charge for the very best they could buy in New England, and they charge that price for those little things consequently, the man working for \$2.00 a day, if he buys a few quarts, can't afford to pay the price for the best apples.

For the number two apple that is just what it is represented to be there is a legitimate market. Some of them the working people can use, but when the grocery stores pay a dollar and a half or seventy-five cents a barrel and ask five cents a quart for a core and skin it is an imposition and they don't sell. There is lots of need of working out a co-operative system of distribution for the apple.

A Member. Here is another kind of trouble that we didn't mention today, and I would like to hear Mr. Smith say how he treats the Railroad worm. I would like to know what he does with it on his sweet apples.

Mr. Smith. In answer to the gentleman, I will say that we have not got it seriously. We had it seriously a few years ago and put ourselves to great expense to destroy all the trouble, and you people who raise Hubbardstons and all the sweet varieties, I can tell you there is no control except to destroy the fruit. This is speaking about the railroad worm or the apple maggot. All varieties are subject to this, but it is more prevalent on the yellow and sweet sorts. Your Baldwins may be infested with it just the same, but not nearly as likely to and it doesn't develop until the fruit goes into storage.

A Member. It is on the Baldwin?

Mr. Smith. Yes, but not so prominently.

Mr. Morse. I would like to ask, in regard to growing Baldwins, if it is necessary to inter-breed other varieties with them in order to get the best results?

Mr. Smith. I can't answer that. I can simply give you these suggestions—Western New York has been putting in the heaviest plantings of Baldwins and today those are interplanted most carefully. Of course, in ordinary years and

under ordinary conditions you will get plenty of interpollination and probably get plenty of it on the Baldwins, if your orchard is solidly planted with Baldwins only. At the same time, I have a feeling that a man is neglecting one of his chances unless he makes some effort to interplant other varieties blooming at the same time. I have that feeling and I notice those commercial men, who have thought deeply over it, feel the same thing; so I am satisfied that on general principles it is the proper thing to do. Certain varieties have a very short blooming season, possibly five or six days, and during that time you may have some wet times.

That makes me come to the subject of the discussion that was held yesterday, as to the necessity of having or not having bees. During these short blooming seasons you may have times of sunshine and then fog and then absence of mist and I don't feel satisfied that you are going to get the best results unless you have a host of these little fellows working for you; and if you can artificially introduce a lot of bees that is very nice. If you could control or produce conditions it would be very well, but if we can let's do so. Many forms of insect do the same work, many of the lesser bees, and beetles and bugs and the wind.

Mr. Race. Do the bees and the butterflies and those things work in unseasonable weather when the blossoms are wet.

Mr. Smith. No, they do not. On the other hand, I believe this: I would take chances and feel more safe if I had an abundance of bees and had them distributed through various orchards, and I would like it much better. Of course, where the sunshine comes through a haze and it is overcast and cold, the bees are chilled and driven back, but I believe the chances are better to have them at it. Bees get out very quickly; as soon as the sun shines on them they are out and active.

A Member. Are you troubled with the black smut on your Northern Spies?

Mr. Smith. If you mean that fungus that comes on in the fall, that seems to be less than skin deep, so fine a film that you can by hard rubbing rub it off, I will say yes, we are. I would like to explain to you what you may not know, that we are located within four miles of the seashore and during the fall we get day after day of damp morn-

ings and early fog at night and we are seriously troubled. It will be overcome by a very weak Bordeaux. The strength for that purpose is one pound copper-sulphate, four pounds lime and 50 gallons of water. We have had very good success controlling it with a mere dash of copper-sulphate alone.

A Member. I had some Northern Spies shown me and they were very badly covered with it.

Mr. Smith. It is a very serious thing for us who are trying to grow fruit in a very damp location.

President Maynard. It is quite important we should begin the next subject which is under the auspices of the Worcester County Horticultural Society.

President Breed. It is certainly a great pleasure to our Society to see that we can be helpful in the work of the Fruit Growers' Association and that we can contribute, even in a small measure, to your pleasure and happiness; and therefore we welcome you, and it is certainly an inspiration to any speaker to look into the faces of such an enthusiastic and interested audience, men who have come here for a purpose and from a desire to improve along our horticultural lines; and it certainly should be a help to every enthusiast to feel that he has so many who are interested in the same subject and who are working along lines for better fruit and better management.

We have striven today to procure a speaker whom we thought would be of special interest to you, and I have every reason to believe that he will bring a message to you at this time that will be helpful. I take great pleasure in introducing Professor Pickett of Durham, New Hampshire, who will now address you. (Applause).

A stereopticon lecture was given by Professor B. S. Pickett on Fruit Bud Formation.

A Member. Is there any difference as to the use of cow manure and horse manure?

Professor Pickett. I think that horse manure would be more desirable on heavy soil, and cow manure on the lighter soils. In all cases stable manure, especially if the application of it is continued, is apt to lead to poor colored fruit, but to fruit of large size.

A Member. What about the excess of phosphoric acid?

Professor Pickett. It gives the poorest results. An excess of potash gives slightly better than the excess of nitrogen, but not much; and I might say we got scarcely any better colored fruit where we applied excess potash than we did where other fertilizers were applied.

The President. A few moments more for questions. Any further questions?

A member. I would ask the Professor if he would please repeat what fertilizer he used with best results?

Professor Pickett. Well, I said I hated to recommend one as giving best results. I think I can recommend a better one. This one that gave us the best results consisted of 150 pounds nitrate of soda, 400 pounds of acid phosphate and 200 pounds of sulphate of potash to the acre. We worked these out, of course, for our purposes, at so much per tree and actually worked it out in the quantities of each element of plant food rather than in the totals. This is for another purpose, but I think I could recommend it better than we are using on that orchard. Of course, those are to show actual effects of each particular element.

A Member. In regard to plowing, can you get very near the tree with a plow?

Professor Pickett. We can on this particular orchard. Those pictures I showed of the trees and the grass and sod were taken in that orchard, they were high up so that there was no difficulty in getting right up to them.

A Member. I would like to ask if those apples that were grown on cultivated land were any better color than those on grass or sod?

Professor Pickett. Just such color as these are; just exactly the color. They didn't average up as big as those are, though.

A Member. I would like to ask if the gentleman can give any scientific reason why fruits grown on cultivated land will drop much earlier than on sodded land.

Professor Pickett. Yes I can give you quite a number of reasons why that is so. They don't apply in each case. On cultivated soil along about the middle of the summer after you get showers or something of that kind there in a heavy growth of small fibrous roots near the

surface. You cultivate after that and cut off a row of those roots for they are nearly always up by the top. Another possibility in a summer like the last is that in those cultivated orchards where fruit grew rapidly, in the very hot weather, they came to maturity a good deal earlier in the cultivated land than on the sodded. That is borne out by the way in which the apples keep this year. Those from the sodded trees, which matured later, kept better than those on the cultivated land, which matured too soon, and I am sure there are lots of people in this audience that had that experience and will recognize that condition. There are two sets of conditions, with two sets of reasons. (Applause).

President. Owing to the limited time we will make a change in the program by having the address of Mr. Castner the first thing after dinner; and we will hear a short talk from Mr. Wheeler and a paper by Mrs. Shattuck. Mrs. Shattuck is to speak first, Mrs. B. B. Shattuck of West Acton.

A BEGINNER'S EXPERIENCE IN SELLING APPLES

Mrs. Bertha E. Shattuck

There is always a reason, or group of circumstances why a person enters upon a certain line of work, or makes a radical change from a previous one. A city bred person, who moves to a farm is often regarded as a curiosity by the average city dweller. Why should one want to go? There is no amusement, no excitement, few social advantages, and the winters—"Oh! how can anyone stand a winter in the country," they say.

An inherent love for the country; a desire for the peace and quiet of the simple outdoor life; a firm belief that children could be brought up to be more natural and unaffected on a farm, where there is a chance for quiet thought, a chance for the mind and soul to develop; and also a belief that a given amount of money would enable one to live on a higher standard in the country; all these reasons made me decide to leave the city. Not for one moment have I regretted the change, nor have I longed for "the flesh pots of Egypt."

In looking for a farm, I found that my knowledge of values was rather limited. I wanted to rent for a year with

the privilege of buying, but the Real Estate Agents told me it would be practically impossible to find such a place. However, perseverance won, and I finally found my farm.

My choice was providential, for upon that old, almost abandoned place is an orchard of one hundred and fifty bearing trees, with about fifty more that have not come to maturity. No care had been taken of the trees in many years, and as I was a tenant and unacquainted with the place I did nothing for their good. The majority of my trees are Baldwin with the fortunate habit of about half of them bearing heavily each year. A neighbor bought the apples, he picking them all and taking only the firsts. The rest I sold for cider, not knowing better than to sell them all that way. Now I know how much better than to sell them all that way. Now I know how much better I can do by working harder and helping pick, sort, pack and sell the apples myself. That first year I had no stock, and the sale of standing grass and apples paid half the annual rent.

The next June it became possible for me to buy the place, so I began improvements. I hired the oldest Baldwin orchard plowed; the younger one pruned. I engaged a neighbor to spray the trees, but he did not get around in time as he had too much to do at home. The plowing and pruning did a great deal of good, my apples being of better quality than the previous year. My early apples were sent in bushel boxes to a commission house in Boston; the winter apples were sold to a store-keeper who took all I had, Baldwins and Ben Davis, packed firsts and seconds in barrels. The remainder went as cider apples. My receipts the second year were 75 per cent. greater than the first. Besides the apples, I raised a good crop of potatoes in the orchard that was plowed, enough to pay the cost of the extra labor hired.

This past year found me more anxious than ever to care for my fruit trees. I had proven to my own satisfaction that with care the trees would repay me for all I could give them. All the trees were pruned, the orchard that was not plowed the previous year was cultivated and buckwheat sown as a cover crop. I made the mistake of having the buckwheat plowed in last fall instead of leaving it until Spring, but as it is almost impossible to hire a plowman just when one wants to have him it may have been for the best.

The trees responded bountifully to the care given them. Spraying kept the apples free from fungus growth and there were comparatively few wormy ones. The size and color of the apples was much better than the previous years. My sales were 200 per cent. greater than the first year; this I account for in several ways; the fruit was of a higher grade, they were sorted and graded more carefully, and I understood selling them to better advantage. All the early apples were sold as before in the square bushel boxes. In October I read about the Apple Show and how Mr. Castner was engaged to demonstrate Western methods of packing; that decided me to visit the show to see how the fruit should be packed. I did not happen in at the right time to see a demonstration but carefully noted the different packs in the Western style boxes. The next week I ordered the desired boxes, secured papers and proceeded to polish, wrap and pack the Ben Davis apples for foreign shipment. The reason I shipped the Ben Davis was, that the man who bought my winter apples the previous year wanted my Baldwins but declined any more Den Davis. Some of my neighbors had done well with foreign shipments and why shouldn't I? So for several days I worked industriously to get the apples, that looked so beautiful but tasted so poorly, ready for shipment. At last they went and I, tired, but proud of my work, could hardly wait for the weeks to pass before my check came back. When it came my disappointment was great for I had only received half as much as I expected. I shall ship no more apples as a speculation to England, as I should have realized much more at private sale at home.

Two-thirds of my Baldwins I sold at a good price unsorted, just as they were picked and placed in barrels. The rest were carefully sorted in four grades, the firsts were sold at private sale, all seconds of both Baldwins and Ben Davis were sent in bushel boxes to a commission agent. The next grade were sold to a caning Factory and the remainder for cider apples. This coming year I shall endeavor to sell all apples direct to eliminate the commission agent so as to get all the profit for myself. All the profit is none too much. Anyone who thinks that growing apples is a good scheme for "getting rich quick" or a way to make money easily had better not undertake it. There is good money in it but only in payment for hard work; in spraying, pruning, cultivating the trees, picking, packing attractive, put your name or trade mark on the wrappers and boxes as a guaran-

tee of quality, and sell direct to consumer or store-keeper, then you will make a good profit.

In closing I wish to say a word of the great advantages one can receive in attending the Massachusetts Agricultural College. Last month it was my privilege to be a member of the first class to take a short course in apple packing. The lectures by professors and apple growers were most instructive; giving as they did expert advice on everything concerning apples, from the selection of an orchard site, the choosing of varieties, cultivation, cover and associated crops, pruning and spraying, to packing, picking, and selling apples, and it was an inspiration for us to put in practice the good advice given. Each student could learn just the best method for his individual case. I wish that every member of the Massachusetts Fruit Growers Association would take advantage of a short course, or even a correspondence course at the Massachusetts Agricultural College at Amherst.

Applause.

The President. The next speaker is Mr. Wilfrid Wheeler of Concord.

TEN MINUTE TALK ON SMALL FRUITS

Wilfrid Wheeler

Mr. Chairman and Friends: The subject assigned to me for a ten minute talk is such that it is almost impossible to go into details, so I am just going to run over some of the main things necessary in growing these small fruits. Some small fruits are very well adapted to cultivation in orchards, and return a profit to the grower while the large trees are coming into bearing, but if you are going into the business by itself as a small fruit proposition, the first thing to consider is to get as near a good market as possible. In that connection I want to ask this one question: Are we planting berries enough and doing as much as we can to supply the home market? I think we are not supplying the local market enough with the small fruits. They should be planted and grown near the small cities and towns and carried right in where you can sell them directly to the consumer. I don't think we have looked that up nearly enough. We are apt to take them to Boston and Boston sends them back to the local markets, the same products, that were grown in that vicinity.

There are a number of splendid varieties that don't

lend themselves to shipping, and if we can get them directly to the consumer in a fresh, nice state, the consumption of them will be ten times as great as at the present time. So, if you are going into the business be sure to get near a good market and look up all the markets you can, because I think that is one of the most important things you have got to consider.

In regard to soil and preparation, whatever soil you have, just use one that will grow good corn or potatoes, that has an abundant supply of moisture. I would rather use a soil that required draining rather than one that required irrigating, and then you will have plenty of moisture at the time you need it most which is the fruiting season. You can grow any kind of small fruit on dry soil, but you certainly need a good deal of water at the time of planting and it is better to have a soil that needs draining rather than one that is dry. Then the preparation should be very thorough; you should be as thorough and careful for small fruits as you would be with any other crop. The root system is very delicate and small entirely different from apples and trees and the root is near the surface; therefore the soil preparation should be very thorough. I should recommend plowing and getting well prepared for the crop at least the previous year being sure to get rid of all the grass and weeds which it is very hard to do after they are put into the ground:

The distance from plant to plant depends a good deal on the kind of cultivation you are going to give. In strawberries for matted system set 4 by 2 ft. or hills 14 to 18 inches apart, according to the variety. With currants and gooseberries about 4 by 6 ft. or 6 by 6 ft. according to the variety again; and for blackberries and raspberries, 6 by 6 ft. or 2 ft., if you are going to keep the direct row.

The question of variety comes up again. If you are going to market at a near point you want the very best, but if you are to ship away some of the firmer and harder varieties can be planted but you can't have quality and still expect the fruit stand up in a long distance shipment. The preparation of the soil for small fruits should be as thorough as for any vegetable crop. Unlike the apple tree they should never be grown in sod. For the raspberries and blackberries, currants and gooseberries there can be a partial crop put on during the late summer, but for straw-

berries, never. Thorough fertilization and cultivation should be practiced. Fertilization for small fruit should be in the first place to get a fairly good wood and plant growth of a fairly nitrogenous nature. Potash and phosphoric acid should predominate. A good one for currants and gooseberries should consist largely of phosphoric acid and potash, with a small amount of nitrogen in the form of manure. I think that manure is the best thing to use on currants and gooseberries, blackberries and raspberries. But an excess of nitrogen in the form of nitrate of potash has a tendency to soften the fruits and it is rather apt to make too much wood growth, so that the fruit is poor in quality and color.

For varieties of strawberries, if you are near Boston or south of Boston, I don't think there is a better variety to grow than the Marshall. It will bring more money in Boston or any good local market than any other I know. It is only fit to grow near the coast, where you are not troubled with late frost. If you are on a high enough elevation to be rid of frost in May or April you can grow it successfully. But if you are a long way from the market I should choose the Glen Mary or the Sample. The Glen Mary has been probably more chosen in Eastern Massachusetts, particularly near where I am situated, and there are more acres of that grown than all the others put together. The Sample is good for the local market and very good for the long distance market.

I see on the list the question, "What are the six best varieties of strawberries to plant to cover the season?" My idea would be the Mashall for south of Boston and for west or north I would grow the Barrymore for early, the Abington and Sample as mid-season, with the Glen Mary as late mid-season, and the Minute Man and Stevens Late Champion to follow. The Commonwealth is of fairly good quality, but I don't consider it good enough to grow as a home berry when we have other varieties that are much better. The Everbearing have come into use and they are truly everbearing. The Pan American, Suburban and Productive I think are best. They fruit in August, September and October, and while they may not be at the present time a commercial proposition still they should be planted more in the home gardens.

For currants I consider the Fay, the Wilder and the Perfection the very best at the present time. The Cherry

is very good, and while it is a big berry it doesn't sell in the same class as the Fay or the Wilder. The Perfection makes a very large bush; it is not as dark red as either the Fay or the Wilder, but still there is a good deal to recommend it for the near future.

For gooseberries probably the only commercial variety satisfactory to grow at the present time is the Downing. I think we can develop a market to take them, particularly, if we grow them larger, as they do abroad.

The raspberry and gooseberry, particularly the raspberry, are grown somewhat in Massachusetts, but not nearly enough. We depend largely on New York and they ship quite a distance, but it is not in as good condition as those grown near the market. The Cuthbert and Herbert are the most common varieties and I think the Cuthbert should be the one preferred, having been raised longer and having established a good reputation.

Considering the blackberry, I think the Snyder is the best for market, but the Eldorado is also good.

It has been asked that some mention should be made of grapes in this meeting, so I want to say that while I think grapes are not a commercial proposition on a large scale in Massachusetts, I think there is a splendid market for a very fancy article, grapes that can be grown, weighing, from three-quarters of a pound to a pound to the bunch and cut with a bit of the stem on them, packed in shallow trays or baskets so that there is only one layer in the tray, and supplied to the markets, for anywhere from eight to ten cents a pound, which can be received for them, even at wholesale, when they are grown in that way and shipped and packed in those packages, and I think there is no more profitable fruit when grown on the lighter warm soil, on the South side of the hills, than is the grape. For that purpose I think the Concord and Worden might be grown, and possibly the Delaware in some sections. It comes down largely to a matter of pruning, and I think that is one of the points where we fall down. We are apt to grow too much wood. We are growing the fruit in the fourth and sometimes the sixth year, whereas we should keep the grapes down more to renew the system of the entire vine practically every year, and in that way get a very much better bunch. We should keep in mind that the less wood growth the stronger and larger the bunch will be. The

south side of a hill almost too steep to cultivate, lends itself admirably to grapes and it is the warm side and will hold the heat into the late fall and should be utilized, particularly near a good market.

The automobile truck has been coming right along as a means of transportation. At the present time the automobile trucks, most of them, are a little too heavy, too shaky, to take small fruits for a long distance, but over our good roads and with pneumatic tires on the lighter trucks I think over a long distance we will be able to take them in and sell them directly from the grower to the consumer. The whole question is largely one of transportation and if we are going to give all our money to the transportation companies we are not going to get a great deal out of it ourselves; and when we consider the high cost of commission a few years ago, the profit between the producer and the consumer was in some cases as high as 60 per cent. it seems as though the farmer who grows these things should have a part of that profit, at least, and I think in communities where a great many small fruits are grown, a few people could combine and get a truck and deliver the fruit even to the retail store and in that way get a great deal better service and more profit. At the present time it goes from the commission man to the retailer, from the retail man to the customers, getting three handlings between the farmer and the consumer.

All these questions I think could be well discussed in a little more extended manner if I had time, but I see my time is up and I just want to leave this thought with you that the principal points in small fruit growing are, getting some land near a good market, as near as possible, thorough cultivation, plenty of fertilization of the right kind, and varieties that suit your market or your locality, and, finally, marketing them in neat, attractive, clean packages, and getting them from the farm to the consumer as quickly as possible.

I thank you for your attention. (Applause).

President. Mr. Brooks, wishes to make a motion.

Mr. Brooks. This Association has been very fortunate all these years in being invited by the Worcester County Horticultural society to the privilege of this hall and the privilege of the city. The least we can do is to extend a vote of thanks to the Horticultural society for these privi-

eges, and I move you, sir, that this Association extend a vote of thanks to the Horticultural society. It was voted and the meeting adjourned until 1:30 p. m.

AFTERNOON SESSION

The Pres. The time given on the program for the afternoon meeting is 1:30 and we had better begin. I notice that the card outside gives the time for two o'clock, and there may be members who have not arrived yet, so before calling the first speaker, let us devote the time to questions.

The second one is, "Is it wise to continue planting Baldwins with the Baldwin spot on the increase and no known method of control?" Anyone to discuss this question.

Mr. Copeland. The idea with the Baldwin is that there are very large sections which have never been touched with the Spot at all, and it looks to me as though we could still plant the Baldwin to good advantage. In our particular section it is really the leading apple. So far as the other apples are concerned, I, for one have lots of faith in the McIntosh, but I do believe that we are overdoing it just the same. If I were setting again I have 30 acres, mostly Baldwins, I would put in a lot of Baldwins. I know what it can do, I know the reputation it has, and all we have to do is to improve it and it is going to hold that reputation. That is my opinion.

Mr. Morse. I would like to ask what time the vote on the amendment will come up.

Pres. It can be taken up at any time. I think our Secretary has some recommendations.

Secy. Brown. Mr. President and Members: In the secretary's report is the recommendation that a committee on exhibitions be appointed, and in order to bring the matter up I move that a committee of five be appointed by the President, to be announced later, with the understanding that an exhibition be held, if feasible, this coming fall. I saw Director Hurd of the Agricultural College, recently and suggested to him that an invitation be extended by the College to hold a fruit exhibition at Amherst this fall. So I would make this motion and I would like to hear a discussion of it by the members to know what they think about it.

Pres. You hear this motion. Is it seconded?

A Member. Second the motion.

Secy. Brown. I would like to hear some discussion before this motion is put. I don't think we ought to go into it unless a majority of the members favor it.

Pres. Anything to be said on the subject?

Mr. Wilder. Are we to consider that the committee has power to hold an exhibition or not, as in their judgment they think likewise?

Secy. Brown. I should think that would be necessary; yes. Leave it to the committee.

Mr. Brown. Will you allow me to make a suggestion? Down in Connecticut our State Pomological Society holds an exhibition every fall, but we have the practice of meeting with the various fairs around the state and sometimes at Willimantic, and they usually give us some assistance and furnish us a tent for placing our exhibit, because it is quite a large exhibit and it helps both ways; it draws attendance to the fair and helps us get new members.

Pres. The committee could be authorized to make such an arrangement, perhaps. I think it is covered by the motion that the committee arrange for an exhibition if found possible. Anything further to be said on the question? If not, all in favor of the motion please manifest by raising the hand, contrary minded. It is a vote.

We will continue the discussion of our questions until the committee is ready to report.

A Member. The third question: "An orchard has a heavy sod. Would it be advisable to plow in the fall?"

Mr. Brown. No.

Pres. Will you tell us why?

Mr. Brown. My idea is that it breaks up the roots and exposes them too much.

Pres. If we are to plow at all, would you plow in the fall?

Mr. Brown. Plow in the spring.

A Member. Question thirteen.

Pres. "Does it look practical to the fruit grower that our city friends can engage in our business and make a success?" There is a great tendency on the part of wealthy city men to buy farms and operate them.

Mr. Wilder. I think that question was very ably answered this morning by Mrs. Shattuck. I shall be glad, of course, to know if there are a lot more who can answer it the same way she did.

A Member. Number eleven.

Pres. "What kind of soil suits the Northern Spy best?"

Mr. Mead. I should say a good, strong, rich soil; not too moist, but good and heavy.

Pres. Is the bark not liable to injury by the frost freezing it and shelling it off? I have seen a great many cases.

Mr. Brown. A rather moist, heavy soil, natural grass land; high ground, but what we would call a pretty good grass land.

A Member. Question number four.

Pres. "Cost of production and marketing are steadily increasing. Where are our profits coming from?"

Mr. Morse. (Whose peach buds are all killed) I wish I could tell where my profits are coming from this year. I don't see that there will be any profits.

Mr. Hawkins, can you tell us about profits on pears?

Mr. A. C. Hawkins. I expect to have a good crop, because I have taken pretty good care of the trees but it is something of course I can't tell until later.

A Member. Question eighteen.

Pres. "What is the best cover crop for a peach orchard?" There are peach growers in the audience and a good many peach orchards about. What is the best cover crop?

Mr. Parker. In my experience we have used spring vetch several years. Last year we tried crimson clover and got the best results I think, we have ever had on that.

Pres. Did it withstand the winter?

Mr. Parker. I don't know how it is coming out. It is covered with snow at the present time. We sow twenty pounds to the acre.

Mr. Brown. At what time?

Mr. Parker. Last week in July.

Pres. Question twenty-seven. "What varieties of pears pay best, and why?" Perhaps Mr. Hawkins can tell us about that.

Mr. Hawkins. I can only tell what kind pays best in my locality. I have had great results from the Buerre Bros.

Pres. What is the average price you are able to get for them?

Mr. Hawkins. For the Buerre Bosc the usual price is three dollars a bushel in Boston.

Pres. Question nineteen: "Is much planting of cherries being done in Massachusetts?" Who is planting cherries?

Mr. Wheeler. I think there is about one-half of the cherries planted at the present time in Massachusetts there ought to be; that is, young trees. I think there is a good market for sour cherries in this state.

Pres. The sweet cherry does not grow readily?

Mr. Wheeler. I don't think it pays to grow it. The sour should be planted a great deal more.

Mr. Sprague. Might I ask what section of the state cherries will do well in?

Pres. Will any one give us an idea or tell us where there is a profitable crop, for the sweet? The sour, I think, is generally successful. (No reply).

A Member. Question twenty-three.

Pres. "Which is better, the 'drive' or 'mist' nozzle?" That is, the mist nozzle gives a short spray, and the drive gives us a long, unbroken stream. Which is the better?

Mr. Putnam. I think the mist nozzle is. You want a very fine mist, or else the spray slides off the leaf.

Pres. Mr. Frost, can you give us a word on this?

Mr. Frost. I don't know whether the question means the drive nozzle as a special form of disc nozzle, or something like the Bordeaux nozzle.

Mr. Morse. My idea was a form of Bordeaux or a mist nozzle.

Mr. Frost. There is a disc nozzle gotten out by one manufacturer for carrying the spray farther, which is

called the drive nozzle, and I think that for very tall trees that is much preferable to the other; but wherever I could reach the tops of trees with the ordinary disc nozzle I should not use the drive nozzle.

A Member. It seems to me that that question can be answered that if you do much spraying you must use both. If there is air stirring you must use the drive and cannot spray with the mist nozzle, but if it is a calm day you can do better work with the mist.

Pres. We will take up the date of the annual meeting. The committee which reported yesterday has some recommendations. Shall we hear from the committee? Mr. Kinney.

Mr. Kinney. Mr. President and Gentlemen: When I reported yesterday morning I was a little bit worried because I knew that there was a division of opinion and it was liable to make hard feelings, but it seems to me that we have come to an agreement where all should be satisfied. We have decided that there is no necessity for changing the constitution. We feel that it would be desirable to hold the annual meeting in Worcester as formerly with a one-day session only, on the same date as now, the second Wednesday in March. We can have a two-days meeting held wherever and whenever it may seem desirable. Of course, we have had the meeting here for a great many years, but if it is an advantage for us to have it held here it may also be an advantage to hold it elsewhere, and this will leave it so that it can be held where it is best. I think Mr. Frost has a proposition.

Mr. Frost. We have invitations here today to hold our meeting in Boston. A number of us have talked this matter over, the date of the meetings, and where to hold them and we have thought, after conferring with some members of the Worcester Horticultural Society, that it may be advisable for us to hold our annual meeting here in Worcester, at which time we elect our officers, but to hold our two days meeting perhaps in other parts of the state where we may be invited. In this way we can hold our two days session early in the winter, when we can all get away easier and hold the short meeting in March, with the Worcester Horticultural Society, and at that time elect our officers.

Now, I think, Mr. President, that the first thing to be decided on would be the time of holding what we might call our "other meeting." Our constitution calls for two meetings during the year, the annual meeting and another one and at the present time I believe, Mr. Secretary, that the annual meeting to be held the second Wednesday in March, at which time the officers are to be elected. To bring this before you I am going to make a motion, Mr. President, that we hold this "other meeting," a two days meeting, during the second week of January.

A Member. Second the motion.

Pres. You hear the motion, that we hold a two-days meeting the second week in January. This is not the annual meeting. Anything to be said on the question?

Mr. Waters. Do I understand Mr. Frost to say that we are to hold this two-days meeting where we get the best invitation?

President. That is it.

Mr. Frost. I think we would have it part of the time in Worcester and part in Boston, and possibly part of the time in the Connecticut Valley. At any rate, we all want to spend part of our time here in Worcester, and without doubt I think that we may hold the most of our meetings here.

Mr. Knapp. It seems to me that this is a location very favorable for the fruit growers to come to. We have prospered very well and there is nothing about the meeting this year to indicate in the least that we have fallen behind. We have a large and growing interest right here, and it seems to me it is up to somebody to show that it would be some improvement if we discontinue what we are doing and go into anything new. Unless there was something to be gained by doing away with the usual custom and some reason why we can't come to Worcester, why shouldn't we continue, especially as the meeting this year is so large and enthusiastic?

Mr. Wheeler, of the Massachusetts Horticultural Society. It seems to me it would be a big advantage for us to go around to other cities. When I found yesterday afternoon that we had practically no representation in three of the biggest counties, it seemed as if we ought to go that

way and get people in that section interested in our Fruit Growers' Association. Last Saturday and the Saturday before in Horticultural Hall at Boston we held two meetings on fruit subjects. At those meetings there was an average of 400 people present at both sessions. Anybody that says we can't get a big crowd out at Boston simply doesn't know what he is talking about. I think that next year if we hold a meeting in Horticultural Hall in Boston we will get at least 700 or 800 people there, not only our own membership, but we will have a great many chances to raise the membership by getting the people in the eastern part of the state interested in fruit growing in Boston. They may not have farms in Massachusetts only, but they have them all over New England and they would come to our meetings and I heartily invite this Association to meet with the Massachusetts Horticultural Society next January, and they will furnish free of expense to this Association one of the best speakers we can get in this country on some fruit subject. That speaker can be recommended by your Association, if necessary, and we want very much to have this Association come down there, take our halls, free of any expense and have an exhibit at the hall, if you want to, or do anything you please. We have got plenty of room to have an exhibition and meeting at the same time, and we want you to come very much. (Applause).

President. Mr. Wheeler, may I ask you a question? Is it necessary for us to act upon this matter of a meeting held in another place?

Mr. Wheeler. There is no need of any vote, excepting whether you want to accept the invitation or not.

Mr. Frost. I withdraw my motion.

Mr. Putnam. I move that we accept the invitation.

A Member. Second the motion.

Mr. Frost. Before the motion is voted upon I want to read two other invitations:

“Massachusetts Fruit Growers Association, in Session at Worcester:

We understand that the Boston members of your Association intend to extend to you an invitation to hold a meeting in January, 1913, in Boston. The Boston Chamber of Commerce hope very much that you will accept this invitation. The advantages of this city as a meeting place

must be well known to you. Its hotels and convention halls offer convenient and reasonable accommodations; its theatres and other places of amusement are of high grade, and for those who have never before visited the city its points of historical, literary and artistic interests are points of great attractions.

Hoping to welcome you here next January,

(Signed)

J. R. COOLIDGE, Jr.

First Vice-President.

JAMES A. MCKIBBEN,

Secretary.

D. CRAVEN PARKER,

Chairman Committee on Conventions.

A letter addressed to Richard Hittinger, a member of our Association and a member of the committee on agriculture for the Boston Chamber of Commerce:

"I am informed that a movement is on foot to hold a meeting of the Massachusetts Fruit Growers' Association in Boston in January, 1913. I trust that the Association may vote to carry out this plan, as I believe Boston is not only an extremely attractive city for the holding of conventions but has peculiar attractions for the fruit growers. In the first place, it is one of the best markets in the world for fruits of all grades and the center of one of the finest market gardening districts to be found anywhere. Through the displays at Horticultural Hall its population has been educated to a fine discrimination in the higher grades of fruits and vegetables, and I believe for this reason the Association would be able to get the best kind of publicity to its ideas through intelligent and appreciative audiences which it would command here as nowhere else. I assure you that the city government will do all in its power to make the visit of your Association a pleasant one. I remain

Very truly,

(Signed) JOHN F. FITZGERALD, Mayor."

We also are offered Horticultural Hall free of charge and there would be a chance to use another hall, at a small expense, for an exhibition of the tradesmen. I think that many of us would gain a great deal if we could see up-to-date apparatus, spraying materials and nursery stock, and at the same time replenish our treasury. We can go there

and make a charge to all the dealers, which should be quite an income for the Association. The Massachusetts Horticultural Society has a membership somewhere around a thousand, and as near as I can remember only a very few of them ever heard of the Massachusetts Fruit Growers' Association. Some of us feel that if you could have a good big meeting at their hall we could increase our membership to a great extent. As Mr. Wheeler said, within the last month they have held two fruit meetings here, at which there have been in the vicinity of 400 present at each.

President. You hear this invitation of the Massachusetts Horticultural Society to hold a meeting on the second week in January, at Horticultural Hall.

President. All in favor of accepting this invitation of the Massachusetts Horticultural Society please manifest it by raising the hand. Contrary minded? It is a vote.

Anything further before calling the next speaker, Mr. Castner.

Mr. Frost. I would like to propose for action to be taken next year—it can't come up for voting until the next meeting—that we have a life membership list, with dues of \$20. I am doing this because I feel that many wealthy men are interested in fruit, who would join our Association if they could pay their dues for life rather than have an annual payment of one dollar. I simply propose this to come up at the next meeting.

President. It will be brought up at the next annual meeting.

Mr. Stowe. One of our members brought up the other day the question of appropriations made by the State and asked some of us to consider it. As you know, Governor Foss declined to sign the appropriation for the spraying of browntail and gypsy moths for the next three years, thinking it was too much money and on Saturday he sent a message to the House asking for a bill to be enacted appropriating \$50,000 to carry out the work of the browntail and gypsy moth men through this year. Then, on top of that he says that the foreign governments are having great luck with birds and he wants a bill put through appropriating \$50,000 for experimenting with birds to kill the brown tails and gypsies. Now, it seems to some of us that \$50,000 could be expended in a great many better ways than that. We

dont know what kind of birds they are going to get, what kind of troubles are going to come. We think that we have troubles enough and that if any of the members feel the same as we do we should see the Representatives and Senators and have them look out that such a bill is not enacted. It is nothing, I think, that we care to have the Association take any definite stand on, but it does seem to some of us quite important that such a bill should not be put through. (Applause.)

Mr. Mead. I want to say that if either the browntail or gypsy is ever got under control it will either be by birds or parasites. It won't be by human means. (Applause).

President. A question which is always uppermost in the business of apple growing is how to pack and get our crops to the market.

The next speaker is Mr. Castner, who will discuss the matter of Comparison of Apple Growing in New England as Observed by a Western Grower.

COMPARISON OF APPLE GROWING IN NEW ENGLAND AND THE PACIFIC NORTHWEST

MR. JOHN B. CASTNER,
Hood River, Oregon.

Mr. President, Members of the Massachusetts Fruit Growers' Association and Friends: I say "friends," because of the hospitality shown to me since I have been in New England this trip and last fall.

I have been asked by your Secretary to speak to you on the comparison of the apple industry in New England and the Pacific Northwest especially Hood River Ore., a section which I am the most familiar with. Hood River is the most free advertised apple section in the world, for the reason that all other sections claim they are just as good and by this admission place Hood River at the top. I have had eighteen years experience in the business in Oregon, and my trip through New England last fall while not for a long period, gave me a good idea of how the business is handled here.

It is certainly the hot bed of all the fruit sections, for it was here the idea originated of putting up the box apples in the manner in which they come on to your market here

today. Now why cannot New England go these other sections one better and grow better fruit?

The boosting of Hood River puts me in mind of a story I heard not long ago. It is told of an enthusiastic Real Estate dealer of our section, who was on a trip to the middle west. It seems a stranger had died there and the usual services were being held. When the time came to make a few remarks about the deceased, the minister who was very conservative, saying he had not known the party, asked if there was any one who had and was willing to make a few remarks. There was a large congregation present, but no one seemed to have anything to say. After a few minutes had elapsed a stranger in the back part of the church arose and saying as long as nobody had anything to say about the deceased, he would like to make a few remarks about Hood River.

Now, I did not come east to boost Hood River or any other Western apple section but I did come here to give you a few points and ideas about the growing and marketing of apples and how we made a success of it.

My trip east then was in the missionary line, a home missionary if you please, and was in the interest of the New England Fruit Show and some progressive growers who have awakened to the fact that there is some thing in the up-to-date and modern methods of growing apples and marketing them. It is a well known fact that the western people have the idea that the East cannot grow good apples. This idea has been installed in their minds by a good many of your New England people who thought they had to go West to grow apples.

What was and is the trouble? Is it the fruit or the growers?

I will answer that question. It has been the growers themselves, for in most cases the apple has been a side issue, and nobody knows what a lot of these old landmarks would have done if they had been given half a show, as it is you will find a good many of these old trees here in New England that are from fifty to seventy-five and some of them a hundred years old still bearing large crops of fruit, although everything possible was done to kill them. I may injure the feelings some of you who are still in the same old rut, but nevertheless I am going to give you my observation of the matter, where I know the trouble lies and the remedy.

As I said before your trees show that you have a natural apple soil here in New England.

The apples have been a side issue, a good many of the farmers picking out the poorest land for the apples, while the best land they have they will plant to corn or hay for the cows and sell milk from four to five cents per quart, while ten acres of Apple Orchard planted on good soil will net more than any other part of the farm if given the proper care.

In choosing an orchard site there are many points to be considered, which will vary more or less in degree of importance according to locality. These points are air and soil drainage, exposure, elevation and depth of soil.

It has only been in recent years that these different points have been taken into consideration, but I know from experience that these points should be taken into consideration before starting an orchard, certain varieties doing better on the same type of soil and at the same elevation.

One thing that should be looked after thoroughly is soil and air drainage. A tree planted in shallow soil, the water drainage being poor, or in other words a tree whose roots stand in water during the winter months is never in an entirely dormant state. The reason for this is that the roots are affected by too much water, and decay, consequently the tree is weak and this tree is the first to start in the spring and is generally caught by frost. It is known with us as the Winter Kill. Another thing is to avoid setting trees in a frost pocket. I think these conditions exist here in New England as they do with us.

Another thing I would guard against is setting on a southern slope, as I have known of whole orchards being killed by starting too early and being caught by frost. This condition might not apply to New England. If I myself were going to set apples even here in New England I think I would look for a North, North East, or North West slope, if it had the proper soil conditions.

I had to admit a good many things on my arrival here last fall that I did not expect I would have to when I left home. I saw a few orchards "Not very many," and some fruit that I did not expect to find, but I did see enough to convince me that New England can grow just as good apples as any section in the world if its growers will take hold of it as they should.

And I honestly believe there is just as good an opportunity here for a young person who wants to make the start as anywhere I know of. Although in the West and especially Hood River, Oregon, you would have the advantage of getting information from a good many who have made a success of the business while here there are very few of these cases and information is not so free, so the beginner would have to rely upon himself a good deal and the information he gets from the Agricultural colleges.

"We can grow better apples here in New England" was sprung on me from all sides. That may have been true years ago and I will admit there are a few being raised at the present time, but if you are raising all this good fruit here, why is it that we have been shipping apples in here for the last ten years and receiving almost as much per box as you have been getting per barrel?

I will tell you why. It is simply because the grower could not put his conscience in the barrel, but I think the day of reformation has come. "You can fool some of the people part of the time, but you cannot fool all the people all the time." I went on the Boston Market last fall and received permission from a wholesale fruit firm to open a number of boxes of Hood River Apples. Every box I opened was in first class condition and the apples were just as they were represented. I also opened some barrels of extra fancy Eastern apples. I suppose the most of you know what I found. It certainly was a fright, the apples were hardly fit for vinegar. Had they been offered for sale in Oregon or Washington the fruit inspector would have taken charge of them and destroyed the fruit and the owner fined for selling them. What a fine time an inspector would have had on the Boston Market last fall.

Mrs. Buckley. Who packs them?

Mr. Castner. The grower packs them.

Mrs. Buckley. The commission houses send men down there to pack the apples?

Mr. Castner. The grower dodges the responsibility, says the packers do it; but the grower himself is to blame for ever letting it leave his place in that condition. The grower is the one in the long run who gets the blame, so it is foolish for him to let it go off in that condition. That is the reason New England people get the reputation of putting up poor fruit. Very few ever have any culls. They

barrel up everything and label them "Extra Fancy." (Applause).

The Western box fruit I opened were selling from \$3.25 to \$4.50 per box according to variety while the barrel apples were selling from \$1.75 to \$2.00 per barrel. The Manager of this firm told me that last year he handled thirty-five cars of Hood River Apples and did not have a complaint from a single box. If that is not proof enough that it pays to put up an honest pack I do not know what is.

I will not say that all growers here are affected with the same trouble, there are some exceptions, but very few, but if you will only take the trouble to inquire you will find they are making some money in the apple industry.

On my arrival here last fall I was directed by Secretary Ellsworth of the State Board of Agriculture to Mr. A. A. Marshall of Fitchburg. I am not quoting Mr. Marshall to advertise him or his orchard, but I do so for the reason that it was so much different from anything I expected to find. Mr. Marshall was one of the progressive growers who had made up his mind to get out of the rut and try the up-to-date methods of apple growing, and put up his fruit in a package he could guarantee. It was an experiment with Mr. Marshall, but one well worth trying, for of the fifteen hundred boxes of McIntosh and Baldwins we packed, the lowest price he received was \$2.50 per box and the highest \$5.00. A good many growers have the "I can't fever and can't do as Mr. Marshall has done, but the trouble is they won't or have never tried. One big advantage you have over the west is nearness to market. Here you are right at your own market, we are thirty-five hundred miles away with a freight rate of sixty cents a box, that is the freight is fifty cents and refrigeration, ten cents. So with the sixty cents per box which it cost to grow and pack each box makes one dollar and twenty cents invested in each box of apples we ship into this market. Here you can make money by selling apples for a dollar a box, we cannot. We have to get the high price in order to make any money as well as interest on our investments, so in order to do so we have to raise as large a per cent of high grade fruit as possible.

Another secret of our success is co-operation of the growers. It seems to be the opinion of some growers here that this can never be accomplished in this section, but you can never tell until it has been tried.

We used to have these same unbelievers with us when we talked organization, and some of them hung back for five years, but as we continued to get better prices, they began to believe there was something to it and came into the fold. The first year after the Hood River Apple Growers, Union was organized we received \$2.00 per box for apples, which the year before brought us \$1.00 and \$2.25 for apples for which we received \$1.25 per box, so you can see what the organizing of the growers did for us. The Apple Growers Union has as its members at least 95 per cent. of the Growers of Hood River Valley. The Association does the packing of the apples for its members. No grower is allowed to pack his own fruit for very few of them could see the flaws in his own fruit that he could see in his neighbors. So in order to keep the grade and pack the same, it hires its packers and the work is charged to the growers. It is a very hard thing for the good apples in the box or barrel to bring up the price of the poor fruit you put in, but no where near as much as the poor will bring down the price of the good, so we have to be on the alert all the time and keep our standard up.

Another thing that helps us to get the fruit we do is the laws we have in regard to spraying our orchards and the marketing wormy or diseased fruit. We can sell the wormy or diseased apples to the vinegar factory, but if they are offered for sale on the market, they become the property of the Fruit Inspector, and he gives them a dose of Kerosene, which makes them unfit for use. So with these conditions and the high price of land it does not stand a grower in hand, to raise much of the inferior grade of fruit.

The question has been asked will it pay to renovate some of our old trees. One of the finest examples I ever saw of this work was performed by Mr. George A. Drew at Greenwich, Conn., who took an old orchard that was in very bad condition and has brought it back in very fine shape. I saw the trees last fall at picking time and they looked good and had a fine crop of Baldwins and R. I. Greenings, but the question arises, are not the majority of these old trees so infected with different diseases that it would be doubtful whether we would get a healthy wood growth and would there not be danger of the new growth breaking from the old part of the tree when it commenced to bear a heavy crop. I think I saw several cases of this kind last fall, and then again

the age at which we are able to bring trees into bearing at the present. I think it would be better to start a young orchard and have trees you know are right. I think one mistake that is being made by a good many of the growers is wanting a tree to bear too young. I myself would rather a tree would make a good healthy wood growth and then go to work bearing fruit. I knew from experience that a tree allowed to bear too young and allowed to bear too heavy will become stunted and will never become a money maker. It may bear every year but the fruit will be small and an inferior grade. I should not want a tree of mine to bear much of a crop under five or six years. I saw a good many trees here in New England last fall that were bearing very heavy at three and four years.

The question of over production is a problem that is worrying a good many people who are thinking of starting in the apple business, but I hardly believe there will be an overproduction of fancy fruit. There is already an over production of poor fruit. The large acreage of apple trees being planted, does not signify so much, as a large per cent. of the trees being set are not on apple land and also a large number who make the start are doomed to disappointment and will go out of the business. A person who does make the start and makes a success of it will have to work and work hard. Those of you who have been thinking of going into the business don't get the idea into your head that all you have to do is to plant the tree and in five or six years pick twenty dollar gold pieces from them, because you won't, even though a lot of the literature that is being sent into this section says it can be done. There are thousands of acres being planted in every section of the United States to catch the sucker who is looking for something easy. Honestly it is like **taking milk away from a baby to see how the people will bite at some of these orchard schemes.**

The Orchard business is a business by itself and needs attention the same as any other line of business. Nobody ever saw a business of any kind that would take care of itself. Your Apple Show at Boston last fall proved to you as it did to me, and also the Land Show at New York, and Portland and Augusta, Maine, shows that New England is going to make a new start in the apple industry, your apple show and vegetable exhibit at the New York Land Show was the finest there.

Very few of the people who figure on going to the West

or Northwest to start in the apple industry realize what they are up against. The price of land in most of these sections will cost from \$250 to \$350 per acre. When I speak of land at this price I mean good apple land. This price varies some according to distance from transportation. This land which is covered with scrub oak or large fir or pine stumps from which the timber has been cut will cost from \$150 to \$200 per acre to clear it for planting trees, so you see how much you have invested in land alone before you start your orchard. Bearing orchards say from eight years up will cost from \$1,000 to \$2,000 per acre so no matter whether a person buys land in the rough or a bearing orchard he has a fortune invested.

Now I don't want you to get the idea that there is no money made from these high priced orchards because a good many of them to my knowledge are paying a good dividend on the investment some of them paying fifteen and twenty per cent. on two thousand dollars an acre land.

A person can make the start here a good deal cheaper than he can there for the reason you can buy just as good apple land as you will find anywhere, the highest price not to exceed one hundred dollars per acre, and a large amount for considerable less.

Some one has said that your statements do not verify the literature that comes from that section. The literature is all right as far as it goes, but in most cases it does not go far enough, it does not tell the other side to show you what our methods in Hood River did for us in 1910. I will give you a few figures.

The Apple Growers Union received for its members in 1910 two million and a half dollars for their apples, while the state of Maine with one million barrels of apples received less than a million dollars for its Growers. Now when a small Valley like Hood River which is only six miles in width and twenty long can take that much money right out of your own market, it is high time that you sit up and take notice. On my trip west I stopped in Michigan at the small town of Lawton which is in the grape belt of Southern Michigan. The growers were hardly receiving enough returns from their fruit to pay for the harvest. On inquiring what the trouble was I found that each grower packed his own fruit and the majority of them were very adept at putting the bad ones in the bottom and a few good

stems on top, but the buyers had got next to what they were doing, so were sending to Ohio and New York for their grapes. The Michigan grapes were finding a slow market and poor price.

In conclusion I will say that when the growers of New England will get together and decide to put their conscience in the box or barrel and give the consumer a square deal, then they will make a success of apple industry in New England, and get a better price for their fruit. (Applause).

President. Are there any questions to ask Mr. Castner?

Mr. Spaulding. I think it would be a good idea, when we hear so much said about the situation in the north west, if we could come down to cases. I would like to ask what the orchardist gets for the best fruit per box?

Mr. Castner. We sell our fruit f. o. b. Hood River. Last year and in 1910 Newtons sold for \$2.10, and Spitzenburgs for \$2.25 a box. They cost us sixty cents a box at least. The balance will be all net. We don't pay the freight east; the buyer pays that.

Mr. Spaulding. Who pays the cost of the packing and the boxing?

Mr. Castner. We do. As I told you, it costs us sixty cents for growing and boxing and packing. The other is for the freight east, which the buyer pays.

A Member. Do you use the winesap?

Mr. Castner. We don't grow them. Our main variety is the Yellow Newton.

A Member. Do you raise the Delicious?

Mr. Castner. Very little. It is a very good apple, but will it take the place of the others? We have three varieties we can make a living out of; we will stay with them. Let somebody else experiment with those other varieties.

Mr. Dudley. I would like to ask if it always costs the same amount, just 60 cents?

Mr. Castner. Yes, 55 and 60. I have kept track for six years and it varies between those. It costs more now.

Mr. Dudley. Weather conditions don't make much difference?

Mr. Castner. Very little, with us.

Mr. Morse. Does that include the cost of the land?

Mr. Castner. Not figuring on that.

Mr. Miles. The Spitzenberg is the highest priced?

Mr. Castner. It is. Now, take our annual Fruit Fair. There is one thing that you will see, that is the extra fine looking fruit at that fair. Everybody tackles it, and they offer prizes and they get the fruit put up in beautiful shape. I met an eastern man going down the street with a great big armful of Wolf Rivers, and I said, "You got a few, didn't you?" and he said, "They only cost 50 cents apiece." I think he was going to ship them back home somewhere. What is the use of trying to raise apples that you know you can't raise as good as somebody else can?

Mr. Mann. I would like to ask what the age is of those western trees?

Mr. Castner. It is hard to tell. I have got trees in Hood River 60 or 70 years old, still bearing good crops of fruit, and nobody knows who planted them, but they are there, Baldwins and Rhode Island Greenings. They have been taken care of and are still bearing heavy crops. I had two trees pack 50 boxes each two years ago.

A Member. I would like to ask regarding the twenty odd varieties on the market where the bulk of them come from. There are twelve or thirteen red apples and about five yellow. Of those apples, the yellow apples I see are bringing the very highest prices, selling for from nine to twenty cents apiece at retail and some of the red at fifteen, and those apples seem to have absolute, entire possession of our fancy fruit markets with the exception of two growers who can be named in Massachusetts—do the bulk of those come from Hood River?

Mr. Castner. I couldn't say positively where the bulk did come from. I saw some McIntosh out at Mr. Marshall's place apparently in as good shape as they were the day I packed them five and a half months before. The stores in Worcester display them and will use them in preference to the western apples if they are only put on the market in that fine shape and guaranteed. That was not just because I packed them. The man who inspected them this morning told me he took one bruised one out. You couldn't do that with barrels.

Mr. Pratt. Have those been in cold storage?

Mr. Castner. Yes. I think they were put in last fall.

Mr. Dickinson. I would like to ask what are the com-

parative keeping qualities?

Mr. Castner. It all depends on where they are grown. That is very easy to explain. It is just simply a case of not being able to put your conscience in a barrel or a box. There is the secret of the whole business. (Applause).

Mrs. Buckley. And the remedy?

Mr. Castner. That will have to come afterwards. I tell you, the remedy is coming slowly, but it is bound to come surely. The people who will acknowledge that there is money in putting up fancy grades of fruit are going to make the money. Poor stuff will have to stand aside, because people will take the good fruit every time.

Mrs. Buckley. I understand you have in Hood River an organization?

Mr. Castner. We do.

Mrs. Buckley. Does this control this conscience business?

Mr. Castner. It does. (Applause). This, and the laws we have.

Mrs. Buckley. That is what we need in New England?

Mr. Castner. It is.

Mrs. Buckley. That is the point I wanted.

Mr. Castner. I will tell you, it is going to be a pretty hard thing for a good many of the old time growers to live up to some of those ideas, and it is hard for them to see that they have got to step aside for some of the younger generation. It is going to be the younger generation who are going to get the success, while a good many of the older ones are going on in the same old way.

Mrs. Buckley. That is the lesson I think we ought to learn from your talk.

Mr. Castner. We had the same trouble years ago. The people who have made a success out there have been the fighting spirits of the New England people have made that western country. I think you have got enough left here to pass some of these laws. (Applause).

A Member. How drastic are your laws?

Mr. Castner. In regard to spraying?

A Member. Yes.

Mr. Castner. I am a County Fruit inspector there. If

you are not spraying for the San Jose scale and your orchard is covered with it, I send you a notice. You don't spray. It is immaterial whether I dig your orchard out or spray it myself and charge it to you. I can go in and take every tree out and the law will uphold me. The notice I send you is enough. We had that tried after the law was enacted. The Fruit Inspector of one of the counties of Oregon claimed they could raise just as good fruit as anywhere, but they weren't doing it, the trees were covered with lots of San Jose scale and you couldn't tell whether they were apples or what they were. The Fruit Inspector notified one man, who had ten acres of prunes and ten of apples and he said a bad word and said he would spray when he got ready, that he didn't have to spray. The Fruit inspector didn't say a word, but he went down town and hired a bunch of men, and took the man's prunes right out, and when he started on the apples the fellow squealed, and said "If you won't take them out I will spray." Then he brought suit against the inspector, but the law was upheld. He carried it to the Supreme Court. The opinion of the lower judge was sustained, that the law should stand. So now, when a Fruit Inspector tells a man to spray, he sprays. It is optional with the Fruit Inspector to go on the street the same as here or in Boston and if he sees fruit that he does not consider right, and he can condemn it. The man who has bought it loses, and the man who sold it is fined.

Mr. Dudley. I should like to ask if they have the recall in Oregon and if they can recall the County Inspector of Fruit?

Mr. Castner. Not yet. (Laughter). They have it in Washington. They recalled one man and put him back in office again.

Mr. Teele. I would like to ask if we haven't here in Massachusetts a similar law?

Mr. Castner. I don't know.

Mr. Teele. I would like to ask Professor Maynard.

President. Mr. Wheeler can tell us of that law in regard to spraying.

Mr. Wheeler. We have got a law, I think, that contains some provision like that in regard to the gypsy and browntail moths.

President. It is not enforced much, however?

Mr. Wheeler. Not enforced at all. (Laughter).

Mr. Dudley. I think there is a law of Massachusetts that distinctly states that if a man sprays his apple trees and his next door neighbor don't he can get him hauled into court by a civil suit for damages to his own property.

Mr. Teele. I have read that complaints can be made to the State Inspector of Nurseries; Dr. H. T. Fernald, Amherst.

Mr. Frost. That only relates to nurseries.

Mr. Smith. I would like to say in regard to the law on spraying, if a person's neighbor has trees infested and he refuses to spray that person can go to the State Nursery Inspector and when the Nursery Inspector hears it he can notify that party to spray his trees, and if he doesn't spray then the Nursery Inspector can spray them at his expense. Of course, with regard to gypsies and browntails, everybody is supposed to take care of their own trees. If they don't the local superintendent is supposed to do it at their expense.

Mr. Castner. The proposition is, haven't the people here got pride enough, the growers, to put up stuff right and stop the extra heavy shipments from the west? Are they going to let us keep on doing that? We are going ahead doing it just as long as they let us. In order to stop it they have got to take care of their fruit.

I would like to ask if all things considered, the promise of commercial orcharding in the east is equal to that of the west?

Mr. Castner. Yes, sir, it is. That is my point of view, from my trip all around last fall. But the trouble is it has never been demonstrated to the majority of the people that you could do it. Such a thing as the Fruit Show last year, people getting together and holding a show, is the best way for everybody to show what they have got to compare their own fruits with the fruits grown in other sections. Don't be ashamed even if you don't get a prize the first time. Go back again.

Now, there is packing the fruit. Take the recent packing school at Amherst. I came on this spring stayed at the Massachusetts Agricultural College, held a packing school, and I believe it is going to be a start in the new arrange-

ment of the apple business in Massachusetts; this putting them up right is a mighty fine thing. (Applause).

The President. The next speaker, whom most of you know, is Mr. H. W. Collingwood, of "The Rural New Yorker," who will discuss the question of "Cooperation." (Hearty applause).

CO-OPERATION

Herbert W. Collingwood, Editor Rural New Yorker

When I was a boy on the Bristol County Farm, the old minister began his sermon about as follows:-

My Brethren, we have come today to discuss the theory of religion, there is also a practice. Last Sunday on going home I saw Deacon Brown out behind the barn forking hay over. Last Sunday, Sister Smith, was out in the wood pile cutting wood, while Brother Smith, was talking politics by the stone wall. I am told that Deacon Rogers sold a tub of butter, and when the buyer cut into it he found a stone weighing three pounds. Now this is the practice of religion. These same people are here today with the best clothes and best behaviour after the theory, but the good Lord will judge them not by their theory, but by their practice. Now I have thought that the trouble with most people is the fact that they cannot make theory and practice co-operate. I have been looking over your exhibit of apples. It is a beautiful display, the pick of the New England crop, and is showing the theory of what your fruit growers can produce, it is perfect. But in order to find the practice, I went out to a grocery store and bought a quart of apples; here they are, six little Northern Spys. They cost 15 cents a quart, which, as I figure, is \$14.40 a barrel.

They will sell you a peck for a dollar, or \$12.00 a barrel, and they have two sizes of Baldwins for 50 cents and 75 cents a peck. It is doubtful if the man who grew these Northern Spy got \$2.50 a barrel, and I will leave some smart boy to figure out how much of the consumers dollar he got. Here again is another case where practice and theory fail to co-operate, and therein lies one of the greatest lessons for the New England Fruit grower. From childhood men see from day to day the need of co-operation, yet it would seem as if the older they grow the less they are inclined to work together, until necessity drives them to it. My children

have given me two illustrations, which I think cover the point. The children were playing on the lawn. They had been eating some little cakes, and wanted to save some of them over for another day. As wise as was Joseph of old in providing for the lean years of famine, the cakes were wrapped in paper, and a pile of sand put over them. A hen came, scratched this sand away, and made away with the cakes, greatly to the disgust of the children. They heard a mason tell that sand and cement mixed together would hold anything, so the next day they got a handful of dry cement, mixed it with the sand, and again made a pile over the little cakes, and again the hen came and scratched it away easier than before, for if you throw the fine cement into the air, it will blow away as dust. Then someone told the children that water should be added, but they had begun to lose their faith in such things, for here were sand, cement and water, three of the most unstaple things when used alone that man could think of. Yet, they went ahead, mixed the sand, cement and the water, and made a pile of what they called dough over their little cakes. Then there was a change, for that dough hardened; the hen came again, but this time she scratched the nails off her toes and was baffled. The next day the children had to use a hammer to break down the protection and get at their cakes. Here is the great vital lesson of co-operation. The sand, the cement and the water, each of itself, or two of them together, had no power of protection; a more futile or useless protector would be hard to conceive of. Yet when they were put together and molded into form, a sledge hammer was required to break them down. Sometimes farmers think of the mighty interests which are arrayed against them, and they become discouraged, for what can individual farmers do against such mighty power? They can do nothing, so long as they permit themselves to represent the sand, the cement or the water alone, but put them together in number representing the sand, the power and thought representing the cement, and the ambition and brotherly feeling representing the water, and they form a bond which could not be broken. That is the first lesson we have learned from children.

Again, my own children formed a little farm organization. There was four of them, my daughter was elected Secretary, one of the boys Vice President, the other boy President, and the other girl treasurer. I gave them a piece

of ground for their garden and started them at the job. I happened to look back after half an hour from my work, and the girls were crying, while the boys were squabbling. As a director in the enterprise, I started an investigation, and my little girl came to me in great trouble, saying "Don't the President have to work?" It appears that the President held that he didn't need to work, all he had to do was to be President. The Secretary, of course, had nothing to do but write in a book. The Treasurer, naturally, did nothing but handle the money. It left therefore the Vice-President to do all the work, and he had resigned in consequence. Now you may smile at the children, yet again and again large organizations of grown up men have gone to pieces and failed utterly, for just the same reason, for when men organize they sometimes forget that even greater labor and keener care are required than when they run their own business, and in these two simple illustration lie just about all that there is in successful co-operation.

And now you will ask why should a farmer co-operate? Let me ask anyone here to get up and name a single line of business which either sells goods to farmers, or handles his own product, which is not thoroughly organized in a business way? The railroads the express companies, the commission men, the milk dealers, are, every one of them, organized and standing like a well drilled army against the individual farmer. Can any one hope to make a successful battle of the individual against the army? This organization works in a dozen different ways. It is doubtful if butter at 50c a pound would be anything like as extortionate as a pair of rubber boots at \$4.50 a pair. Both are called necessities, one made by the individual farmer, the other by an organized corporation. Yet if butter should go to 50c a pound, our entire city population would unite in denouncing the farmer. They would call it an outrage and attempt to prove that farmers were all getting rich, yet the public will walk up and pay \$4.50 for the rubber boots, although there is a far greater margin between cost and selling price than in the case of the butter. The organization of the manufacturers and the railroads enables them not only to hold up their prices, but through advertising and other means to control public opinion to a large extent. It should be easy for any man to see that if he can unite with 10, 50, 100 or 1000 of other farmers, that he can come closer to controlling his business, as these large companies do. As is well

known, the New England farmer never did like to be drilled to give up certain things of his individual rights, and that very thing has been to his disadvantage in a business way. During the Revolution, the New England soldiers came close to mutiny at Valley Forge. That will seem strange to New England people who regard their section as the most loyal part of the country, yet it is true, and the mutiny was not over a principle, but over what our soldiers call a mean practice.

Baron Steuben came from Germany and started in to drill American soldiers. He had them out at all hours of the day, drilling and drilling, handling their guns and marching about. It seemed like an outrage to those Yankee soldiers, and they went to Washington for relief. They said they came to fight, not to march around like school boys. Washington told them to go back and learn how to fight, but they said "We know how. With our rifle we can pick a squirrel of the top of a tree, what more do we need?" The answer was, "If that is so, why do you not stand in the open field against the British regulars. We cannot always fight behind stone walls as at Lexington, and you know that you cannot stand up against those regulars until you learn to fight together." They went back to their drill, though it galled them to the heart, but when the British left Philadelphia and marched across New Jersey, Washington chased them, and at the battle of Monmouth, Baron Steuben was vindicated. As the result of his drill, the American soldiers stood up like a stone wall, and for the first time in history the British regulars found soldiers who were more than their equal, because the Americans had learned how to co-operate and fight together. And there lies the great lesson today for the New England farmer. He must learn all over again through hard and constant drill how to stand up with us brothers on even terms, and fight not as individuals, but as a strong body of men. Imagine the folly of a man, in battle using the power of his arm and his shoulder, and yet sticking out one single finger, or his thumb, to deliver a blow. He would hurt himself more than he did his enemy, but when the fingers and the thumb are put together in the form of a fist, the same power back of them makes the man five times as effective.

Or if you ask further why the New England farmers should co-operate, let us consider another point, the competition which is constantly growing in our markets from

fruit sent to us from the Pacific Coast. As we all know, this excellent fruit is coming into every large town, competing with our own fruit and in many cases actually driving it out. Now think for a moment how impossible it would be for those Pacific Coast growers, each one acting by himself, to send their fruit far across the country in little individual lots. The reason why the Pacific Coast farmers have formed their co-operative organizations is the fact that necessity drove them to it. Few men go willingly into a form of co-operation, but stern necessity compels them to do so. Those western men saw that they never could enter the eastern market as individuals. Co-operation alone would give them enough of a crop to make it worth while to ship; nothing but co-operation would enable them to make terms with the carriers or to compel the buyers to come to them and handle their goods. And further than that, nothing but co-operation or control of the business would enable them to put the guaranteed perfect pack of fruit upon the market. These things have been carried out in the West, and we see the result of them in our markets today. Those men who represent an organization of 500 or more men may go to the buyer and state what they have to sell, and guarantee each box or barrel absolutely. The buyer knows what he is sure to get, and he treats those men as business people, exactly as he would be obliged to treat a manufacturer.

And strange to say, the most useful thing about such co-operation is the thing which would be most galling at first to the average New England fruit grower, for in a co-operative enterprise the individual takes a back seat of necessity. For example, if we were to form an organization of 100 fruit growers of Worcester County, we should be obliged to handle them about as follows:

When the time came for packing the fruit, the grower would be notified to pick it, put it in the packing shed and then let it alone, for the packing would all be done by experts under control of the organization. You can imagine what a tempest this would create for each man would claim that he knew exactly how to pack the goods yet if each one of the hundred were to do his own packing there could be no possible uniformity in the pack and no one could guarantee what was to be sold. The only hope would be for the individual to leave the packing absolutely along with cold blooded experts to put all the apples in barrels or boxes re-

ject what they saw fit and guarantee the goods absolutely. This has been tried out again and again and it has been clearly demonstrated that there can be little hope for a co-operation among growers of vegetables or fruits unless the goods can pass through some central point repacked and handled to a standard by people who are not interested in their growing. This is the stumbling block in most attempts to co-operate yet it is the foundation principle of all. Another thing which must be remembered in forming a co-operative society is the fact that co-operation means quality. The quick and the strong giving up something of their superiority to aid the dull and the weak. Hundreds of co-operative efforts have failed because after a short period a few strong and unscrupulous men saw an opportunity to exploit the rest. Such is usually a definite form of robbery and has thrown more discredit and suspicion upon an honest effort to co-operate than anything else in the history of the movement. The only safety lies in all the members realizing that each must accept a fair average and no more and that the ruling spirit of any such organization must be the square deal and brotherly feeling. Without this there is no hope for permanent strength in a co-operative society.

That has been the history of every co-operative society. thus far, and there can be no getting away from the proposition. One of the most successful instances of co-operation in this country is the Citrus Protective League of California. That organization was formed to handle the situation which grew up in the lemon and orange business. A strong lobby of importers in New York City has been working over congress for the free importation of citrus fruits into this country, which it was claimed in the present state of California conditions would have ruined the industry there. When representatives of this industry went to congress, found themselves handicapped because they were unable to give definite figures about their business. They therefore went back, organized their society, raised the necessary money, and engaged a well known man to handle the business. This has enabled them to get together the most comprehensive statement of the cost of producing a crop, ever worked out in the world. They know just exactly what their oranges cost from the tree to the consumer's mouth, and with these absolute figures they were able to convince congress that their industry should be upheld. And when the railroads undertook to raise the price of carrying their

oranges, this organization was again on deck with the facts and the figures, and the power which enabled them to make such a contest that the rates were reduced. In numberless other ways this organization has been able to help those California farmers. They would have been powerless trying each man by himself to do the work. The New England fruit growers are in need of just such work, and cannot obtain the legislation or the help as individuals. They can only do it when thoroughly organized in a co-operative society like that in California. There is another instance in New Jersey where the farmers in the neighborhood of Freehold have formed a farmer's exchange. This grew out of the trouble and loss in handling their potato crop. This is quite a famous potato section, the soil and the conditions being well adapted to growing that crop but before this exchange was started, the farmer sold his potatoes to the local buyer. This local buyer sold to a jobber in New York or Philadelphia; this jobber sold to another in some western city, and this one sold to a wholesale or small jobber; this man in turn sold to a retail grocer, who sold them to the consumer at 25 per cent. or more advance. Thus five sets of dealers stood between the potato growers and the consumer, and the growers received 41c. of the consumer's dollar. It was impossible to remedy this trouble, so long as farmers sold as individuals. The Monmouth County Farmers Exchange was organized in 1908, and has steadily increased its business. Until last year this Company sold 2,518 carloads of potatoes. Their seed potato trade amounted to nearly \$85,000, and their total business was \$1,499,509.99. The average price obtained for potatoes as the result of this exchange was 89c. per bushel, and the estimated extra amount put into the hands of farmers of that neighborhood since that Exchange was started is \$125,000. And not only has this exchange helped those farmers in a business way, but it has helped them in other ways as well. Now the only hope for New England as a farming and fruit growing section, lies along the pathway of co-operation. The time has gone by when the New England man can afford to conduct an individual business and not unite with his neighbors. Wherever the co-operative principle has been fairly tried, the results justify this assertion. In many ways it will be harder to start true co-operation in this section than elsewhere, because for so many years the New England farmer has been taught in every way to act as an individual. He

must come to it, however, or be passed in his business by other sections where men are able to get together, and it can be done in New England as well as anywhere else. I do not think it would be wise to attempt to start such work on a large scale, because the strength of such an organization will depend upon the strength of the units which go to make it up, and the smaller organization of 10, 20 or 30 men should be perfected first, and when such men have learned to work together thoroughly, they can be united into a larger organization and thoroughly welded together. The future strength of the New England states lies where the real strength was found in the past, among the hills and on the smaller farms. Under the system of individual working, such small farms are at a disadvantage, but let them be brought together in a fair system of co-operation and they would have a business strength as enduring as the old strength of the hills themselves. There is every reason for a true revival of the New England small farm and home, for the real strength of New England is not to be found in your cities, your banks or your great corporations, but out in the open air where farmers may work and feel that they are to receive full recompense for their labor and their care. (Applause).

On motion of Mr. Wilder a vote of thanks was extended to the speakers who helped make this the most successful meeting in the history of the Association. Adjourned at 4.12 p. m.

**Officers of
Massachusetts Fruit Growers' Association
1913**



H. L. FROST, President

F. C. SEARS, Vice-President

F. HOWARD BROWN, Sec-Treas.

MASSACHUSETTS
FRUIT GROWERS
ASSOCIATION



REPORT OF THE
19th Annual Convention
HELD IN
HORTICULTURAL HALL
BOSTON
1913



THE GAZETTE PRESS
WARREN, R. I.

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SUFFOLK COUNTY: A. Warren Patch, Boston.

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MIDDLESEX COUNTY: C. L. Blake, Ashby; Dr. F. Earland Gilson, Groton; E. R. Farrar, South Lincoln; Wilfrid Wheeler, Concord; R. A. Hittinger, Belmont.

HAMPSHIRE COUNTY: John W. Clark, North Hadley; J. T. Geer, Three Rivers, A. J. Norman, Amherst.

HAMPDEN COUNTY: L. W. Rice, Wilbraham.

BERKSHIRE COUNTY: R. H. Race, North Egremont.

FRANKLIN COUNTY: E. F. Copeland, Colrain; Wm. Davenport, Colrain; Charles A. Smith, Ashfield.

WORCESTER COUNTY: W. D. Ross, Worcester; H. R. Kinney, Worcester; Edmund Mortimer, Grafton; H. A. Cook, Shrewsbury.

OUT OF STATE: J. H. Putnam, Conn.

INTRODUCTION

The splendid weather of the first day brought a large attendance at the very opening of the session, the large hall being filled when President Frost called the meeting to order. Memberships poured in at the Secretary's desk that day, nearly 300 being taken care of and two thirds were new members. The second day the rain cut down the record, about 100 being taken in and only about one half were new ones. However all previous records were broken and the wisdom of holding the convention in different places was vindicated. Some sixty-six members are from outside the state, the one farthest away being in Manila. We have many ladies on our list and trust we will have many more.

To many members this report will be the first they have seen. We would particularly request that they show it to some neighbor who is interested in this line and invite him to join. How easy it is just to send along that dollar. That is the way we have added practically 100 per cent to our membership each of the last two years. Everybody get a new member and we can increase the benefits to all.

The 1911 Report was issued to members within two weeks of the close of the meeting. The 1912 Report was held up by delays at the printers so that spraying was well under way when it came out. That is one reason for issuing the report now rather than waiting till March, so members can have the material and study it up before the spring rush. The Annual Meeting will be held Wednesday, March 5th at Horticultural Hall, Worcester.

The great success of the Boston meeting was due to the untiring efforts of President Frost in every direction. Send those memberships to the Secretary at Marlboro, Mass.

Nineteenth Annual Convention

of the

MASSACHUSETTS FRUIT GROWERS' ASSOCIATION.

January 10th and 11th 1913

Horticultural Hall, Boston

[Convention called to order by President Harold L. Frost.]

PRESIDENT FROST. Ladies and Gentlemen: I will open this convention now, and I feel that it will be one that will be remembered by the members of our Association for a long while, for four reasons. We are inaugurating several new departures: The first one will be our Round Table Talks for those interested in special subjects, and they will be announced during the two days of the session. The first talk will be held here in one of the small rooms of the hall and will be for all of those interested in the growing of small fruits. Now, the Round Table Talk idea is to give people who are more interested in other subjects than the general subject under discussion an opportunity to confer and discuss different questions with the special leaders. The talk this afternoon will be in charge of Mr. Fred A. Smith of Ipswich on "Small Fruits." Now, if you will ask the secretary in regard to it, those who wish to attend this talk will be notified where it will be held. The other two talks will be held tomorrow morning and tomorrow afternoon.

Another reason for remembering this convention will be the unity of the subjects which will be the basis of the general discussions and addresses. Our addresses will all relate to the production of the apple, from the commencement to the finish, including marketing. I do not think we have ever had any addresses on the marketing of fruit, and one idea of this convention will be to bring the commission and market men closer to the producer.

Another reason for remembering it will be our trades exhibition. We have never made a specialty of making trades exhibitions of educational value. I think that they will show you apparatus which has never before been shown in New England. The success of our convention, if we are successful, will be largely due to the trades people, as they have furnished the means for advertising our convention here in Boston. Our Association is not very well known in the eastern part of the state.

Another reason for remembering the convention will be that this is the first meeting that we have ever held in any city other than Worcester. You know we have met in Worcester every year since the organization of the Massachusetts Fruit Growers' Association. We hesitated to leave our home city and would not have done it had it not been for the sake of advertising ourselves and showing the fruit growers in the eastern part of the state what benefits they could secure by joining us.

Our speakers today are men of national reputation in their line; many of them have never been heard in Boston. They are our guests, and we are their hosts; our treatment of them at this time may make them desire to come to Boston again. I am going to ask every one of you to feel as though he was the speaker's individual host, that he feel as though he had him in his own care.

At a meeting of the officers and directors it was voted not to have any addresses by the president or other officers or any addresses of welcome. The convention is going to diet on meat alone. If you want any of the social functions, come to Worcester in March and attend our annual meeting, which will be held on the same dates as during the previous years.

Our subject for discussion this morning will be on spraying, and I understand that Dr. Whetzel will confine his remarks largely to the fungus diseases, more so than to the insects which have been spoken of to much greater length in this hall. We want this to be a very informal

meeting, and after the speaker finishes his address we would ask that every one of you feel free to ask questions. Now, Dr. Whetzel is a man who can answer questions on spraying better than anyone with whom I am acquainted. He is a man that is liked by everyone who knows him. Since our programme was issued I have had several inquiries as to when Dr. Whetzel was to speak; some of them have come from his former students in Cornell, and when a student asks to be given the privilege of hearing his former teacher again, it means that he must think a great deal of him and that he must have gotten a great deal from his lectures.

Before Dr. Whetzel gives his address I am going to show you some apples that I picked up in a store in Arlington. They were put in the window and were grown by one of our professional men who is an apple enthusiast, and they were marked "Number 1 Apples." [Laughter]. Is there any wonder that the western apple is driving our apple out to such a large extent, when you see apples of that description? [Exhibiting very poor specimens of apples]. Now, our Association is organized to help professional men like the one who raised these apples. He can raise good apples just as well as anyone else can.

I have the pleasure now of introducing to you Dr. H. H. Whetzel of Ithaca, New York. [Applause].

SPRAYING FOR THE CONTROL OF APPLE SCAB.

Professor H. H. Whetzel,
Cornell University, Ithaca, N. Y.

The Scab an Epidemic Disease. The apple scab is a disease distinctly epidemic in character, appearing with marked severity some seasons, being almost entirely wanting in others. This marked difference in the abundance of the malady may occur in two succeeding seasons. While appearing in epidemic form throughout the apple growing regions only at rather long intervals, it is nevertheless epidemic in some section of the country nearly every year, as for example during the season just passed (1912), the disease was very severe in Maine, but almost entirely absent in New York. An examination of the records available indicate that the scab has been generally epidemic throughout the United States at rather regular intervals every few years. Since there has been but little scab generally for the past three or four years, due largely to the dry seasons which have been general it would appear that we are approaching another epidemic period for this disease. I have chosen for several reasons to confine my remarks to the control of apple scab, rather than to those troubles such as lice, etc. which have more particularly concerned you during the past season or two. First I am not a "bug" man and so am in no position to advise you in matters relating to your insect troubles. Second, because the past history of scab epidemics indicate that your chief concern in orchard troubles for the next two or three seasons is to be the apple scab rather than lice. The scab may not be upon you in full force next season but rest assured it will come and that right soon. It is but the part of wise and sensible men to arm yourselves with the best and most recent knowledge of this your enemy

that when it does come up against you you will not be worsted in the contest.

Life History of the Scab Fungus. The apple scab, as every man in this room must know, is a disease caused by a fungus, a minute plant living upon the leaf, fruit, and rarely the twigs of the apple. It is a parasite, at least during the growing season of the apple tree. Before entering into a discussion of the control of this scab fungus we shall do well to have before us the chief facts of its life and existence during the round of the seasons. **The fungus passes the winter in the old leaves on the ground.** When the scabby leaves fall from the apple tree in autumn the fungus which has been living on the surface now grows into the tissues of the dead leaf and there forms large numbers of globose spore cases, more minute than the head of a pin. These grow during the autumn and mature in the early spring, appearing as very small black pimples discernable by the aid of a hand lens, just under the skin of the leaf on the side lying uppermost. The spores in these pimple-like cases are produced eight in a sack called an *ascus*. Fifty or more of these asci are produced in each spore case. These spores are ripe at about the time the blossom clusters begin to show a trace of pink and during the rains which usually come at this period are forcibly discharged into the air. Within five minutes after the old leaves on the ground are wetted spores begin to be discharged. Mr. Wallace, working in our laboratory some years ago showed that no less than 8,107,200,000 spores may readily be discharged in 45 minutes of rainy weather, from the leaves on the ground under a tree having a spread of 40 feet. These spores while shot less than a quarter of an inch into the air are very light and float off on the slight air currents to lodge on unfolding leaf, flower bud, or pedicel. If the rainy weather which has brought about the discharge of these ascospores continues for 30 to 40 hours so that the foliage and blossom clusters remain wet the spores germinate and sending a germ tube into the skin of the leaf establish the parasite which within 10 to 14 days develops

sufficiently to appear as an olive brown spot or scab. This early establishment of the fungus is known as the primary infection. It is usually the underside of the unfolding leaves and the pedicles of the blossoms that are first infected. The spots developing on the pedicles cause the young fruits to drop within a week or two after blossoming while on the infected leaves, spots develop from which great numbers of summer spores or conidia are developed, which falling on the surface of the leaves below and on the upturned blossom ends of the rapidly enlarging fruits give rise to the black scab spots on the upper side of the leaves and fruits. From these spots new crops of conidia are produced which spread the parasite to other leaves and fruits throughout the season, whenever rainy weather favor. The ascospores described as causing the first or primary infection may continue to be discharged over a period of a month, so that if weather is not propitious for discharge just before blossoming time primary infection may occur later, after the blossoms have fallen. It is, however, generally the primary infection before blossoms that destroys the set of the fruit and the secondary infections later that gives scabby fruit. Not infrequently one of these secondary infections occurs later in the summer, August or September, making scabby a crop which up to this time had been clean. This is known as the late infection. This late infection sometimes does not develop until after the apples have gone into storage. Late infection scab spots are not confined to the blossom end of the fruits like the earlier lesions but are apt to be more common about the stem end of the fruit. They are, moreover, much smaller, seldom larger than a pin head and intensely black. The scabbing of the current year's twig growth is known to occur in a few varieties but is not common. There is little evidence to indicate that the apple scab fungus like the pear scab fungus winters on the twigs or limbs of the tree. Neither do the fallen scabbed fruits serve to carry the fungus through the winter. The conidia or summer spores are short lived and refuse to germinate

ple scab disease and the almost universal occurrence of the apple, cultivated or escaped, makes the application of methods based on either of the first two principles quite outside consideration. That method (spraying) most generally employed to combat this disease is based entirely upon the principle of protection of the host plant, fruit and leaf from attacks of the pathogenic fungus. Methods of immunization, such as selection and propagation of resistant varieties, etc., are of little value to this generation of apple growers who must look to the varieties already producing, for their returns and remuneration. To the question of spraying then we address our attention.

The History of Spraying for the Control of Apple Scab in this country dates approximately from 1885 when Saunders in Canada and Goff in New York laid out and conducted apple spraying experiments with a form of lime-sulfur. (Lodeman, *The Spraying of Plants* 1896 p. 88.) The then recently discovered bordeaux mixture used so effectively by French vineyardists against the grape mildew was first suggested for apple scab by Lamson Scribner, Assistant Botanist of the U. S. Department of Agriculture in his annual report for 1885. It was soon generally recommended and employed and quickly proved its efficiency against the scab fungus. Its use became general among those growers who sprayed, not only in New York but throughout the other apple growing sections of the United States. Two factors of fundamental importance, however, tended with increasing force to dissatisfaction with bordeaux as a fungicide for apple spraying. From the first it was observed that russetting of fruit and yellowing and falling of leaves frequently followed spraying with bordeaux mixture. Especially was this the case in wet seasons in which spraying was most necessary. In the second place commercially prepared bordeaux was generally held to be inferior in efficiency to the home made mixture and more expensive. I hold it to be a fundamental principle that a fungicide to be universally and continuously acceptable must be of a nature to be made

on a commercial scale, stored and doled out as needed by the grower. Hence I regard the nonadaptibility of bordeaux to commercial manufacture as one of two chief causes for its final abandonment for general use against apple scab, though I, of course, believe the question of injury to fruit and foliage the more immediately potent cause. The climax was reached about 1909-10 when lime-sulfur appeared on the spraying horizon of our western apple sections. Its conquest of the east, the stronghold of bordeaux and conservatism, has been most complete. It is uncommon to find in the State of New York an apple grower who still clings to bordeaux. Lime-sulfur, commercial lime-sulfur, if you please is the fungicide of the day. That it has come to stay I doubt, that it will never be replaced by bordeaux I am quite sure. Copper as the active principle of fungicides has had its day. Sulfur formerly the basis of all fungicides is again coming into its own and that with a vengeance.

Philosophy of Spraying. Let us consider carefully the why of our employment of spraying for the control of the apple scab. It is required of a fungicide (1) that it shall be effective against the fungus to be combatted, i.e. it shall **prevent** the germination and growth of the fungus spore. Both lime-sulfur and bordeaux conform to this requirement. (2) It shall not at the strength effective against the fungus cause injury to the host plant. Here the bordeaux most frequently fails and that too under weather conditions most favorable to the fungus. To be sure lime-sulfur may cause injury but it is far less common and serious than in the case of bordeaux. Most of the injury reported due to the lime-sulfur, results from applying it to badly scabbed or insect injured foliage. (3) It must be of a nature to go together with an effective insecticide especially in the case of apple spraying because here the control of codling moth and other insect pests is quite as important as the control of the scab. Bordeaux was particularly satisfactory in this respect, any of the standard arsenical insecticides working with it quite satisfactorily. The lime-sulfur on the other

hand due to its more active chemical nature, tends to break down arsenical compounds forming new combinations injurious to foliage and fruit. One compound, arsenate of lead, has proven quite satisfactory with lime-sulfur, giving but little injury even under exceptional conditions. Not only must the combination of the fungicide with the insecticide prove non-injurious to the host plant but the efficiency of neither against the fungus and insect pest must suffer. There is abundant evidence in the results of experiments and in the general experience of growers to warrant the conclusion that neither the fungicidal value of lime-sulfur nor the insecticidal efficiency of arsenate of lead are injured by the combination. In fact Dr. Wallace was able to show that the fungicidal efficiency of the combination was greater than that of the lime-sulfur alone.

Having set forth the nature and requirements of a good fungicide and having shown wherein lime-sulfur is superior to bordeaux let us consider the matter of **time of application**. To be effective the fungicide must be applied before the arrival or at least before the germination of the fungus spore upon the leaf or fruit to be protected. We have seen that the first scab spores to reach the young leaves and blossoms in the spring come from the old leaves upon the ground at the time when the blossom buds just begin to show pink. The ascospores are not mature and so not discharged before this time. We have also seen that the fungus does not winter on the twigs. It must be evident to all of you, therefore, that dormant spraying can be of no value for apple scab. This is borne out by experiments and experience. The first application therefore for scab is to be made as shortly before blossoms open as possible. The next period for infection is usually just after blossoms fall. Evidently the time for the second application is as soon after the blossoms begin to fall as possible, say when two-thirds are off. A third infection depending on weather may call for a third application, within ten days to three weeks after the blossoms fall, but this is not usual with us in New York. An

application had always best be made the latter part of July or first of August to protect the maturing fruit and the foliage from a general late infection that will give scabby fruit in storage and a good crop of ascospores in the old leaves on the ground the next spring. It will be seen from what I have just said that the stage of development of the apple foliage, blossoms and fruit is to be the chief guide in determining the times of application. Another factor or guide of nearly equal value is that of the occurrence of rain periods. By this I mean cloudy rainy weather for periods of two to several days. Always spray **just before the rain periods** never just after them. You will recall that the spores are discharged, disseminated and germinate during these rain periods and also that the fungicide to be effective must be on the parts to be protected when the spore arrived or at least before conditions favorable to its germination occur, hence the rule I have just laid down.

Equipment. It is neither my function or purpose to discuss under this heading the very important questions as to different types and makes of spraying machinery. That lies wholly within the province of my colleagues the farm machinery men. There are certain phases of the equipment question, however, of which the field pathologist is or should be most competent to judge. I want to point out a few things in regard to the spraying equipment which from my knowledge and experience in spraying apple orchards I know to be of financial worth to every apple grower.

Pressure. What particular make of power sprayer you shall use is as I have said is not for me to judge. There are many good ones. I require only that the machine give a constant uniform pressure of 175 to 200. Less pressure than 150 lbs. is never to be tolerated with the large nozzles now generally used in orchard work and brings us to the question of:

Nozzles. An efficient nozzle must give a good volume of fine, evenly distributed, hard driven **mist**. There appear from tests made in the farm machinery laboratory of Cor-

nell University to be but few nozzles that meet this requirement. A very clever device known as a "sprayograph" has been devised by my colleague, Professor H. W. Riley for testing nozzles. All nozzles should be set on the pole at an angle of about 60 degrees. For dormant spraying one efficient nozzle to each pole is all that should ever be used. More are wasteful. For later sprayings two nozzles on tower pole may be effectively used but never more than one on the pole on the ground.

Hose. Field experience has shown that in spraying large trees, two men, no more no less, may work to advantage with each rig but only when proper length of hose etc. are provided. For the man on the tower the length of free hose should about equal the length of the pole, 12 to 14 feet, with a length of 8 to 10 feet to bring the hose to the top of the tower, a total length of 20 to 25 feet. For the man on the ground a length of at least 40 to 50 feet is required. The hose should be of as small a diameter as possible, of the best material, etc. so as to be of as light weight as may be. Large heavy hose are never to be tolerated. They interfere directly with efficient work.

Poles. For the man on the tower a pole not less than 12 ft. long is required for effective work while 14 to 16 ft. is far better. The lightest bamboo compatible with necessary strength should be used. The inner pipe should be of brass or aluminum firmly fastened so it will not turn inside the bamboo. The operator can spray effectively only when he can turn the nozzle in any direction at will. Iron gas pipe poles should never be tolerated. The pole for the man on the ground should never exceed 10 or 12 ft. Longer poles cannot be used effectively among the branches.

Tower. No apple tree after it is five years old should be so small as to be effectively and efficiently sprayed from the ground alone. The spraying of a bearing orchard should certainly never be so attempted. The saddle type of tower here shown (Fig. 1) has many advantages over other types. Make one and find out. Height is the primary requirement.

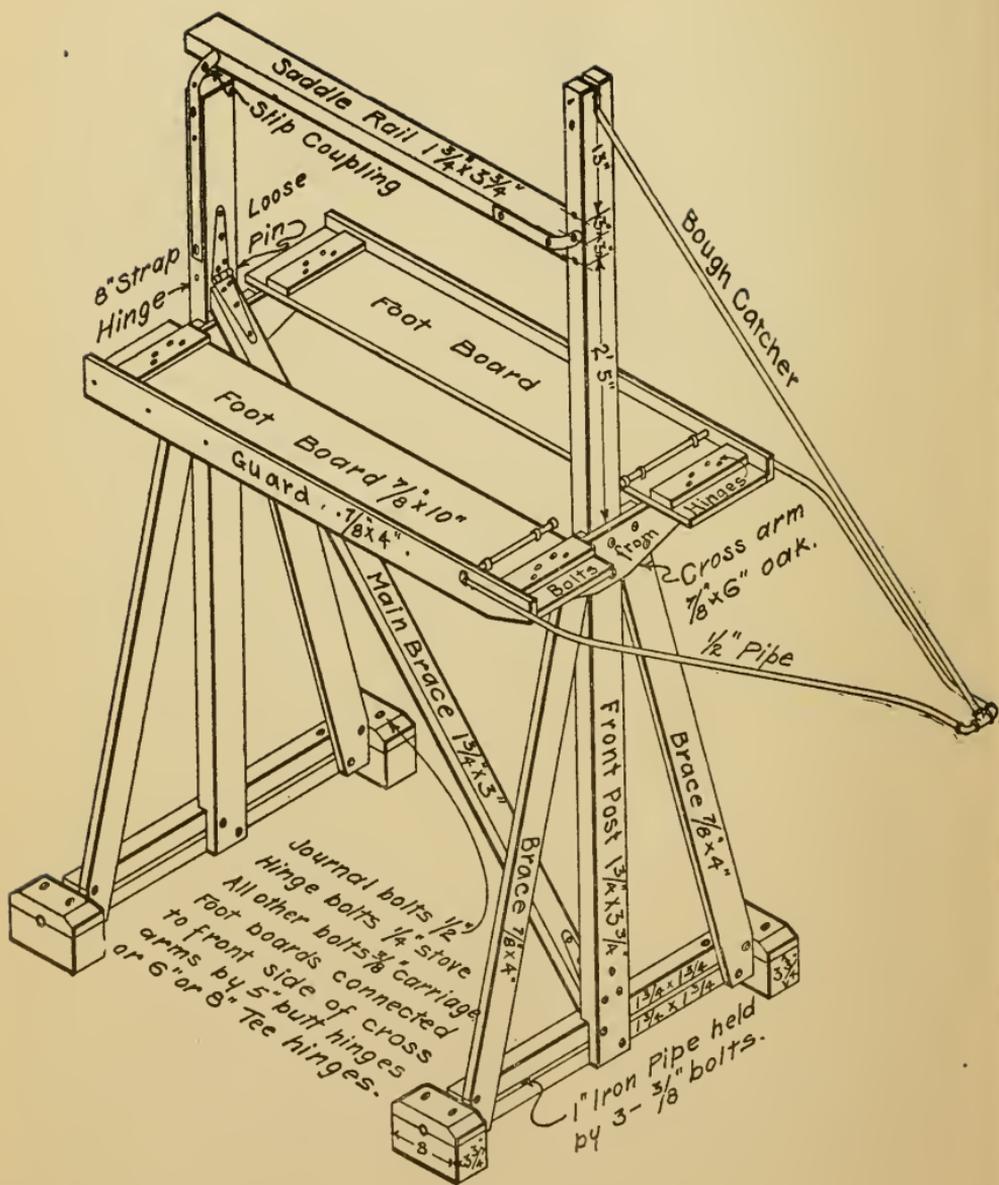


Fig. 1. The Cornell Tower. Saddle type of folding tower devised and perfected by the departments of Plant Pathology and Farm Mechanics, Cornell University.

in a tower. The rule is, have a tower of such a height that the hips of the man on the tower are well above the bulge of the tree.

Facilities for filling the tank should be such as to require a minimum of time. At the periods when spraying is necessary time is too valuable to be used for anything else than **spraying**. **Filling tanks is not spraying**.

The fungicide and its application. I have already pointed out the superiority of lime-sulfur for the control of the apple scab.

The strength or dilution required for a given fungicide is determined as we have seen primarily by the minimum strength required to kill the pathogen and the minimum dilution necessary to prevent injury to the host plant. The more these limits overlap the more satisfactory the fungicide since the greater the margin of safety and efficiency. It is now generally held that lime-sulfur diluted at the rate of 1 to 40 of a 32° Beaume concentrate, is most satisfactory for the control of apple scab. Arsenate of lead is at present the only known arsenical both safe and effective for use with lime-sulfur. Dr. Wallace (N. Y. Cornell Bulletin 289 p. 146 and 290 p. 178) has conclusively shown that the addition of arsenate of lead actually increases the fungicidal value of the mixture. 2 to 3 pounds of arsenate of lead per 50 gallons of the dilute lime-sulfur is all that is required for effective control of the codling moth.

Marker. Milk of lime has often been used and advocated as an addition to the dilute solution for a marker. So far as its effect on the fungicidal value of the lime-sulfur is concerned Wallace's experiments seemed to show that it actually increased it. (N. Y. Cornell Bul. 290 p. 185) We have found the addition of three to five pounds of iron sulfate to a two hundred gallon tank of spray mixture the most effective marker. It gives a black liquid which contrasts sharply on the green foliage but soon turns to a rusty brown. Its effect on the fungicidal value of solution has never been satisfactorily determined. It does, however, markedly re-

duce the burning qualities of the solution.

The character of the application of this combined fungicide and insecticide is of the greatest importance. Since the principle involved is that of **protection** from the scab fungus every susceptible part must be thoroughly covered but not drenched. To do this will require time, intelligence and honesty in the work. The most conscientious and intelligent workmen on the place will be none too good to manipulate the poles, I was about to say "hold" the poles, but that is just where most spraying fails. The poles are usually held not manipulated. Most effective and satisfactory work can be done **spraying against the wind, never with the wind.** To do this successfully drive with or against the wind. Make two stops for each tree or rather for the two trees you are passing between, one as you approach them and one just as you are past. Hold the pole so the nozzle faces the wind and **spray a limb at a time.** There is no nozzle or operator that will spray a tree at a time. Hold the nozzle at such a distance from the limb that the limb will be just where the force of the wind breaks the spray thus exposing the limb on one side to the forward driven force of the spray and coating it on the other side with the backward wind driven spray, in short hold the nozzle at such a distance that the limb is surrounded by the fog formed where the force of the wind breaks the spray cone. You thus finish a limb at once. No waiting for the wind to change. The application is made at the most effective time. There is no spray driven into your face or the faces of your horses. It blows past you on either side. Try it and you will never again **spray with the wind** when you can help it. To thoroughly spray a tree 30 to 40 years old will require not less than five minutes. Ten trees per hour is rapid work.

The quantity of the dilute solution to use depends of course upon the size of your trees. From careful estimates based upon extensive operations in many orchards the following figures are offered as reliable guides in this matter. For trees 30 to 40 years old, 30 trees to the acre, will be re-

quired 6 to 10 gallons dilute solution per tree per application. Even for dormant spraying this amount will be necessary as a large percentage goes on the ground. In figuring the amount of concentrate needed allow half for the dormant spray, (on account of the greater strength of the solution 1-9 or 11) and half for the summer applications (three or four). In general this will require one barrel (50 gal.) of concentrate per acre (of 30 trees.) Count on using about 40 pounds of lead per acre.

Schedule for spraying the apple orchard for scab, and codling moth, etc.

Dormant Spray. As the leaf buds begin to show green. Lime-sulfur (32 degrees Beaume) diluted 1 to 8, for San Jose Scale, Oyster Shell Scale and Blister Mite. Add arsenate of lead 2 lbs. to 50 gal. for Bud Moth and Case Bearer.

Summer sprays.

A. As blossom buds begin to show pink. Lime-sulfur (32 degrees Beaume), diluted 1 to 40, for apple scab; add arsenate of lead, two pounds to 50 gallons, for bud moth and case bearers.

B. As the last of the petals are falling (begin when two-thirds are off) Lime-sulfur (32 degrees Beaume) diluted 1 to 40, for apple scab; add arsenate of lead, two pounds to 50 gallons for codling moth.

This is the most important spray for the control of codling moth and should be thoroughly done.

C. Three weeks after the petals fall. Lime-sulfur (32 degrees Beaume), diluted 1 to 40 for apple scab; add arsenate of lead, two pounds to 50 gallons, for codling moth.

D. Last week in July. Lime-sulfur (32 degrees Beaume), diluted 1 to 40, for apple scab, late infection; add arsenate of lead, 2 pounds to 50 gallons, for second brood of codling moth.

LIME-SULFUR

The concentrated Lime-Sulfur solution may be purchased ready made or may be prepared as follows:

Lump Lime	40 pounds
Sulfur	80 pounds
Water	50 gallons

Make a paste of the sulfur with about 10 gallons of hot water. Add the lime. As the lime slakes add hot water as necessary to prevent caking. When the lime has slacked add hot water to make 50 gallons and boil one hour, stirring constantly. Store in air-tight hardwood barrels. Test the strength of the solution with a Beaume hydrometer and dilute for use according to the following table:

Dilutions for Dormant and Summer Spraying with Lime-Sulfur Mixtures

Reading on hydrometer	Amount of dilution.		
	Number of gallons of water to one gallon of lime-sulphur solution		
Degrees Beaume	For San Jose scale	For blister-mite	For summer spraying of apples
32.....	8	11	40
31.....	7 1-2	10 1-2	37 3-4
30.....	7 1-4	10	36 1-4
29.....	6 3-4	9 1-2	34 1-4
28.....	6 1-2	9	32 3-4
27.....	6	8 1-2	31
26.....	5 3-4	8	29 1-2
25.....	5 1-4	7 1-2	27 3-4
24.....	5	7	26

PRESIDENT FROST. If you haven't got all you want from Dr. Whetzel, dig in and get more; but I am going to ask each one of you in asking a question to rise and give his name. All of these discussions are taken down in shorthand and will come out in the report. Now, this report will be issued probably within a month of this time, so that you will have this advance information for your spraying work this spring. This puts you ahead of the man who is not a member of the Association.

I am going to say that those apples I show you are grown by a man who is not a member of our Association. [Laughter]. These [showing other apples] were grown by a member of our Association. The man who grew these [showing apples] has become a member within two weeks. [Applause].

MR. MUNROE MORSE. I would like to inquire if cultivating the land under the apple trees and burying the leaves would have any effect in preventing that scab?

DR. WHETZEL. I expected you to ask that question. Yes, it would have considerable effect, depending on how thoroughly you turned under the leaves and when you did it. If you plowed in the fall and did a thorough job you would very greatly reduce the amount of infection the following spring; if you did not plow until spring and plowed so late that the spores were already discharged, you wouldn't gain anything. On the other hand, while this is a good sanitary measure to be employed in the control of apple scab, you must not depend on it alone. We have records in certain orchards in New York State that have been plowed and cultivated, in which the check (unsprayed) apple trees were in the middle of the orchard, and have been thoroughly sprayed, by the way, for 12 years—98 per cent of the fruit showed scab, even though the land had been thoroughly cultivated and the orchard thoroughly sprayed the season before. It merely shows that there were a few leaves sticking around that hadn't been turned under, those that were in the fence corners and under the trees, which would have sufficient spores in them if the season was favorable to give a large percentage of scab. Of course, 98 per cent doesn't mean badly spotted, but it was that 98 per cent showed one or more spots. Plowing under is a good sanitary precaution, but not to be depended on, nor are you to omit the spraying.

A VOICE. How about burning?

DR. WHETZEL. It might work, except that you would have the same objection that you couldn't thoroughly burn every leaf, and I am inclined to think you would be discouraged if you should try. It is dangerous to the trees if you put around enough straw to burn all the leaves. If you get the leaves thoroughly dry, it would be more effective than plowing under and would probably kill a great many spores on leaves which were not actually burned up.

MR. KIDDER OF MILTON. I was very much interested in the speaker's statement—which I don't doubt for a moment, because I have arrived there by my own experience—that sprinkling is of no particular good, whereas spraying is useful. Now, I thought that perhaps the speaker can tell us in a few words why that is the case, because to the casual observer it might seem as if getting the material on in any shape ought to do the work. Apparently it doesn't, and I think it would be very interesting if we could know why it is necessary to spray and not sprinkle.

DR. WHETZEL. Well, the gist of the matter is this: If you sprinkle the leaves you do one of two things, either put on large drops at various places on the leaves, or pour a lot of it on, and the result is that most of that runs off. If you drench a tree, even when you are spraying with a mist, many of the leaves will actually have no fungicide on them, because there will be such a large quantity that it will run off the leaves. If you only put a few large drops there will be many places on that where the leaves are not covered. These spores are not as big as a pin head, but are exceedingly small and don't require very much space in which to germinate and grow. They are much smaller than the point of a pin and an area as large as the head of a pin will be ample, even though a big chunk of lime-sulfur or Bordeaux may be quite close to it. Now, when you remember that there are millions of spores in the air and that thousands will fall on the leaves you will see that you are taking large chances when you sprinkle. On the other hand, if you spray and put it on in a fine mist, just to the point of dripping but not quite dripping, you have covered the surface of that leaf with many fine drops, and when it dries so closely together on the surface of the leaves the ascospore has no chance of finding spaces between in which they can fall and germinate. It would be surprising to see how small a space a spore may occupy between two drops of Bordeaux mixture, and still grow. If you had it under the microscope, with a magnification of say fifty diameters, you could see

one drop here and one drop there with the spore between and growing, so that in order to be effective you must have a very fine mist with the drops as close together as possible. The test of a good nozzle is to have it give as many drops per square inch as possible which will not run together.

MR. RICHARDS OF MARSHFIELD. What is that scab that I find on some of my apples—I raise some six or seven acres—I find some that will have some black spots on the surface of the apple, extending some ways into the interior of the apple and destroying the taste of the apple. Another question is this, in speaking about the use of lime-sulfur and arsenate of lead the speaker gave us what proportions to use. What proportion shall we mix them in to get the best results for the apple scab.

DR. WHETZEL. I will answer the last question first. I thought I had made it clear to you. Lime-sulfur, one part to forty parts of water. To this dilute solution you add arsenate of lead, paste, two pounds to fifty gallons of this dilute solution of lime-sulfur. If you use the powered, one pound to fifty gallons. For your conscience sake you can throw in an extra pound if you want to.

Now, the first question was with respect to a particular case. He has a black spot on the fruit which goes into the flesh some distance, and he wants to know if that is scab.

MR. RICHARDS. It is very small.

DR. WHETZEL. I doubt if it is scab, although I couldn't tell unless I saw the fruit. Most of the scab spots on the fruit are as large as your finger nail except those which come on the storage apple. They are always very small, seldom larger than the head of a pin, and very black, but they don't go into the fruit to any depth. Probably what you have in mind is the so-called Baldwin Spot, which is very common. It is not caused by a fungus.

MR. RICHARDS. Can that be prevented by spraying?

DR. WHETZEL. No, sir. Spraying will not control that.

MR. J. O. HALE OF BYFIELD. I would like to ask

what the trouble is on these russet apples [indicating] and how it can be controlled; and I want to ask at the same time whether it is natural just around here, or whether you get it in New York State.

DR. WHETZEL. This is the sooty blotch, caused by a fungus which lives only on the surface of the fruit and does not go in as deep even as the scab. It is a very common disease wherever apples are grown, especially on trees that are not thoroughly pruned, not opened up enough, or standing in a low situation where the atmosphere is apt to be moist. The remedy for this is opening up of the trees and spraying thoroughly, spraying as for apple scabs, especially the application made ten days or two weeks after the blossoms fall.

MR. HALE. Those were sprayed twice.

DR. WHETZEL. You want a later application, probably, than you made.

MR. HALE. I think probably that is it.

MR. WHETZEL. Yes. Along in the middle of the summer, ten days or two weeks after the blossoms fall, will undoubtedly catch that. The only injury to the fruit is making it unsightly. It doesn't injure the fruit itself. You can rub it off if you rub hard enough.

MR. HALE. They are just as good, but they don't seem to sell so well.

DR. WHETZEL. Now; that is the trouble. Here [indicating] is a spot on an apple that I can't diagnose. There are a large number of fruit spots on apples which have come into prominence recently, not that we haven't had them before, but that we are getting more particular than we used to be and we didn't use to see these at all. The price makes a great difference in your eyesight. [Laughter]. All apple growers have much better eyesight today than they used to have.

PRESIDENT FROST. I will state for Dr. Whetzel's benefit that the apple I picked up a while ago and showed to the convention I picked out of an Oregon box in one of

our stores yesterday.

DR. WHETZEL. These spot diseases all appear to have come from Oregon, or the west. [Laughter]. The reason is that they got their sight sooner than we did, that's all. We have some in the east, but the truth is that a large number of these peculiar spots—that is, the Jonathan spot and the Fruit Spot—appear to be a type of scald. You have seen the scald on the Greenings.

MR. YEATON OF MAINE. Would spraying in the fall, after the leaves have fallen, spraying the ground thoroughly, saturating it with lime-sulfur, be of sufficient assistance or benefit to us in controlling the apple scab to warrant doing it?

DR. WHETZEL. The question is, will it be sufficiently profitable to warrant us in spraying the leaves after they fall in the autumn, in order to kill the fungus on the leaves? Well, now, I will tell you a story which will illustrate this, I think. It isn't a funny story. Some of you must know the black rot on grapes, in which the bunches turn black and hang on the vines in winter. The disease is something like the apple scab. It produces spore bodies inside of the black grape, which produce these spores which are shot in the spring the same as the apple scab fungus. A couple of years ago, when Dr. Reddick was working in a vineyard in New York State, the hired man in this particular vineyard thought there ought to be some way of killing this black rot. He suggested spraying them thoroughly in the fall, and Dr. Reddick said that wouldn't do any good but this hired man thought he would try a little experiment of his own. He took a bunch of mummies and hung them overnight in a barrel of strong vitriol that they used there for a stock solution, and the next morning he took it out early and hung it away down in one of the vines right near a lot of blossom clusters and then waited. Along in the summer when the black rot became apparent, one day he said to Dr. Reddick, "Doc, come down here; I have something to show you," and he took him down to this particular place, and

there was this bunch of mummy grapes that he had soaked in the vitriol, and all around that bunch the grapes were plastered with rot. The fungus had lived through that immersion in vitriol. That was due to the fact that the fungicide in solution in the water was filtered out. The water went through. If you sprayed the apple leaves on the ground the water might go through the leaves. But at that time there are no spores yet formed. There would be in the spring enough spores there so that they would ripen up and be shot into the air just the same. Generally speaking, no success has ever been attained by treating them in that way, by spraying any solution on them in the fall.

MR. RICHARDS. I have been told by a fruit grower that you must spray early in the spring. The speaker spoke of spraying at the time when the blossom is about to open. Now, in the east we have to some extent the San Jose scale. Shall we spray early in the season, say, the middle of March or the first of April? The other question is in regard to leaves. Some of my trees seem to be infected with yellow leaves, which are curled. I don't mean being dried up and ready to fall, but I thought that perhaps it is lice, that the lice got on the leaves, and I would like to have him explain both of those questions if he will.

DR. WHETZEL. To be sure, we make the dormant spray in New York, but since I was talking about scabs I omitted that on purpose. The so-called dormant spray is made just when the buds begin to put out green, that is, before you see the blossom clusters, just when they have swollen up to show a little green; that is when we make what we call our dormant spray for scale, blistermite, bud moth, case bearer, and so on. It is almost entirely an insect spray, and we use the lime-sulfur, one to nine or eleven, depending on whether you have the San Jose there or not. If you have the San Jose, it is one to nine; if it is the blistermite, it is one to eleven. To this we add from two to three pounds of arsenate of lead for fifty gallons. This catches the bud moth. Lime-sulfur, one to nine for scale, and one to eleven for blistermite; to that we add the two or three

pounds of arsenate of lead for fifty gallons for bud moth. It has no effect or control of the apple scab. There is a tendency on the part of growers to hold this spraying off as long as possible, as near to the opening of the blossoms as possible, in order to make one spraying do. In some seasons it may be done, but is a dangerous practice.

MR. W. F. GOULD OF IPSWICH. Will spraying have any effect on honey bees? Is there any danger of their carrying the poison to their hives?

DR. WHETZEL. I am afraid there are some bee men in this crowd. [Laughter]. I got stung once and it put me entirely out of business, so that I am a little skeptical on that question. In the first place there is no object in spraying when the apples are in blossom, nothing to be gained, because ordinarily it is a period in the growth and development when there is clear weather, when the fungus will not be active. If you spray properly it is done before the blossoms form, so that the bees and the poison would have no relation to each other. In the state of New York, again, it is against the law to spray when the trees are in blossom. Professor Slingerland, however, said that there was no evidence to show that the bees were poisoned, even if the trees were sprayed when in blossom. It has been shown however, that spraying in blossom tends to reduce the set of the fruit. There are many good reasons why you shouldn't spray in blossom, even aside from whether the bees are injured or not. There is no reason why you should spray in blossom, so far as I know.

The other question that this gentleman asked in respect to the curling and yellowing of the leaves, I suspect is caused by lice, but I don't know. I am not a bug man, so I can't give you any very good information. But I have had some experience of my own, and I have concluded that the lice is one of the big issues. I spent a good deal of time chasing lice on a few small trees, so I haven't a suggestion to make, because they got the best of me. [Laughter]. I followed the advice of our staff and I found that the best

proposition, after they got to the leaves, was to use soap-suds, about a pound to five or ten gallons, put a little Black-Leaf-40 in, and dip the tips of the twigs in it. Do it just before dark in the evening, so that they will have to sleep in it. [Laughter].

MR. BROWN OF POMFRET, CONNECTICUT. I would like to ask if it is not possible that that is orange rust?

DR. WHETZEL. When the gentleman first began to describe it I was on the point of concluding that I had an answer for his question, but when he said the leaves curled I was inclined to think it was not rust, because so far as I know now rust doesn't curl the leaves. It makes them very yellow in spots and in the spring it causes a yellowing of the foliage and also attacks the fruit. Certain varieties, like the McIntosh, are especially susceptible.

MR. BROOKS OF BOXFORD. I read in a book something about destroying the old crop. How would it be possible to destroy it, what method would you use to actually get rid of those apples so that there would be no come-back on your trees?

DR. WHETZEL. You are asking me a question that belongs to the grower, I am afraid.

MR. BROOKS. You wouldn't put them under the barn would you?

DR. WHETZEL. In the manure heap, you mean?

MR. BROOKS. Yes.

DR. WHETZEL. No. I don't know what you would have to do. You would have to try and see, first. If I had a large orchard I think I should do just as the rest do, and leave them on the ground. Someone might suggest that you turn in the hogs. That is all right if you have hogs and they will eat them. I suppose it is really an exceedingly good thing to do, but I personally know nothing about it.

I do know one thing that you ought to do, and that is pick the gnarly and scabby and little fellows off the trees before you do your main picking, thin your fruit. You

will have to thin your fruit if you are going to compete with the fellows in the west.

PRESIDENT FROST. That question might be saved for the market men this afternoon. Has anyone else any other question?

MR. SPALDING OF BOSTON. I have heard quite a prominent man advocate a kind of copious overhead irrigating system, simply the use of a copious amount of water. Can anybody tell me anything about that?

DR. WHETZEL. I don't know a thing about it.

MR. WILSON. I would like to inquire about the Baldwin spot, the cause of it.

DR. WHETZEL. I am afraid you are asking me a hard one. It is an exceedingly common disease, not only on Baldwins but on other varieties. The symptom is a slightly sunken, brown spot, usually more apparent around the blossom end, and when you cut into the fruit under these spots you will find the flesh dead for half or a quarter of an inch inside. Oftentimes you will find the spot further in, scattering through the flesh. Sometimes when it is serious the flesh will be bitter, and it has been called "bitter rot." It is not the bitter rot of the middle west. The best name for Baldwin spot is stippen, a German name, which means sinking or dipping. It is not a fungus disease, not caused by fungi or bacteria. Therefore it is a physiological disease which means that we don't know anything about it. [Laughter]. I can detail for you several theories with regard to the cause of this disease, and it will probably interest you because of all the men I have ever met farmers are the greatest on theory. [Laughter]. If you don't believe it, just start a question about anything down at the hotel and see how many theories you will get. There is a theory in regard to the Baldwin spot which is worth considering, however. Those who have investigated the disease most, especially in recent years in South Africa and Australia, where it is very destructive, hold one or two theories. The first is that it is due to a disturbance of the water supply,

in which case the most destruction comes in seasons when they have a wet spell followed by a dry spell, and then wet and dry, when they have sharp changes in the water supply. That is to say, when they have a season which is uniformly moist they have but little as compared with the seasons in which they have, say, the first part wet and then very dry and then wet, and so on. The mechanics of the injury I shall not go into. The lesson to be learned, however, which is up to the fruit growers, if that theory is true, is to maintain as uniform a water condition in their soil during the season as possible. That he will do by the ordinary practices which the horticulturist recommends, first, drainage, because a drained soil is more uniformly wet and more uniformly dry than an undrained one; cultivation, which conserves the soil moisture and makes it uniform, and the putting on of a cover crop in the middle of the season, which relieves the extra water pressure which may come in the fall from the fall rains; and spraying the trees. That is not because of the direct results, but because you then have foliage which is green and free from injury throughout the season on account of the uniform removal of the water which comes through the rots. If you start out with a heavy foliage the roots respond with a certain amount of water which they will bring up, with the expectation that this crop of leaves will be there all the season. If that crop of leaves become injured and half of them go off and the other half is badly injured, you will see at once that the root system will bring in more water than the foliage will be able to get out of the tree. The water that trees use comes in through the roots and goes out through the leaves from day to day. So, the better the foliage the more uniform movement of the water, so that if the leaves fall off the uneven pressure which is brought about is said to bring about that injury, from too much water.

The other theory, recently developed in Australia, is that it is arsenical poisoning, due either to spraying or arsenic in the soil. We Americans do not believe that that is

the case. That is the best I can do for you on that question.

PRESIDENT FROST. I want to break in on the discussion a moment. Some of our editors are desirous of knowing what states are represented, and I will ask that question each session. I will ask how many there are here from Maine. Please raise your hands: Nine from Maine. Now, New Hampshire: Eleven from New Hampshire. Vermont. None? We have several regrets from people who stated that they wished to come, and there may be someone here from Vermont later. Now, Connecticut: Nine from Connecticut. Rhode Island: Five from Rhode Island. I thank you.

Anyone who wishes to go out, who doesn't care for this discussion, I am going to ask to visit the Trades Exhibit Hall. You want to encourage the trades people as much as you can to help our Fruit Growers' Association, and we will continue this discussion as long as you wish. Now, I will ask you to ask any more questions that you wish.

MR. COX OF WAKEFIELD. Where there is apple scab on the leaves on the trees and it is used for bedding for cattle, when the manure is put on the land will there be any danger from the fungus getting on the trees?

DR. WHETZEL. There is no question at all that the fungus would persist in the leaf and ripen its spores, but if you put the manure on the corn field it wouldn't hurt the corn any. It would be bad practice to put it in an apple orchard, but if you put it in any other field away from the orchard there would be no harm caused, because it has no place to grow.

MR. LYONS. Are not the two most essential things for people that have trees to spray them, and then burn the leaves?

DR. WHETZEL. If I understand the question the gentleman wants to know if the two important things to do with respect to scabs are not, first, burn the leaves in the fall and then spray the trees in the spring?

MR. LYONS. Yes.

DR. WHETZEL. Yes. But the first is very much less essential than the second. That is to say, you can control the apple scabs to within two or three per cent without making any effort to destroy the leaves. Here is a point that you must not forget: If you spray the trees thoroughly every year, leaving such a large percentage of green leaves that have no fungus on them, they won't need to be burned or plowed under or tinkered with in any way. The only man who is justified in spending much time or money in destroying the leaves is the man who has neglected his orchard and has an exceptionally scabby crop of leaves to go on the ground in the fall. Generally speaking, if everyone of you apple growers would spray every year the question of what you are going to do with the leaves would not be a question for you. That is, if the foliage is clean it doesn't matter.

MR. WILSON. I understood, Doctor, that about five minutes was an average time for the average size tree, and about six gallons.

DR. WHETZEL. I said five minutes was the minimum time for a tree of thirty or forty years. That is not an exceptionally large tree. And I said that six gallons was the minimum solution. Now, ten gallons is better. It takes approximately as much for the dormant spray as for those later sprays, because so much mixture is lost. You have to put more in the tree to get it covered, so that when the trees are in foliage you will actually get more solution on in a given time than you will when they are dormant. There are many trees in the State of New York that six gallons wouldn't begin to spray. It takes ten or fifteen, even twenty. I know a grower who puts on fifteen to twenty per tree, and the trees don't drip. They are large trees. It all depends on the size. I was merely giving you something to go by.

It might be of interest for you to consider this, also: We found our Fruit Growers' Association wanted to know

how much to buy and how much they would have left, and we made an estimate and on the average we find they will need one barrel of lime-sulfur solution per acre of thirty trees or thereabouts. Half of that will be used for the dormant spray and the other half for the summer. I thought I could give you the exact figures, but I can't. It will be in my paper, at any rate.

MR. WILSON. One more question, Doctor, that you have left us in the dark about. You have told us there are practically only two nozzles, or three, on the market that are really good. How are we going to find out what those are, the names of them? On the quiet, or how?

DR. WHETZEL. Well, sir, if I had not forgotten you could find out. I am not afraid to tell.

MR. WILSON. I will leave my address with you.

DR. WHETZEL. Don't do that, because I might lose it. But if you will write to me or to Professor H. W. Riley of the Farm Machinery Department and ask him, I think he will send you the names of certain nozzles that were especially good. If I remember right, among the good nozzles were the Friend, the Gould Mystery, and one of the Bean nozzles, and the Scientific.

A VOICE. But wasn't that at 175 pounds?

DR. WHETZEL. Yes, those are all large volume and must be from 175 to 200, or they won't do the business. If you must have low pressure, use the Vermorel type.

Now, don't imagine that the more nozzles you get on the end of the pole the more business you are doing. That is another kind of poor eyesight. The rule we follow is this: Never more than one nozzle on the pole on the ground. One nozzle on the pole on the ground is all that is necessary, because actually the man on the ground does a very small part of the actual spraying. The man on the tower is the man who does the business. On the pole on the tower for dormant spraying, only one nozzle, because I have never seen a man who could work two nozzles and make them do business effectively because he is spraying a limb at a time

and while he is spraying with this one nozzle, the other is shooting off into the air somewhere. When you are spraying trees in foliage you may profitably use two if they are set properly. If you spray with two nozzles, you must see that they are set at an angle of about 60 degrees. I know that a lot of you are spraying with nozzles set straight on the end of the pole. You cannot do a good job with them set that way. If you don't believe it, go home and get one and try it.

MR. GOULD. Would you recommend scraping off the loose bark and spraying the trees?

DR. WHETZEL. No, I never recommend anything. Don't forget that I have recommended nothing to you today, nothing. I wouldn't for the world have you say that Whetzel recommended this or that, and then have you cuss me out. I wouldn't even suggest that you scrape the trees. I don't scrape trees, because I haven't any to scrape. [Laughter]. But if I had, I think I should not scrape them unless I had a bad infection of the oyster-shell scale, say. From the plant doctor's point of view there is no reason why you should scrape trees. There are some however, why you shouldn't. You are apt to injure the bark and admit canker or something of the kind. It may be that from the bug man's point of view there is a need for scraping, but that is their problem. I don't know in respect to that part of it.

MR. REYNOLDS OF HAVERHILL. I would like to ask if we get better colored fruit and fruit that will keep longer, in a sod than we do where our orchards are cultivated?

PRESIDENT FROST. Mr. Reynolds, I suggest that that question be brought up this afternoon. Will you be here with us?

MR. REYNOLDS. I will.

MR. RICHARDS. I am troubled some with my apples with a dry rot that attacks the calyx. There will be a space of perhaps a quarter of an inch around the calyx.

I thin out my apples, thin out everything four or five times before they are gathered, and I always throw out those apples that have this defect just around the calyx, a dry rot. It spoils the look of the apple.

DR. WHETZEL. I can only guess the answer to that question. There is a large number of calyx rots. One which has been especially troublesome in the west and also some in the east here is known as the ordinary core rot. It starts at the blossom and goes down to the core. Does this go into the core?

MR RICHARDS. No.

DR WHETZEL. Just a black spot?

MR. RICHARDS. Yes.

DR.WHETZEL. You probably have what is generally held here in New England to be arsenate of lead injury. It appears as a black spot around the calyx cup; it doesn't go in very deep, but sometimes your fruit cracks. I think the evidence is pretty good that it is due to an accumulation of arsenate of lead; I think that is probably what you have.

MR. COX. In spraying with oil is it well to drench the tree?

DR.WHETZEL. That is the bug man's question. I don't know anything about it.

MR. FOX OF TAUNTON. I would like to ask whether cedar rust can be controlled by spraying?

DR. WHETZEL. Yes, sir, it can be controlled by spraying. At the Cleveland meeting of the American Pathological Association we had a number of papers on the question of the control of cedar rust, which is now an important question to Fruit Growers. We are just going through an epidemic of cedar rust the country over. It was conclusively shown that rust could be controlled by one spraying. The difficulty involved is to know just when to make that spraying, and I was not able to gather from the evidence presented enough facts to enable me to formulate in my own mind exactly when that spraying should be done. In general, the proposition is this: The fungus winters on the

cedar, showing big, yellow, gelatinous masses forming in the spring, during the rains, some of these spores will carry to the apple. The point is to get that spraying in just before the rains, which give you the gelatineous masses on the cedar, and that will have to be individual matter for every one if the growers. Study the situation and keep an eye on the cedar and find what time it occurs. It varies in different localities by as much as two to three weeks. You will have to study a little bit and then make your spray time to meet it just ahead of that. The difficulty is that this comes at a time when the apple leaves are opening, and there may be a growth before and there may be some after the spraying, which will be infected because you couldn't cover it, it wasn't out yet. But I imagine that early spraying just before the blossoms open, if you pay attention to the rains which come in your sections, and put it on just before those rains, would probably get it. We have so little of it in New York State that we never did anything especial on it, and what I am trying to give you is merely what I have gathered from experience of pathologists in other states. It is second-hand information and isn't very reliable.

MR. FARRAR OF LINCOLN. I would like to ask the Professor if, in using arsenate of lead with lime-sulfur, there is any danger of chemical reaction injuring the foliage?

DR. WHETZEL. That is the chief danger, of course, in mixing anything with lime-sulfur. Sulphite of lime is a chemical solution which reacts quite readily with other things, and you do have chemical reaction between arsenate of lead and lime-sulfur. But the bulk of the evidence indicates that the danger of injury to the apples is very small. It does injure peaches, and some varieties will not stand the combination at all. In connection with some experiments by Scott of the Department of Agriculture, it was found that injury resulted where the apples were sprayed two or three times or more during the season. Arsenic was appar-

ently set free. In the State of New York I recall no cases where injury of serious nature was due to that.

There is one thing which I might mention, and that is that you are practically certain to get serious injury from lime-sulfur and arsenate of lead if you spray foliage that is already injured. The common experience of our growers is that in the early spraying there is a little burning; then they use a much stronger solution when the leaves are young than when they are older. The answer to that question is that when the leaves become older they get scabbed or punctured by insects, which allows the mixture to go in and you get spots. Another reason why you should spray just before the blossoms open is that if you get a bad infection of scabby foliage and go on and spray after the blossoms open, you will get bad burning and you will say it is bad stuff. Well, it isn't. If the leaves are perfect and have no spots on them lime-sulfur, one to forty will not injure them.

MR. CARTER OF WILMINGTON. I would like to ask the gentleman if it isn't necessary to use a different kind of spray for peaches and plums and grapes than what we do for apples?

MR. WHETZEL. Yes, sir, you can use a lime-sulfur for apples. Generally speaking, you cannot use lime-sulfur solution for peaches or plums or grapes. It has a dwarfing and burning effect on grapes, even in very dilute solution. We have tried it out very thoroughly on grapes in New York State. If I had peaches or plums in the orchard I should use commercial lime-sulfur, that is, on my own orchard. I don't want you to try it, just because I would, because you might burn all your leaves off. But if I had a peach or plum orchard I should use it from one to one hundred and fifty to one to two hundred for the control of the brown rot and scab. I use it right along on my plum trees at home, five or six of them, and have never had any serious trouble. They are a little spotted, but nothing serious. Certain varieties of peaches can be sprayed with a stronger solution, about one to fifty, and others right side of them

will lose every leaf, so it isn't safe for the grower to go ahead blindly. If you want to experiment and try, that is a different matter.

MR. TENNEY OF MAINE. I would like to ask, if you use the same strength of spraying material at the first of August, if there wouldn't be danger of your hurting the fruit?

DR. WHETZEL. You want to know whether the same strength of solution should be used for all the sprayings for scabs? Yes: one to forty. There is less danger of burning your foliage in the first spray than there is the second and third. As I pointed out, when the leaves first come out the surfaces are protected by a cuticle which is perfect. You can actually use a stronger solution. As a matter of fact, I know men in the State of New York who have used one to eleven for this first spray when the blossoms showed pink, without any injury. However, I shouldn't advise you to try it. On the other hand, with one to forty, if the foliage is injured you will get serious burning. The general practice is, however, one to forty. If you are to dilute it any it should be later, the first of July or August, and then perhaps one to fifty would be safer, because the foliage is certain to be more or less injured then and you might get more or less injury by burning. I have never seen any cases where it caused injury to fruit under ordinary circumstances. I have seen cases where they thought it did, but when an examination was made the evidence didn't bear that out. Apples may scald in hot weather from spraying with anything, but that is due to the water, and the action of the sun.

MR. WILDER OF LANCASTER. Will the Professor kindly tell us the spraying outfit he uses for his small orchard?

DR. WHETZEL. I use the Gould Pomona outfit. A barrel hung in a cart, and I can carry 200 pounds pressure with that pump. Of course, I have to work a little, but they say that exercise is good once in a while for a professor. I

use a boy to pump, though [laughter]. I think that is a good outfit for a small place. There are other good pumps on the market.

MR. ROBBINS OF LANESBOROUGH. In spraying just before a rain, do you get all the benefit you need at the instant of the spraying, so that it makes no difference whether the rain washes your spray off right afterwards or not?

DR. WHETZEL. No. In the first place, the rain does not wash the spray off. That is a delusion some of you gentlemen labor under. If the mixture has dried only a very small quantity will be washed off. In the case of Bordeaux mixture an exceedingly small percentage, but in lime-sulfur perhaps a large amount. Of course, if it all were washed off in the first few minutes of rain it would be worthless, because it must be on the foliage during the rain when the fungus is germinating, therefore if you wait until after the rain starts, infection has already taken place and the spraying is worthless. To be effective it must be a mixture that will stick to the foliage during the rain in sufficient amounts to kill the fungus. The very fact that lime-sulfur does control it is evidence that it stays on and is not washed off. Now, if lime-sulfur does not have time to dry a much larger percent will be washed off, if there is a driving rain a much larger percent would be washed off when the rain came. But the ideal condition would be to have the mixture on so that it would have half an hour or so in which to dry before the rain strikes it. But since the spores are being shot during the rain, after the rain starts, it would be more profitable to put it on even in the rain.

MR. FLOYD OF TOPSFIELD. I would like to ask the Professor in regard to spraying outside of the trees or under the trees.

DR. WHETZEL. Well, in the first place, as I pointed out to you, the greater part of the spraying should be done from above the tree, that is, outside of the tree. The man should be on the tower established well enough above the bulge of the tree so that he can freely use all the pole to

reach out and spray thoroughly. The great bulk of the fruit and foliage is on the outside and of course it is that side that wants to be sprayed. The spores fall down and not up. Most of the infections are on the surfaces exposed upward. On the other hand, a certain amount wants to be done on the inside of the leaves and limbs inside; it can be done, most of it, by the man on the tower, and the man on the ground can do it where the man on the tower can't reach below. But the bulk of it should be done from outside. The pole on the ground should be short enough so that the man can get under the tree to reach the limbs that the fellow on the tower cannot reach.

PRESIDENT FROST. The hour is getting late and we have a very busy afternoon before us, and I am going to suggest to you who haven't had opportunity to ask questions that you get Dr. Whetzel in the corner, as he has suggested, since we are going to try to keep him as long as possible.

We will now adjourn until two o'clock.

(Noon recess.)

AFTERNOON SESSION.

PRESIDENT FROST. If the meeting will come to order I will say that there will be a Round Table Talk in the hall below, commencing immediately, and if there is anyone in the audience who is more interested in the growth of small fruits than in the talk on pruning this afternoon, I would ask that they go to the room below.

Our first subject of the afternoon is on pruning, with special reference to summer pruning. Now, this is a subject that we have not made a great study of, and there are only a few people who have specialized upon it. This afternoon we have with us Professor C. D. Jarvis of the Connecticut Agricultural College, who has done some very fine work in the line of pruning, and especially summer pruning. Summer pruning is something that is being taken up quite extensively by the most up to date and scientific growers.

I have the honor of presenting to you this afternoon Professor C. D. Jarvis. (Applause).

PRUNING THE APPLE WITH SPECIAL REFERENCE TO SUMMER PRUNING.

By Dr. C. D. Jarvis, Conn. Agr'l College.

Pruning is a natural process. It may be observed on both fruit and forest trees. In the struggle for existence the weaker branches, or those unfavorably located, die and drop off. An attempt, often successful, to heal the wound takes place. The modern practice of pruning is an attempt to assist nature and to improve upon her crude methods.

OBJECTS OF PRUNING.

The objects of pruning are three in number. The pri-

mary one is to reduce the struggle for existence among the various parts of a tree so that the remaining portion may produce larger and better fruits. Pruning, therefore, is a thinning process, the beneficial effect of which may be readily demonstrated by the cutting out of about half the brush from a neglected apple tree. The process includes the removal of dead or diseased parts as well as of superfluous living branches.

The second recognized object of pruning is to control and modify the shape of trees. Pruning, therefore, is a training process. It commences when the tree is in the nursery row and may continue throughout its life.

Finally, pruning is practiced on account of its effect upon the formation of fruit-buds and leaf-buds. The physiological processes concerned in this are not well understood, but it is well known that pruning during the growing season produces an entirely different effect from pruning during the dormant season. A heavy pruning of the top during the winter tends to produce wood, because the same amount of root energy is concentrated on a smaller top. The pruning of the root has the opposite effect, tending to lessen the production of wood, because the same amount of top receives a smaller supply of the stored up energy of the roots and a smaller supply of the soil water with its plant food constituents.

THE IDEAL IN PRUNING.

In the pruning of the apple tree there are two distinct styles or ideals, the central type and the open-center type, each with its corps of adherents. There are many supporters of the central leader type among the western growers and they claim that a tree pruned in this form makes a stronger structure and is not so likely to be broken down by wind and heavy crops of fruit. This is a strong argument and cannot be ignored. A tree of this type, however, is inclined to grow too high and completely shuts out the light from the center of the tree.

The open-center type of tree is the one most commonly

found in the commercial orchards of the east. For New England, where the maximum amount of sunshine is necessary to develop fruit of high color, this seems to be the most desirable type. If carefully grown and properly trained, and if the trees are not allowed to overbear, there is not likely to be much trouble from the breaking of the branches.

In order to develop a strong open-center habit, we must have a good nursery tree to start with. We hear a great deal nowadays about the desirability of growing low headed trees and I am a strong advocate of such practice, but I do not believe in heading them so low that there is no room for the proper distribution of the main or scaffold limbs of the tree. Many nurserymen are making a mistake in "rubbing" their trees too high; by this I mean that all the buds and shoots are rubbed off from the yearling tree to a point six or eight inches below the point where the tree is headed in. If the practice is to head a tree thirty inches from the ground, the "rubbing" should not extend more than twelve inches from the ground leaving a space of eighteen inches for the proper distribution of the scaffold limbs of which there should be from three to five. These should be fairly evenly spaced along the central axis and no more than one should be allowed to develop at the same point.

An apple tree is a wonderfully tractable object when handled properly. The man who follows the ordinary practice of severely pruning during the dormant season, only, is going to have trouble for the more he prunes at this season of the year the more persistent the tree becomes. To encourage the development of the weaker growing branches and to check the persistence of the stronger ones, it is necessary to do some pruning during the growing season. This subject will be discussed more fully under the head of Summer Pruning.

GROWING THE YOUNG TREE.

I believe that in the past we have grown our trees too fast and have pruned them a great deal too much. To develop a strong fruit-bearing structure, a tree should not be

unduly forced. It may be observed that with trees that have made a normal growth the branches are more tapering and more rigid than those on rapidly grown trees. The excessive growth is frequently due to liberal fertilization and cultivation but is just as often due to severe winter pruning.

During the past six years I have had under observation a young orchard that has been developed under various systems of pruning and I am forced to state that the best shaped trees in the orchard today are those that have not been pruned since they were planted. Now we should not deduce from this that under all conditions a young tree should not be pruned. These trees were Baldwin and McIntosh and were grown under the grass mulch system. I was fortunate enough to find another young orchard that appeared to be about twelve years of age and composed of Baldwins and Spies. These trees had not been pruned since they were planted. They had been under cultivation part of the time and in grass part of the time. The Baldwins were in bearing but the Spies had evidently not started to bear. The Baldwin trees were fine shaped specimens, but could have been improved by a moderate pruning. The Spy trees were unsightly specimens and their tops presented a broom-like appearance.

It is safe to say that some varieties would be better left unpruned until they reach the bearing age and that others should have a moderate amount of pruning and that a large part of this pruning should be done during the growing season. The character of the soil of course will exert considerable influence upon the behavior of a growing tree. Trees grown on light soil undoubtedly will require less pruning than those grown on heavy soil. Drainage, also, exerts considerable influence upon the behavior of a tree, and the training of a tree on a well-drained soil is an easier proposition than that of training one on land that remains wet late in the spring.

SUMMER PRUNING.

Summer pruning, as contrasted with the regular practice, is the pruning of trees while in foliage. Its influence

upon the tree in many respects is opposite to winter pruning. The latter, as mentioned before, stimulates wood growth while the former tends to lessen wood growth. As a rule, any practice that checks wood growth tends to induce fruitfulness. Growers have taken advantage of this fact for many years. In England the result is attained by root-pruning. The method consists in digging a trench around the tree at some considerable distance and severing some of the roots. This interferes with the food supply and necessarily reduces growth. In the famous Ozark apple region of Missouri and Arkansas the same result is attained by ringing or girdling the trunk or main branches of the tree, thus checking the downward flow of sap. The roots in this way are partially starved and are, therefore, unable to induce a strong wood growth the following season. The work is done during the growing season and, as a result, the wound soon heals over. The growers in the Pacific coast region practice summer pruning to check wood growth. A complete or partial defoliation by insects, disease, or spray, injury during the early summer seems to have the same effect.

Just why the checking of wood growth should induce the formation of fruit buds and how it exerts this influence is not well understood. The theory has been advanced that there is some inherent tendency on the part of the tree to reproduce itself before it dies and that when anything interferes with the natural processes the tree prepares for death. This is not a satisfactory explanation and it is hoped that the physiologists may be able to throw some light on the subject in the near future.

OPINIONS OF EXPERTS.

For assistance in the preparation of this paper I have appealed to some of the best authorities in this country and in Canada. Personal letters were sent to twenty-four different people, mostly college and experiment station horticulturists. Twenty-two replies were received. While these replies brought out many conflicting statements with regard to the time and method of doing the work, they mostly agree

that there is a place for summer pruning in our orchard practice. Extracts from some of these letters may be of interest here:—

I. From the letter of Professor M. B. Cummings of the University of Vermont, dated Dec. 16th, 1912:—"In general, I am very much inclined to believe that much of our pruning is best done in the summer time, and if annual attention is given this matter, very little of the severe winter pruning will be required. I think the taking out of the laterals where the crown is too thick and pinching out the terminal buds will tend to hold the tree in check and shape it up better for the permanent stocky branches."

II. From Professor U. P. Hedrick, of the N. Y. Agr. Expt. Station, dated Dec. 14th, 1912:—"As you know we have several dwarf orchards in different parts of this state. We have done some pruning in these orchards every season for the past seven years, the time ranging from the middle of July to the end of September. As yet, we have found no time in the summer in which trees can be pruned to advantage in this state. If the work is done early in the season the weak succulent growth which is nearly always winter-killed, follows. If the work is done late in the season the effects of pruning do not differ at all from those obtained by winter pruning. We have about concluded that summer pruning is wholly unsuccessful for this climate. At least, it is in the average season, under average conditions, and in the hands of the average fruit-grower."

Prof. Hedrick's opinion seems to be based upon the behavior of dwarf trees only.

III. From Professor C. A. McCue, Delaware State College, dated Dec. 17th, 1912:—"I am a firm believer in this method of handling trees and I believe that in the past we have done altogether too much winter pruning on peach and apple trees. Of course summer pruning can be overdone and if care is not used and proper judgment exercised, a tree may be seriously injured by pruning during the summer season.

IV. From Professor C. I. Lewis, Oregon Agricultural College, dated Dec. 17th, 1912:—"I believe with trees three to ten years old summer pruning, if properly done, will have a very good influence in keeping up certain characteristics and tend to bring the trees into bearing earlier. Certain trees like the Northern Spy, have been materially benefitted. I have seen indications all over the coast of its being a hindrance. In some cases the work has been overdone and I feel that the trees have been damaged. The tendency in mature and bearing trees is to overdo. I have seen men cut off branches six inches in diameter. I have watched a number of orchards, two or three years old, and I fail to see any benefit from such work, in fact the effect if anything, was injurious to the trees.

"Of course summer pruning can be done in two ways. One is to help shape the tree, correct the habit of growth and perhaps time can be gained in that way, and this type can be done any time you desire. I believe, however, it should be done moderately and that one should work with the idea of avoiding undesirable growth and development by early pinching and moderate cutting. I believe in doing considerable work of this kind with trees from three years up and perhaps two year old trees.

"The second type of summer pruning is to induce fruitfulness. There is no doubt but what you can increase the accumulation of tissues around the buds and around the branches by summer pruning, but whether this will result in more fruitfulness and stronger growth, is still an open question. Probably it would, like everything else, be influenced by the general treatment of the soil, the drainage it is getting, any artificial stimulation it is receiving, etc. This second pruning for fruit has to be done when the trees are just in the right condition of activity. If the trees are growing too strongly the results are not secured."

CONCLUSIONS AND RECOMMENDATIONS.

I believe that with young trees we should do very little winter pruning and that we should direct the growth largely

by summer pruning. The work to be most effective should be done a little each year and at just about the time the tree completes its annual growth, which in this section is about the first week in July. If done too early it will defeat its aim and produce a strong growth of shoots. If done too late it forces out a soft growth which is likely to be winter-killed. The object of the work at first should be to direct the growth and later to induce fruitfulness. Only strong growing trees should be pruned during the growing season, remembering that it is a devitalizing operation and may easily be overdone.

With regard to bearing apple trees the necessity for summer pruning is less pronounced if not entirely eliminated. Since our mature trees tend to overbear there is no necessity for inducing fruitfulness and winter pruning would therefore be the most logical practice. The problem is an intricate one, and since there is so much difference in the character of soils and the behavior of varieties, it is going to be difficult if not impossible to formulate any set of rules that any fruit-grower may safely follow. The physiologist in time may be able to reveal the underlying principles in connection with the work of pruning but the problem always will be a local one and the details relating to the practical application of the principles must be worked out by each fruit-grower.

(Applause.)

PRESIDENT FROST. The best part of any address is the discussion following it. Now, in our discussions each day I am compelled to ask everyone who asks a question to give his name and address. The Chair is going to ask this, whether he recognizes the person speaking or not, so everyone is requested to give his name as clearly as possible so that our stenographer can get it. Remember that these discussions are all printed in the report, and oftentimes leading questions may bring out the best information. We will have something like half an hour in which to ask Professor Jarvis these questions for him to answer. I will await now any

the consummation of which will add dignity and renown to my native and much revered state, the State of Massachusetts. The subject matter assigned to me seemed at first glance not difficult to present to you, but the more I considered it the more involved the topic became, and the less it lent itself to conciseness.

Early in the history of this country the exchange of one's wares was conducted along very primitive lines, but in consequence of increased production and increased population crude methods were perforce, discarded and by various ways of approach the several commodities have become specialized and classified. Specializing will continue to go on until perfection shall have been reached, and I sincerely trust that when attained it will be maintained.

I am not going to attempt to tell you the peculiarities of the various markets in different parts of the country. Boston is one of your natural outlets and what may be said of its requirements applies equally to the other eastern cities of the same or greater population, save only in this respect, that in Boston there is a relatively greater demand for high grades. This is not only true of apples but of other goods as well. However, our good old city seems to be destined to become more cosmopolitan and the conditions existing today may not be so marked ten years hence. I understand that the all-absorbing topic today is apples, and my remarks will have reference thereto. In dealing with the subject of apples it would seem wise to take it up in chapter forms, as follows: Packages, Grading, Transportation and Distribution. I beg you to understand that all my remarks are intended to be broad gauged and I trust they will be taken as such.

PACKAGES. I boldly state that I advocate the standard barrel as the best and most adaptable package for marketing New England apples, and I say this with the full knowledge that many of you do not agree with me. Experience bids me oppose the box as a commercial package for the distribution of large quantities of New England ap-

ples. Moderate quantities of short lived apples, such as McIntosh Reds and Gravensteins, have in many cases sold relatively better than in barrels. Similarly, a few growers have had success in marketing winter apples in boxes, which has given rise to the belief that the box will be the popular package. There is now a limited demand for fancy apples in boxes, and it is my opinion that it will always be limited. What concerns us the most is to determine the best package in which to market the crop, not a limited quantity. Again I say, standard barrels.

GRADING. There is probably more difference of opinion on that point than on any other, and it is a pity that it is so, for it is the cornerstone that holds the structure. The apple industry of Massachusetts will progress or be retarded, depending upon which course is pursued. I advocate establishing three grades,—clearly defined and lived up to. I would designate them as “Extra Fancy,” “Fancy,” and “Choice.” The Extra Fancy would be apples of a minimum size of 2 3/4 inches in diameter, free from imperfections, and, if a color variety, the surface of each apple to show 75 per cent. true to its natural color. The Fancy would be apples of a minimum size of 2 1/2 inches in diameter, free from imperfections, and, if of a color variety, 90 per cent true to color. The Choice would include pale apples excluded from the higher grades, apples with worm hole in the blossom end and apples even down to two inches in diameter, if perfect and of good color. These grades make an assortment that would satisfy the demands of the home market, and if established so that they could be relied upon would go far towards fixing the supremacy of New England apples. It would make it possible for the dealer to order without personal examination.

Let us contrast the desired condition with what actually exists. I think I speak without exaggeration when I say that not 25 per cent of the apples consigned to the Boston markets measure up to a standard such as I have outlined. Why is it not possible for this Association to create some

such grading law? Why is it not possible for this Association to assume such proportions that it can afford to maintain instructors and inspectors, to the end that some ideal condition may exist? The fact that we have such a small percentage of really graded apples in Boston is not altogether due to the poor quality, but more to the insufficient knowledge of packing or indifference, and, I am sorry to say, there is plenty of evidence of downright deception. If we are to have an enduring structure we must have a strong foundation. Poor packing is a weak foundation and deception is a rotten foundation. Now is your time to build a lasting institution.

I firmly believe in the future welfare of New England apple growing if but wisely managed. We have all the advantages of soil, climate and nearness to the richest markets. Nature has given us much and seems but to ask that we make intelligent use of her gifts.

I have heard it said that apple growing will be overdone, that a Waterloo is ahead. Well, let Waterloo come if it must, but let us be Wellingtons and not Napoleons. (Applause). The far west, famous on paper, is having a taste of a Waterloo, but they seem to be Napoleons.

TRANSPORTATION. This is a subject for an expert to handle, and it would not be fit for me to discuss it at length. The chief features for us to insist upon are suitable equipment to transport our apples and prompt deliveries of same. There are other changes desired, such as a more equitable bill of lading. Strong forces, however, are working for better conditions, which will doubtless result in benefit to all. We need here much the same law they have in Maine.

DISTRIBUTION. It is impossible to lay down any fixed rules for distribution. Much depends upon the crop in Europe and in other sections of this country. There will be years when it will seem clearly wise to turn your crop into cash as speedily as possible. On the other hand, there will be seasons when a gradual unloading will net you the best

results. If there is to be no improvement in quality in Massachusetts I would advise on general principles that you take advantage of the earlier maturity of your crop and get rid of them quickly. The Massachusetts crop today is like a flash in the pan. It does not hold the same important position as do other crops after the turn of the year. If the standard of quality is to be raised, then I would advise that some consideration be given to extending the market over a longer period. I understand that some growers have built, and that others are contemplating building apple cellars and warehouses in which to store their crops. This plan is likely to be successful only when weather conditions are favorable at the time of picking and storing. In my opinion cold storage is the best method, but even this is of little value unless your apples are stored promptly after they are picked.

Under the heading of "Distribution" must come the commission merchant. I shall read, a typewritten letter received by a Boston firm which may be but an echo of the cry of many. It is dated Maine, December 13, 1912, and is as follows:

(Reads letter).

Boston, Mass.

Gentlemen:—

I am in receipt of your circular card of the 11th inst. suggesting that I ship apples for sale on commission, and inasmuch as you are soliciting business from me I think I will take the opportunity to say a few words regarding the farmer's standpoint and attitude toward commission men, and call your attention to a few things which we do not like. I wish to be understood as writing this letter in entire good nature and without any ill feeling whatever. I wish, however, to state a few facts, and let the facts speak for themselves.

In the first place, I have shipped several barrels of apples during the Fall, and have received returns around a dollar a barrel. When you take into account that barrels

cost 40 cents, picking around 20 cents, and packing and delivering to the railroad 15 to 20 cents more, you see is leaves me the magnificent sum of 25 cents to cover care of orchard, spraying, interest on investment and profit(?). I can reach the same result by letting them fall off and lay on the ground.

You say this is an exceptional year, perhaps, and that I am getting all I am entitled to. Let us see. I talked last week with an intelligent man living in one of the suburbs of Boston, and he told me he had been unable to get apples at any time this Fall for less than 46 and 50 cents a peck, or at the rate of \$5. to \$5.50 per bbl. Now, adding to the dollar which I get, the freight 38 cents, trucking 5 cents, and commission 20 cents, we have a selling price, apparently of \$1.63. This leaves a margin to the middleman of \$3.50 to \$3.75. The expenses are to come out of this, of course, but it looks large beside the 25 cents the farmer gets for his expenses and profit. Does it not?

Again, while it may not be the correct view, the average farmer believes the average commission man sells his stuff and sends him what he pleases; and too often when he compares his returns with the newspaper quotations of same date, he feels justified in this attitude, and also justified in making remarks that would not look well in quotation marks.

For instance, I shipped you some Kings a short time since. The quotations during all the time up to the time I received returns were \$3 to \$4 for No. 1. My returns were \$2.50 as the selling price. Now, I am not accusing anybody of dishonesty, but I do say that that is the usual result, and when taken into account with the fact that receipts do not any more than pay for his cash outlay, you cannot expect the farmer to be very anxious to do business with you.

Now this is the way we feel about it, and as a result I have joined with several of my neighbors and exported our apples, with much better results. And this brings me to what I started to say, and that is that the farmers are get-

ting it worked into their heads that they have got to combine and do their own marketing, and that is what they are going to do. It may be slow coming, but you chaps are certainly killing the goose that lays your eggs. There ought to be no question about the proposition that the interest of the producer, the interest of the transportation company, and the interest of the commission man should be one and the same. They ought to work together, but they do not, and the farmer believes he has good cause to believe that he is being crowded, and he is going to take the matter somewhat into his own hands, or I am no prophet. But you can readily see that when a man only gets his bare cash outlay for producing an article, he has no incentive to increase his product. If he could get a square deal from commission houses he could and would do more and ship more.

Perhaps it is idle for me to make these remarks, but it certainly will do no harm to either one of us to discuss the thing for a moment from the producer's standpoint. And for myself, I don't care whether it does or not, for I think I see my way clear along the lines indicated herein.

Yours respectfully,

That letter was written by an intelligent person, and I confess that I don't know whether I am here as the plaintiff or the defendant (laughter). Perhaps before I finish I shall have pleaded for and defended my associates sufficiently. If I do not, I shall be only too pleased to be questioned.

The great and wonderful industry of producing and disseminating food products must of necessity have its intermediaries, perhaps more so than any other line of business. Who are the intermediaries? The transportation companies, commission merchants, jobbers and retailers. No less important than the others are the honest commission merchants. Why are they important? Because they are indispensable. Let us approach this subject broad-mindedly. I know that there are many of you who through personal energy and regular deliveries have created a demand for

your products and have profited thereby, but where a few have accomplished this thousands are less fortunately situated and less fortunately equipped that cannot do likewise, and it is to this great body that the commission merchant is absolutely necessary, and I am not sure but what the best net results would be given if all products were handled through the commission merchant. The commission merchant is indispensable because in no other practical way can the thousands of packages that daily pour into our markets be quickly and directly delivered to the ultimate destination of consumption. Years of training and observation are required to accomplish this. The commission man must know his buyer, must know the financial standing of his buyer, he must know the goods and know the values thereof. Friends, fruit and produce salesmen are not made in a day. More than an oily tongue is necessary to quickly sell the products of the farm and orchard. In my opinion there must always be a class of merchants whose function it shall be to receive from the farm and orchard the products thereof and with skill direct the distribution of the same. None are better fitted to do this than the commission man. This sounds a bit egotistical, but what may be suggested as the alternative? Farmers' cooperative stores? Direct sales to consumers? Now, let us take up the farmers' cooperative stores analytically. Favorably located stores must be had, skilled labor is necessary, capital is essential. In short, farmers' cooperative stores must incur all the expenses now incident to the commission merchant's business, which amounts to quite 75 per cent. of the commission earned. I ask, would a saving of one quarter of the commission paid compensate you for the added cares and risks that would attend operating cooperative stores? As to direct sales to consumers I can only speak of the experience of those who have tried it; complaints of breakage, loss of contents, delays, collections of bills, all contributed to the impracticability. Analysis of alternatives points to the legitimacy of the commission merchant. I contend that the commission

merchant is necessary to you. If my contention is wrong, if we are parasites, whether we will it or not, we shall cease to exist as commission merchants.

I now pass on with some trepidation to that phase which has to do with the abuses of the business, and I again ask that none of my remarks be construed as harsh. Indeed, I speak with the utmost kindness towards all. Were it otherwise, I would be unkind to myself, for I am looking forward to the time when I can afford to live on my farm. (Laughter and applause).

In the fruit and produce commission business are men of very excellent character, men of high ideals; and I am sorry to say there are also some of the lowest types of impostors who have chosen to style themselves fruit and produce "commission merchants." It is largely because of this impostor class that the commission merchants in general are slandered and it is a pertinent question to ask. By whose tolerance do these impostors exist? Their pickings would indeed be small were it not for the easily deceived farmer who only too readily grabs at the bait extended to him. There are promises of extravagant prices, stories of wonderful outlets, and these are but two of the many magnets used to attract them to the impostor's net. The life of the impostor is of course short in any particular spot, but while it lasts it is a merry one and the sting remains for the commission merchant, the reliable merchant, to bear. I was surprised recently to learn that one of your most enlightened members did not know of the existence of the National League of Commission Merchants of the United States, and it might not be amiss for me at this time to tell you briefly about it.

The National League of Commission Merchants embraces or comprises about four hundred firms, representing twenty-eight cities in the United States. It came into being twenty-one years ago and stands today, as it did at its inception, for all that is upright and wholesome, and when it ceases to champion the right it will crumble. While I

questions. There was one asked this morning that was referred to this afternoon, and if the gentleman is in the hall I think it would be well to take that up first.

MR. D. W. REYNOLDS OF HAVERHILL. My question was, is apple raising in sodded ground better for giving the apples color and for keeping purposes than under cultivation?

PROFESSOR JARVIS. There may be someone here who can answer that question better than I can. It is surely the case that apples are better colored when grown on sod, but whether they will keep better is another question. A few years ago I conducted a little experiment along this line and I found that there were a great many conflicting results. With an apple grown on sod we have a little less water in it, and therefore it is not quite so susceptible to some of the diseases in storage and will not spoil so soon. On the other hand, we found apples grown under cultivation that kept better than some samples that were grown on sod, so that there are a great many other factors entering into that problem, and I am not prepared to say whether the apple grown on sod will keep any longer than one grown under cultivation.

MR. BROOKS. Suppose you have your young trees with a growth of, we will say, twelve inches and you don't know when is exactly the right time to practice your summer pruning. Suppose you took that growth of twelve inches and started pruning it,—were satisfied with that amount—would that check up the trees enough so that they wouldn't go on and make a soft growth: i. e., when your twig is out twelve inches, would you prune it then?

PROFESSOR JARVIS. I would. You can do it then, although it is a little better, I think to wait until the annual growth is completed, then you have a better idea as to how much bigger the tree is. You can cut back some of that new growth and thin out even some of the past season's growth if necessary. It is not necessary to restrict your summer's pruning to the present season's growth; you can thin out

some of the branches in the center of the tree of the past season's growth, but if a tree has made a normal growth it is probable that summer pruning is not necessary. It is only the trees that are making too much growth on which that is necessary, and I presume that that is just as much of a fault as is too little growth. In the east we have had trouble in getting our trees into bearing early enough, we all admit that. The western growers get their trees into bearing much earlier than we do here. There are arguments in favor of both systems. We have in the east trees that are longer lived. The trees that come into bearing early are usually the shorter lived trees and it may be short sighted policy to induce that early bearing, but as a rule we like to get them started a little earlier than we have been doing in the past, especially for the trees used as fillers. Where we are double-planting our orchards I think it would be well to induce early bearing on the fillers and allow the permanent trees to take their normal course and insure long lived trees in that way.

MR. FRASER OF NEW YORK. Is the Professor sure that the early bearing tree is necessarily a short lived tree?

PROFESSOR JARVIS. I think it may not be due to the fact that it is early bearing, but evidence is that in the west they are shorter lived than in the east.

MR. FRASER. But does that prove your contention?

PROFESSOR JARVIS. Not necessarily, although I think that anyone has noticed that a tree that is weak tends to bear early. In my own experience—and I haven't yet been able to outlive very many apple trees—I know of some apple trees that have always been bearing since they were about six or seven years old, and they have actually borne themselves to death, they have worn themselves out so that anyone can easily see that they are now in the last stage of decrepitude.

MR. FRASER. Isn't that the fault of the man that had them?

PROFESSOR JARVIS. Probably, although there are

a great many factors coming up that might influence that point. But I think that that statement holds good, that the earlier bearing the tree, the shorter lived it is. I can't bring any evidence to bear on that point aside from observation.

MR. FRASER. I would like to ask further, is there not a normal fall growth in your young apple trees, up to ten years? I mean, the growth after August?

PROFESSOR JARVIS. Not a normal growth. Sometimes we have a little cultivation where we will get a secondary growth, but I have never noticed any on the trees except where we have had abnormal fertilizing or cultivation.

MR. FRASER. We in western New York expect a growth in the fall after August. On young trees from three to ten we expect some growth, and that is one reason why I have had difficulty in determining when summer pruning should take place, because there is that normal fall growth.

PROFESSOR JARVIS. I would like to inquire if anyone here has noticed any amount of fall growth in our New England orchards. Personally I haven't noticed any to speak of, and wherever I have noticed it I have always been able to find a reason for it.

MR. BOWEN OF LAKEVILLE. I have got some trees from New York and they always give me six or seven inches of growth after the first of August.

PRESIDENT FROST. Is there anyone else in the audience who may have made any observations on that?

MR. R. H. RACE OF EGREMONT. Mr. President, I have practiced some summer pruning and have always found it dangerous because it induced a fall growth. The fall growth, way up to September, is dangerous to a young tree, because of the severe winters we have and the starting of the growth in the fall is injurious because they can't stand the hard winters. Take raspberries: I started to prune my raspberries and blackberries in the summer as somebody said, "You don't want your raspberries to grow four and a half feet tall. Pinch them off." Oh, no! That produces a late growth that doesn't harden and they winter-kill right

off, so I abandoned that from experience; and I find that with me it holds good with apples, except the very hardy varieties.

There is a growth after the first of July on my young apple trees. I have always found it so and the summer pruning is dangerous on weak trees, young trees, simply because it induces them to put in their growth after the time you prune them. You snip off a branch and the tree says, "I have lost something and I must go to work and make that up," and it goes right to work to produce a new growth. If it is the first of August it will start a new bud. I have seen them do it, and those buds don't get hard enough after that season of the year to stand the winter, which may go twenty below zero. In the spring is the time to cut off the raspberries and blackberries to the height you want them. But we are not talking about raspberries at all. Go ahead with your trees. (Laughter and applause).

PROFESSOR JARVIS. That point is just exactly what I have tried to explain, that any late growth is always the result of some unnatural condition. Now, our friend here says that by pinching back the top in July you get a late fall growth. Well, that pinching back is the cause of that condition and we will always get more or less growth after that pinching back or summer pruning is done. Therefore I recommend doing it as early as possible to avoid that, or to give the tree a better chance to harden up its wood before the cold weather comes. There is no reason why an apple tree won't have plenty of time from that time on to harden up its wood. Many of you people have seen the second growth of trees as late as August, the middle of August, and yet it has hardened up all right. Just two years ago I happened to watch some trees which were seriously injured by Bordeaux mixture, and those trees lost a large proportion of their foliage and the second growth came out that ripened up, with no winter injury whatever. That occurred much later in the season than we usually practice summer pruning. Wherever you find the late growth, as I

must repeat since this gentleman has raised the question, you will always find a cause, and that cause may be the summer pruning as one item, it may be excessive nitrogenous fertilizer in the soil or it may be excessive cultivation. There are a great many reasons for it and it is often very easy to find that cause. But normally the trees should produce a large proportion of their growth not later than the first of July, or anyway not later than the 15th. I have mentioned the first of July being about the time to start this summer pruning, but sometimes in some seasons, when the season is late, that growth may continue up to the middle of July, but it is more often completed by the first week in July.

MR. U. S. BATES OF HINGHAM. The speaker hasn't mentioned dehorning of the elderly trees for the purpose of renovating them, a subject which we have heard discussed here in times past. I had in mind an instance in my own neighborhood where this past season an itinerant tree man, with two assistants, came through the town and persuaded the people it was the proper time in the fall to graft their trees, and it has been estimated that they carried off from \$1,000 to \$1,500 at five cents a scion through grafting in the fall. There were old trees and trees twenty years of age. I began before the first of September and practically dehorned the trees, leaving but a very little growth to carry the buds for another season. Moreover, I used two year old wood as a scion. Perhaps we don't care to broaden the discussion to include grafting, but I would like to have the lecturer's opinion on fall grafting, putting in at least one hundred scions. I know that one of my neighbors employed that man for three trees, and the bill was \$20 at five cents a scion. (Laughter). I will say that we examined those trees with considerable interest, and I have within a few weeks seen some of the trees on which the scions were put in as early as the first week in September, and so far as I can see they are almost all alive. Whether they are true to name I have my doubts. That was the case of a stranger coming into a town under those circumstances with a very

persuasive argument, talking to people who are not expert fruit growers, but working at places where there are thousands of apple trees. What the results will be we shall know next summer, I suppose, but the people here would perhaps like to know what the Professor thinks of it.

A VOICE. A graft. (Laughter and applause).

PROFESSOR JARVIS. There are evidently two kinds of grafting. (Laughter). I have never done any grafting in the fall, but I have seen a great many examples of it that have been successful. We don't usually recommend it at that time of the year. Mr. Fraser, who is an expert nurseryman, will probably be able to add something to that discussion.

MR. FRAZER. I think they worked a good graft, that's all. (Laughter). I wouldn't give much for it, personally.

MR. RICHARDS OF MANSFIELD. I would like to ask the gentleman a question. I have about perhaps 125 dwarf apple trees that I have been growing for two or three years, some of which are bearing. Is it best to do summer pruning or wait until winter? I suppose, to get the apples he speaks of, it is better to do the summer pruning.

PROFESSOR JARVIS. I think the same principle holds good with the dwarf trees as with the standard trees, and it depends entirely upon the condition of the tree, whether the tree is growing too rapidly. We have had some sad experiences in getting dwarf trees to bear early enough. We wouldn't be able to get them to bear any earlier than the standard trees, and that is one of the strongest points, usually, in the argument in favor of dwarf trees, that they will bear earlier.

MR. RICHARDS. I have had them bear at three years.

PROFESSOR JARVIS. You can sometimes get trees to bear in three years, of course, that is, the standard trees, and it is doubtful whether the dwarf trees will bear any earlier than the standard trees under given conditions. If the dwarf tree hadn't started to bear as early as it should,

the only thing to do is to check the abnormal growth in some way. But the abnormal growth is not always the only reason for unfruitfulness. There are other reasons for the trees failing to bear. It is oftentimes due to something deficient in the soil, (possibly phosphoric acid,) sometimes causing the tree to fail to bear. It will throw out a large growth of blossoms, blossom out naturally and yet you will have no fruit. That is almost a sure indication, or the indication points that way, at least, that the soil is deficient in phosphoric acid. Oftentimes, too, we have a soil not drained properly. There you will have a case of unfruitfulness, when summer pruning would have very little effect upon producing an improved condition.

MR. RICHARDS. If they grow, say, two or three feet you would call that a pretty large growth?

PROFESSOR JARVIS. I should say that is too much growth when you want fruit. After you get your tree to the size where it ought to bear, then I would say that eight or ten inches is plenty of growth for one season.

MR. RICHARDS. Then you would have some summer pruning?

PROFESSOR JARVIS. If they should produce more than eight or ten inches I would do some summer pruning.

PRESIDENT FROST. Our time has now come to close this discussion, and I think that if any of you have not had opportunity for asking questions you will be able to reach Professor Jarvis later in the afternoon, or tomorrow morning.

Coming to our next addresses, I will say that I never have heard any addresses on the marketing end of fruit at any convention that I have ever attended. Two years ago I had an idea that I could retail my fruit. I tried that and I found that I could not do it. So this year I have decided that I have got to use the commission man, and I have also decided that he is not as bad as most of us are making him out to be. As I stated this morning, about two weeks ago I went into one of our nice suburban stores and I picked up

these apples in the open window as No. 1 Baldwin apples (showing apples). The grower of those apples claimed that he had sprayed twice. I want you to compare those No. 1 apples and these apples in my right hand, that are the fourth grade of one of our Massachusetts growers. The man who grew those apples (indicating) wondered why he did not get just as much for his No. 1 apples as this man got for his No. 1's.

When we decided on our program I went to a friend of mine in Boston and asked him if he could recommend to me the best commission man, the one who understood the markets as well as anyone else and who was brave enough to tell the producer just why he did not get as much money as his neighbor. He recommended Mr. Edgar W. J. Hearty, the President of the Boston Branch of the National League of Commission Merchants of the United States, President of the Boston Produce Company, a member of the firm of Maynard & Childs, very large exporters, and vice-president of one of the largest cold storage companies in New York. I understand that they have a capacity of 75,000 barrels. Now, if he is not able to tell us something about the markets I am afraid no one can. I feel that we all ought to come into closer touch with the commission man. When we know him and when we know the markets I think our ideas will change a good deal and we will blame ourselves for the low prices as much as anyone else.

I have the honor of presenting Mr. Edgar W. J. Hearty.

THE HOME MARKET—ITS USE AND ABUSE

Mr. Edgar W. J. Hearty of Boston.

Mr. President and Members of the Massachusetts Fruit Grower's Association, Ladies and Gentlemen: You have heard the introduction and I confess that I don't know whether I have got much to live up to or much to live down. When your very excellent President asked me to address you I reluctantly consented, not because of any unwillingness, but rather because I wanted this Association to have the very best. Your Association stands for progress along lines

know of no one within its ranks who is not reliable, it would be presuming too much for me to say so unqualifiedly. I would say, however, and I do say emphatically, that if he is known he is not tolerated. The emblem of the league means much, it stands for the highest ideals of reliable merchants, and the wrong acts of one must of necessity reflect on all. For this reason the league tolerates no misdemeanor. It is a most active body and through its business manager and various committees accomplishes much for the benefit of shippers and members. I wish I had time to tell you more about this league, but I must pass on.

I have always contended that in the fruit and produce business, more than in any other line, there are surprises and situations that almost defy explanation. The wide variance in our qualities and conditions lends itself to errors in judgment. This is true not only of the salesman but of the buyers as well. In our business we are also human. We all make mistakes and, like everybody else, our hindsight is better than our foresight. One of the serious conditions confronting not only the commission merchant but the reliable shipper as well, is the unscrupulous shipper. The salesman is embarrassed by him, the buyers are dissatisfied with the results that the acts of that man bring, and those acts are reflected on the many, reflected disproportionately upon all shippers identically as the acts of impostors reflect upon the reliable commission merchant.

One of the chief topics of conversation today is the high cost of living and the elimination of the middleman, and yet it is years since wholesale prices have been so low. Take potatoes, cabbages, onions, all root products, all along the line they have been and are selling ridiculously cheap, barely averaging 3-4 of a cent a pound. Take apples, have they not been cheap? Yet shippers write, "Why are the wholesale prices so low and the prices to the consumers so high?" Friends, I wish I knew. It might be that there is a leak somewhere between the producer and the consumer; there must be, when the producer gets but 1-3 on an average of

the consumer's dollar, yet none of the intermediaries or so-called middlemen get rich. Have we stopped to consider that feature of it?

Friends, it is not possible to accumulate a fortune in the fruit and produce commission business. Now and then may be found men who have amassed a very respectable sum of money, but on investigation it will be found that a few hard earned dollars were wisely invested, say, in real estate or railroads. Take the retailer, what about him? Failures are not uncommon, and as a class their net earnings are very modest. I believe that the problem would be more than half solved if a system of spot cash were established by the retailers. It is altogether too easy nowadays to get credit, and charge accounts seem to be the fashion. Bills soon assume unexpected proportions and cannot be paid. With a system of spot cash the family man would be protected against himself and the retailer would not have to consider bad debts. He could, and, I believe would, sell cheaper and the attendant benefits would be felt by all.

In conclusion, gentlemen, I ask that in your deliberations you have the general good of all in mind. Care must be exercised that we do not proceed with any selfish ends in view. Selfishness in itself is reprehensible, but even more it is a condition the outcome of which can only be unsatisfactory and unprofitable. I thank you, Gentlemen.

(Applause).

PRESIDENT FROST. I am sure we all appreciate this talk from a very busy man such as Mr. Hearty is, and we have also received many fine points. In my own experience I believe that he has touched on the reason for the high cost of the products and for the reason that the farmer does not receive his share of it. I have felt that it was the credit system and I have found in my own experience that the retailer got nearly as much as the producer and that the commission man does not get as much as we would require for over-head charges.

I failed to mention that Mr. Hearty had a farm and that

he had hopes of going to it some time, so he can appreciate all sides of the subject.

I will call on our next speaker before we have any discussion on the address just given, so that we can ask the questions regarding both markets at the same time and I will try to give them to the proper man to handle. Our next speaker is Mr. Walter Webling, whom I have known for sixteen years. He is a modest man, and when I asked him to come before us today he immediately thought of the head of his firm in England. He wrote Mr. Simonds and tried to get him here. Mr. Simonds might have been here and talked to us on foreign markets had it not been for a very destructive fire in Glasgow. I have never heard anyone say a word against Mr. Webling who knew him. Everyone who has criticised him that I know of has been someone who has exported apples that landed either in a poor condition or on a broken market. Anyone who has been in Mr. Webling's office or, I think, in any other exporter's office, and watched the market will never criticise the honest exporter.

I present to you Mr. Walter Webling. (Applause).

FOREIGN APPLE MARKETS.

Mr. Walter Webling of Boston.

Mr. President and Gentlemen:—Public speaking is an art I am entirely unfamiliar with, but when your worthy president approached me in the kindly manner characteristic of him, I felt that I must do my small part. I have jotted down a few facts in a rambling sort of way, which may be of interest to you. I believe it is in just such gatherings as these, where ideas are exchanged and methods discussed to improve conditions, that each may gain that knowledge of the other fellow's trials and tribulations that will tend to show him up in not so black a picture as he has sometimes been presented. A better understanding between the man who grows the fruit and the fellow who comes between him

and the consumer must surely ensue, with a more perfect knowledge of just what that other fellow has to contend with.

I have been in the export apple business for 25 years, and believe that much of the misunderstanding and prejudice that now exists, would be overcome if grower or shipper knew just what the man who receives his fruit, 3,000 miles away, is up against; if the grower only knew the reasons why his fruit was not in as sound and fine looking shape as when he shipped it. He finds it hard to believe reports that reach him from Liverpool that his fruit has deteriorated at least 25 per cent. in condition, but I assure you, gentlemen, that the elements one has to contend with, at sea, are more uncertain and hazardous than those encountered when shipping by rail.

It was a Massachusetts fruit grower, of Salisbury, who furnished the first apples to be exported from America, to Great Britain. The shipment consisting of 5 barrels, was forwarded by a Mr. Buchanan in a sailing vessel, the "Ocean Monarch," in 1847, which made the trip to Glasgow in the remarkably fast time of fourteen days. Last Saturday, at the annual meeting of the Fruit & Produce Exchange. I had the pleasure of meeting Mr. George Buchanan, a brother of the gentleman who made the first shipment, and he informed me that the apples arrived in good condition and sold for \$5.00 per barrel.

It was not until about 1870 that commercial shipments were made, and the business did not assume large proportions until 1880,—from which time our statistics date. In that year 1,300,000 barrels were exported from the United States and Canada to the English markets. The bulk of the apples shipped from here at that time, were handled by the commission merchants either by purchase, or on consignment. Growers did not make a specialty of packing their fruit for export, and nearly all shipments had to be inspected and branded at the railroad terminal or steamship wharf. In a great many consignments there were slack barrels and the

buyers men, armed with presses and hatchets set to work to open and fill these loose packages. Very often there was not enough time to do the work properly with the result that thousands of barrels were put on steamers in a very defective condition as to packing, and by time the fruit arrived in the foreign market, it was badly bruised and shaken up. This state of affairs necessitated the present rule in the foreign markets, for classifying apples as to condition.

THE MANNER OF HANDLING FRUITS in European markets is always good when prices realized are satisfactory. On the other hand, when the reverse is the case, there are screws loose everywhere. In the Glasgow market the details of handling are about the same as those followed in Liverpool, not only in respect of Commercial auctions, but disposal by private treaty as well. The methods found to be most successful at Liverpool are in the main being followed by all the other seaport markets in Great Britain, and for the purposes of this article, I shall use these methods for descriptive purposes. Most of the old established British houses have a representative at one, or in some cases, all of the principal North American ports that figure in the apple export trade. These representatives look after shippers' interests at the various ports of export, in a variety of ways, such as rushing forward shipments, preventing delays, securing space, looking after the proper stowage, and promptly advising the principals on the other side of the quantities on board, brands, lists of varieties, etc. As soon as these advices reach Liverpool, and the steamers are reported, freights, dock, town and river dues are paid, customs papers passed, and the releases sent to the dock foreman along with particulars of the marks or brands, and lists of varieties under each brand. His duty is to have space allotted for proper storage of the given number of packages, on the dock, and to have the necessary men ready to receive, select and pile the fruit as fast as it is delivered from the ship's side. At this juncture, it will be readily seen how important it is to have a full description of the brands and list of the varie-

ties at hand, so as to save the double handling of fruit, especially if it is at all tender or over-ripe. The selector classifies the condition of the fruit, as it comes to him from the ship's side. All barrels that do not shake and show no external signs of decay, are classified as sound or tight. Those that shake or rattle when being handled, and show no outward signs of decay, are called slack packed; those that show some juice coming through the heads or staves, are called slightly wets, and those that are so wet with juice as to indicate a considerable amount of decay, are called wets. Each variety and grade and each classification as to condition, are piled separately, a record is taken, and this record sent to the office, from which catalogues are printed. These catalogues are then distributed among the buyers. Two samples of the tights are taken out of every variety, where lots are over 30 barrels: These samples are not opened or tampered with by either buyer or seller, and are opened just as they are put upon the sales platform, one showing the faced end and the other being dumped in the presence of the buyers, into a large flat basket, so that all the buyers may have an opportunity to see the run of the fruit throughout the barrel. If buyers or sellers are not satisfied, the other sample may, after being shown, also be dumped. If the seller is not satisfied with the price offered, he may either put on a reserve price, or withdraw the parcel and have fresh samples brought and shown at the next sale, if not otherwise disposed of in the meantime. Efforts to sell apples, "all faults and defects as landed," have invariably ended in failure, for several reasons, one of which need but be stated, to convince. Buyers who have a high class trade, will not bid on parcels that contain some varieties of apples, or on parcels that have slack or slightly wet barrels because their trade will not take them. Those having a trade for these odds and ends, in varieties and conditions, cannot pay the market value for the good stock, because their trade must have a low priced article.

AUCTION SALE is the method by which the great bulk

of the apples are disposed of. It permits of a rapid distribution, a feature of more importance than is generally recognized. The moist and very often humid atmosphere, even during the winter months, of Great Britain, is rapidly destructive to the keeping properties of American apples, especially when fully ripened. Therefore, a quick disposal and a wide distribution is vitally necessary. Auction sales permit of this, an evidence of this fact is that steamers are constantly arriving at Liverpool, carrying anywhere from 5,000 to 25,000 barrels of apples. In most cases, the apples are landed, sold, and proceeds cabled out on the evening of the fourth day after the steamers commenced to discharge their cargo. Shippers can confirm this statement by their own experience time after time. Another marked advantage that the auction sale has over any other method is, full market values are more likely to be obtained where there is a congregation of two to three hundred buyers, ready to compete for anything or everything they want, than where but a single buyer is being dealt with. Further, many dealers specialize or cater for certain classes of trade; among these two or three hundred buyers, there are a number of these, always competing with each other for their different grades and classes of fruit. Not only do dealers specialize, but various interior markets will take some varieties and grades that other markets do not want, or will not take. For instance, there are four or five interior cities, which will take Talman Sweets at a moderate price, if the supply is not excessive. Other markets, quite as large, so far as the consuming population is concerned, will not take them at any price. Some markets will take Golden Russetts and pay good prices, while other markets are blocked with a few. Some markets consume large quantities of low grade fruit, and other markets will take but a very small quantity: they must have the finer grades, or none whatever. The foregoing will explain to those shippers who have divided up their shipments among inland markets, why returns are almost invariably lower than those realized from their shipments,

at the same time, to the large sea port distributing markets. Public Auction Sales are held in Liverpool, on Mondays, Wednesday and Fridays. In Glasgow, on Tuesdays and Thursdays. Those who advocate private sale consist mostly of men who are anxious to get into the fruit business, but have not the equipment to sell by auction and for that reason decried that method. Public Auction acts as a preventive of any species of fraud, for a Catalogue is practically a Detective Officer. I will not say that those who sell privately are not honourable, but the door is opened by that method, much more than it possibly can be by any other method, for speculation, and there are not lacking instances having happened in this direction.

THE LONDON METHOD of handling apples is somewhat different from that pursued in the provincial towns, as, on account of the magnitude of the City, the docks, where the fruit is landed, are at a considerable distance from the market centers. Therefore, it is necessary to have the fruit brought from the docks to the immediate vicinity of the markets where it is sold. Upon the arrival of the ship, the fruit is discharged in the usual way. Those receivers who have sufficient warehouse room for storage purposes, have vans waiting at the time of arrival of vessel, so that the fruit is simply taken from the ship's side to the van. Those who have not sufficient warehouse room are obliged to leave the fruit at the dock till an opportune moment occurs for them to handle it. It is carted from the docks to the store where it is placed, marked by mark, and countermarked by countermark and catalogued for sale purposes. It is always open to the inspection of any prospective buyer. At the time of sale, the show packages are brought down and opened on the stand, catalogued and numbered, and at the actual moment of sale, they are placed on the rostrum before the buyers. After the sale, the buyers obtain their delivery orders, and take the goods from the store as they require them. I would like to point out that one of the greatest benefits in having warehouse room, in the vicinity of the

sale, is that the buyer is then able, a few minutes after the goods have been knocked down to him, to obtain his delivery order, and get possession of the goods. You can quite understand that in a city such as London, the purchasers cannot spare the time to send their vans to the docks: this is one of the reasons why Covent Garden has grown to such great importance, as shopkeepers can purchase there every article—from vegetables to the heavy barrel and case fruit, and obtain possession, immediately their goods are bought. Auction sales are held in London any day when sufficient fruit offers. The Liverpool market is the great distributing centre for American apples, supplies going from there to Continental markets.

HAMBURG, however, is now receiving large quantities of apples direct from this country, and is supplying not only all of Germany, but also the greater part of Austria, Russia, and Scandinavia. Sales are conducted in Hamburg, similar to those held in Liverpool. However, they only have one sale day each week, Tuesdays, but in case of need, one is also held on Thursdays. In the morning, from 6 until 12 o'clock, all buyers go out to the Fruit Sheds, which are close to the Salesrooms, and there they find printed catalogues of each of the Brokers, and samples are put up so that they can take their notes during the forenoon. In the afternoon, at 4 o'clock, the sale takes place, with the six important fruit brokers selling in turn, similar to Liverpool. All apples are inspected by the German Authorities for San Jose Scale—that is to say, a certain number of apples of each brand are inspected, by well trained and responsible experts,—not only by the naked eye, but also with glasses, and if they find any apples showing this scale, such apples are not allowed to be introduced into Germany, but have to be sold for re-export to foreign countries. If there are not too large quantities of such infected apples arriving, there is always a ready sale for them at the same prices being made for apples not infected, to Scandinavia, Russia and Austria, especially if they are of good quality and in good condition. As the

matter stands, I can only advise our friends to be very careful and avoid sending apples from districts where they know the San Jose Scale is prevailing, and rather ship such stock to the United Kingdom. Hamburg is a good market for really prime apples, in good condition, and shippers who want to send there, must take more care in selecting, than when shipping to Great Britain. Within the last three years, shipments to Hamburg have trebled in volume, owing largely to the push and enterprise of the German Fruit Merchants. One firm, in particular, has chartered steamers and purchased cargoes for same, loading them at Portland, Maine. This season, the shipments to Hamburg from that port, will run up to about 50,000 barrels. In order to reach the German market, Boston shipments have to be sent via Liverpool, at heavy expense and much extra handling. However, this will all be changed when the Hamburg American Line service is inaugurated here, next summer, when shipments will be made direct.

TO RETURN to the manner in which apples were handled in the early '80's. At that time, steamship rates were high, being \$1.00 and even \$1.25 per barrel, and the service was slow, some boats taking fifteen or eighteen days to make the passage to Liverpool. At times, sailing vessels, carrying 2,000 to 5,000 barrels, at about 50c per barrel, were employed, but this manner of transportation did not prove satisfactory, for in some cases, the vessels were so long in making the passage, that cargoes were landed in a wasty condition, sometimes not selling for enough to pay charges.

Along in the 90's large shipments of apples were made from Boston, and there was considerable competition between the various Liverpool lines, for the business, and much improvement was made in the manner of loading and stowage. At the suggestion of the Liverpool fruit merchants, the Cunard Line equipped two of their steamers with electric fans to ventilate the holds where apples were stowed, with the result that these steamers became very popular with apple shippers. In 1902, the "Ivernia" of this line,

carried 39,000 barrels, the largest cargo of apples ever shipped and fruit was landed in fine condition. The success of the Cunard steamers forced the other lines to equip their boats with electric ventilating apparatus, and now nearly all the regular liners carry apples in very good shape, and we get very few reports of "heated cargoes."

Just here, I would like to say a few words about FREIGHT RATES. As everyone knows, ocean freight rates are continually fluctuating. (or will fluctuate if there is no combination of steamship lines), according to the amount of freight offering. Since the absorption of the various steamship lines by the International Mercantile Marine, the apple export business seems to have been singled out by this gigantic trust as a very profitable field for the working of their unlawful combination. At the time this company assumed control, the rate on apples to Liverpool was 44c per barrel: now it is 70c, an advance of about 60 per cent. This is a much higher rate than what they charge for other cargo occupying similar space in their steamers. I will admit that rates on all commodities are higher this season than last, but it has been the policy of this company to raise the rate on apples every year, without regard to the condition of the freight market. Not once has the rate been reduced, and this season it was advanced 13c per barrel. It is safe to say there will be no reduction, and possibly another advance, unless shippers get together and charter outside steamers, which may be done in the fall of the year when apples are moving in large quantities.

AS TO THE USE OF THE MARKETS ABROAD, which take a large portion of the New England crop, I can assure you the prices of apples in the local markets would be very much lower than they are, if it were not for the large quantities shipped across the water. Our Massachusetts fruit, suitable for foreign trade, is ready for shipment much in advance of that grown in any other state, and for the past ten or twelve years, the Williams apple has been exported in early August in moderate quantities, with good success,

owing to our being able to secure refrigerator space on steamers. This variety sells well on account of its being the first red apple to appear on the Liverpool market. Gravensteins, when plentiful, find their way to the other side, and are followed by Baldwins, which in some seasons are shipped as early as September 10th. The growers, who go over their trees selecting the best colored fruit, are the most successful in their early shipments, red fruit being most in demand in all the markets abroad.

This season, those who shipped their apples early, obtained the best results, and it has been my experience for a number of years that the growers who have followed this plan every year, get the largest net return for their crop. A large proportion of our Massachusetts crop can be marketed before the Baldwins in Canada and New York State are ready to pick, and why not take advantage of the situation? Of course, in some seasons, the English markets will not take a large quantity of our apples, in early September, if their home crop is heavy, but their fruit being about all green varieties, does not interfere with the sale of our red stock. Another reason why our apples are preferred to the English fruit, is because of our more attractive package and better grading. The British fruit grower has no barrel or box factory at hand, and is obliged to use hampers, baskets or crates. You can imagine in what poor condition the fruit must arrive in the market, although it travels but a short distance.

Apples are sold in Great Britain at retail by the pound, and a medium sized, well colored, even graded barrel of fruit sells the best. Of course, all apples must be solidly packed to prevent bruising, and better results are often obtained for under grades that are packed in this manner, than for larger fruit which is loosely put up. The standard bushel box of this state is being used for export, by a few shippers, and is a good package in which to ship early varieties that will not stand the hard pressing, if packed in barrels. On the whole, I do not think it advisable to use the

box for export, on account of the extra cost of packing, handling and transportation charges, and as the production of apples is increasing, growers must try to cut down the cost of these items instead of increasing them.

THE EXPORTATION OF APPLES from the United States and Canada, has increased rapidly during the past ten years. In the season of 1902 and 3 it reached two and one-half million barrels and 212,000 boxes of Western fruit. The next season, three and one-half million barrels, and 400,000 boxes were shipped with good results. Last season about three million barrels and 600,000 boxes were exported at fairly good prices. There has been a great increase in the exports of Western boxes during the last few years, due to large production of attractive looking fruit, well packed and graded. Although the orchardists of New England are packing and grading their apples much better than a few years ago, yet there is room for considerable improvement, and they must make up their minds that, especially in a year of heavy production, they cannot ship inferior apples to foreign markets and get good prices. When one sees some of the apples offered for sale in Liverpool, it is almost impossible to believe there are any cider mills in this part of the country. We know there are plenty of them, but they do not get all the fruit they should. Some barrels have the appearance of being packed with the aid of a shovel, and some of the stock is not fit for human food. An apple packing law was enacted in the state of Maine, two years ago, and I believe the same kind of legislation should be passed in the other New England states.

(Applause).

PRESIDENT FROST. There will now be an opportunity to ask any questions in regard to the markets. I wish to state that there has been quite a demand for keeping the exhibition hall open into the evening and it has been decided that the hall will be open as long as there is any demand for it, but there will be no addresses. Our next address will be at ten o'clock tomorrow morning.

MR. R. H. RACE. The speaker made the suggestion that the other New England states have the same regulations that Maine has, about putting up and grading. That is an important thing, because I know when sending apples to the New York market—that is where mine go—they are not respected there, and if there is a dishonest shipper out of 40 the others of the 40 have to suffer for the dishonest one. If I ship a real good No. 1 barrel to New York and my friend ships one right beside it that is proved to be poor or not very reliable, they say the whole shipment isn't very good and they all go for about the same price, and the others have to suffer. Now, is it necessary for us here to pass a resolution or recommend something to the legislature which is in session, that the voice or sentiment of this Association is that they give us a law to regulate the packing of fruit?

MR. HEARTY. In reply to the last speaker, the national law that was passed last year, known as the Sulzer Bill, in large measure covers the point that you speak about. It is a law covering grading, and if you brand your barrels packed under the Sulzer Bill, that carries weight, because there is a penalty attached to the violation of the use of that brand. (Note.—Sulzer Bill is printed in the back of this Report.)

MR. R. H. RACE. Now, Mr. Hearty, you people are thoroughly organized and we farmers are thoroughly disorganized. Why don't you demand that the farmers live up to the law and live up to the requirements of a proper grade of apples and refuse to take apples not properly graded, send them back to us?

MR. HEARTY. It takes about all our time to defend ourselves (laughter).

MR. RACE. There is a wrong here that ought not to exist. I don't believe the farmers all mean to be dishonest, but they don't know how to do, that's all.

MR. HEARTY. The gentleman speaks much truth. I know that there are more honest than dishonest farmers. I don't believe any farmers intend to be dishonest, but it is

human nature for a man to think his own apples just as good as his neighbor's, but it is not always so. There is a national law and I would like to see it extended and put into operation, and I should be very glad, if a list of names is sent to me, to see that everyone gets a copy of that bill. If that bill is followed in spirit and otherwise, a better condition will exist all around, a better feeling will exist between the farmers and the buyers and the commission merchants.

MRS. DEVING. Mr. Hearty has stated here that the commission man is, in his opinion, a necessity. I would like to ask, is it not true that the cooperative societies of the west have practically eliminated the commission man in their business?

MR. HEARTY. That is what they started out to do, but they are now coming back to the commission men. At the outset, when relatively small quantities of high grade apples were raised out west they could do that because it was a novelty. Now, when they have got a very large crop, they are seeking every medium that they can find to extend their shipments. They are perfectly willing, I have heard, to ship to anybody who will guarantee them the freight.

MRS. DEVING. Do they not place their fruit abroad through their own agents?

MR. HEARTY. Not always, no. There are several agents here, ourselves being one, Mr. Webling's firm being another, and we all receive shipments of western boxed apples and from associations.

MRS. DEVING. Is it not true that they bring their fruit here and get a better price, have a better market, than the New England orchardist?

MR. HEARTY. Yes, their fruit brings relatively more on this market than does New England fruit, and that is easily seen by looking at the two grades. Another reason for it is that people are eating more with their eyes today than they are eating with their mouths. (Laughter and applause).

MRS. DEVING. Of course, we New England orchard-

ists believe that we grow the best tasting fruit there is to be had.

MR. HEARTY. And in your belief you are quite right. It is a fact that you take New England apples and the western New York apples, and I defy any other section of the country to produce any better tasting fruit.

MRS. DEVING. But we cannot make the buyers believe that, the retail buyers.

MR. HEARTY. You can, by improving the standard of your quality and through educational methods. People have got to be educated, and I believe that the New England Baldwin apple has a better future than it has a past, and simply because we have got to keep pounding and pounding. As I said in my address, the west is having a taste of a Waterloo such as we have never had. It costs them in the neighborhood of \$1.50 to get a barrel to the eastern market as against our fifteen or twenty cents. I don't see where they stand much show if we improve our quality and get it at the same standard as theirs.

PRESIDENT FROST. I want to state, Mr. Hearty, that these apples here (indicating) were taken out of cold storage and not packed for the convention. These are the ordinary pack from the farm in Ipswich. I want to show here an apple that was picked in 1911.

MR. RANNEY OF DERRY, N. H. We have heard considerable within the last year or so about poor apples being dumped on our market both here in the east and abroad, and I think it has been acknowledged by several here, both by the producers and commission men, that the apples are bad. The question is, how are we going to make them good? I saw in this hall this morning Mr. Hale, who possibly is here now, a man who has had large experience in the handling and packing of fruit. He made the statement in Durham last summer that there were not twelve men in the State of New Hampshire that knew enough to put up a barrel of No. 1 fruit. One man objected and told Mr. Hale he though he was honest in his opinion, but he did not agree with him.

(Laughter). If that is the case, if there are not twelve men in the State of New Hampshire that know enough to do that, I should say the leading question today is, How are they going to educate themselves or be educated so that they will know enough? Because it is the apples that the people want that the producers should be selling them. I would like to suggest that the gentlemen who has just been on the floor can perhaps tell us how this can be done and how it may be brought about through this Association in the State of Massachusetts.

MR. HARNEY OF PITTSFIELD, N. H. I am the man that told Mr. Hale he was mistaken when he said there were not twelve honest men in New Hampshire, and I state here today that I refute that charge. I want to say that we have honest men that pack honest apples in New Hampshire, but our great trouble has been that we have had the buyers come in and buy them on the trees and pack them themselves, and it has ruined our reputation. (Applause).

PRESIDENT FROST. I am glad to have Mr. Harney uphold New Hampshire's reputation. I hope that every state can be as well represented.

MR. HALE OF BYFIELD. I am not the Mr. Hale referred to just now, but I want to say that apples fifty years ago were packed honestly in my neighborhood. My father packed honest apples and a No. 1 was a No. 1, but his son has plugged a good many since then and put bad ones in the middle, and I am here to say that the commission merchants came out in that section and bought our apples and taught us that trick. Now we have here a good honest commission merchant, and I have no doubt that the commission merchants now have got to teach us differently. We are finding out it pays to put up the apples in grades. There are honest commission merchants and I am dealing with one now. He is selling my apples today.

MR. HEARTY. I am very pleased indeed to find that I have made one friend here and that there are some upright commission merchants. (Laughter). In answering the speak-

er before the last, I think I covered the questions in my feeble efforts on the platform. I outlined the three grades that, in my opinion, would be the assortment that would fit our home market demand. Now, he asks how may they best reach that. I also suggested and hoped that this Association would assume such proportions that it could afford to maintain instructors and inspectors. The best way to accomplish a thing is to be taught how to do it, and if you can get the proper instructors and the subject is and wants to be honest, it is only a question then of intelligence, and that, I believe, this organization has. (Applause).

PRESIDENT FROST. I want to state that I think that in Massachusetts our Agricultural College Extension Work, with our experimental orchards, is attempting this in the best possible way. They are doing a great work in the orchard line and have scattered experiment orchards throughout the state, and right here, downstairs, we are to have packing demonstrations. The Agricultural College Packing Expert, Mr. Rees of Oregon, has his apparatus and fruit, and before and after lectures as well as any other time that there is a demand for it he will show the method of packing, especially the box packing. Everyone who attended the Massachusetts Fruit Show last November would have seen the college exhibit, showing barrels with one stave out, showing the poor packing and the good packing. Are there any other questions?

PROFESSOR STIMSON. The question has been asked as to how we are going to get this knowledge spread about. The Board of Education has an appropriation from the state for helping support agricultural instructors in high schools. These instructors take their vacations in the winter and they are on duty through the summer. They help the boys who are growing fruit, and help the fathers of the boys so far as the fathers want help. Naturally, the fathers watch the boys with the sharpest of eyes and watch the instructors, and some of the most interesting things done this fall have been done in connection with the studying of different varie-

ties of fruit and the grading of those varieties for quality. I think, Ladies and Gentlemen, that you may be interested to follow this movement. In just a word I will say that twenty-five of our boys, five taken from each of five different points throughout the state, earned in farm work this last year, while attending school, over \$5,000. (Applause).

MR. R. H. RACE. I would like to ask a favor of Mr. Hearty in behalf of the people that I represent—I live down in Berkshire where we don't get so much as you do here, of the good things going around. If Mr. Hearty would send me a statement of condition of things in brief I would give it to our local paper and get it before the people. It may arouse them and get them to do things. We are going to have in Great Barrington, on the 17th of February an institute with the Granges of Western Massachusetts and the Agricultural Society of Berkshire, and we might have it presented there.

PRESIDENT FROST. Are there any other questions? If not, we will adjourn until tomorrow morning at ten o'clock.

SECOND DAY

Saturday, January 11, 1913.

PRESIDENT FROST. We are this morning to have a lecture by Mr. M. C. Burritt, Editor of the "Tribune Farmer" of New York, who will discuss "The Cost of Growing Apples." I hope that if there is anyone here who anticipates the growing of apples and has not yet tried it, he will study this address. Mr. Burritt is a business man, he knows how to figure costs, which I think very few of us understand. He is not only the editor of the "Tribune Farmer", but he is running a large farm of his own. He will show some lantern slides, giving figures, and some slides showing the orchards, and after he has given his address he will take up the discussion. We value our discussions as much as we do our addresses.

I have the honor of presenting to you Mr. M. C. Burritt of New York. [Applause].

[Paper read by Mr. M. C. Burritt, with lantern slides].

THE COST OF GROWING APPLES

M. C. Burritt, Editor of the Tribune Farmer, New York.

Millions of apple trees have been planted in this country during the last decade, East, West, North and South. Because most eastern orchardists have found the apple industry profitable, they have increased their plantings. Spurred on by stories of great profits and promises of soon becoming independently rich, many city persons have invested heavily in the orchard business. Enticed by tales of the abandonment of apple orcharding in the East, and of fabulous returns from the king of fruits in the golden West, many suckers have taken the bait and invested hundreds of dollars an acre in orchard lands.

In too many of these enterprises enthusiasm has run away with good and conservative judgment. In nearly all of them there has been one serious fault—the investor has

failed to count the cost. The income has usually been estimated for all it was worth, and the cost of production ignored, or practically so. It is true that there has been little or no basis in accurate records of the facts for the determination of costs. Few growers of fruit have thought it worth while to count the costs.

There has been good money in the production of apples. Under the right conditions and with good management there is likely to be a fair profit in apple growing in the future—though probably a smaller one than in the past. But more and more are the profits in the business likely to be measured by the cost of production. Those of us so situated that we can grow good apples at the lowest possible cost or who are able to obtain the highest market prices for our apples are most likely to stay in the business. Those whose costs are high by reason of unfavorable conditions, and those whose marketing costs are large, will gradually be eliminated from the business of apple growing.

Growers of apples in New England have two great factors in their favor. The first of these is a fairly low cost of production; the second is a comparatively low marketing cost.

With a soil and climate especially favorable to the production of high quality apples, with cheap land, and with general farms on which there are other important sources of income, the costs of production should be reduced to a minimum. Few fruit growers realize the importance of these advantages. **But experience has shown that apples can with few exceptions, and these mostly very large plantations, be produced at a much lower cost on a general farm than on a highly specialized one, because of a better distribution of labor, equipment, interest and other costs.**

THE PROBLEM.

Our purpose is to find out if possible the cost of growing an apple orchard to bearing age and the cost of producing a barrel of apples in a mature orchard. These costs, as we have found them out, are under Western New York

conditions, which are somewhat different from yours. **They must therefore be used with judgment and with discrimination. No one can tell what the cost of production on another's farm will be. Each individual must determine his own costs.**

The figures given are mostly taken from my own orchards in Monroe County, New York, but partly from the orchards of E. B. Holden of Monroe County and Mr. L. A. Toan, in Wyoming County, New York. I trust, that you will pardon the use of costs from my own farm. I am using them simply because I can vouch for their accuracy and completeness. They have been accurately and well kept by the manager of the farm, Mr. Robert Hall, and are very near the average of Western New York conditions, neither the worst nor the best. Many records have been gathered on other farms and will soon be published by the government, I am told. The credit for the method of collecting and for the tabulation of all the figures is due to Mr. E. H. Thomson, of the Office of Farm Management, of the U. S. Department of Agriculture.

FACTORS IN THE COST OF PRODUCING APPLES.

First let us get clearly before us the factors which enter into the cost of growing any farm crop. These may be classified under two principal heads, labor costs, and cash or capital costs.

Labor Costs in Apple Production

	MANAGEMENT.	
		Cash Wages
	Manual.....	Board or Rent
		Privileges
LABOR		
		Interest
		Depreciation
	Horse.....	Feed
		Care
		Stabling
		Misc. Shoeing, etc.

Labor costs are simply value of all the work done upon the crop by men and teams. The rate charged for all this work may be fixed by the actual cost of hire and keep, or by an assumed average neighborhood rate. We have used the actual costs, which are 15c. per hour for man and 10c. per hour for horse labor. The fairest way in which to measure these costs is by hours of work done, but this is not as clear to the average man.

Cash Costs in Apple Production.

CAPITAL	Land.....	Interest
		Taxes
	Improvements	Buildings, fences, drainage, etc.
		Orchards, vineyards, etc.
	Buildings.....	Interest
		Repairs
		Depreciation
		Insurance
	Equipment in Machinery, etc.	Interest
		Repairs
		Depreciation
		General
	Cash and Supplies.....	Seed
		Fertilizers
Spraying Material		
Packages		
		Cash to run business

Cash costs are rather more numerous and complicated, and we might add, variable. They include the original cost of the trees, the cost of the tree protectors, spraying materials, the fertilizer or manure charges, seed for cover

crops if used, taxes on the land, interest on the value of the equipment used in the orchard, or rent of the same, interest on the land, the proper share of the general farm charges, such as insurance of buildings or store and packing houses, telephone service, general management, etc. It has been necessary to omit this last charge in these records because it was not definitely known, except for the last year.

It will be seen that all these charges may vary considerably according to farm conditions, land values, etc. Our only comment here is that **the cheaper a grower can produce apples the better able he is to compete with other growers of this fruit.** We have found that the most variable factors are land values and hence interest and taxes. The amount and the cost of the labor put upon the crop also varies considerably, but this is partly reflected in the selling price. Almost needless to say the accuracy and completeness of the record is a very important factor. Now let us see how errors have been mostly eliminated in our work by the method used in gathering the figures.

METHOD OF OBTAINING COSTS.

As I have said, the forms upon which these records were obtained were worked out by the U. S. Department of Agriculture. They were in two parts; a labor report and a cash report. The labor sheet is simply a diary, such as you or I would keep, being the hours of the day at the left and the ruled columns at the right of the page for the field or crop designation and for the horses and man hours. A sample of this sheet follows:—

One of these sheets is made out by each regular workman on the farm every day. Extra men's time is put down in the space provided at the bottom of the superintendent's page as shown in the illustration. These records, after being passed upon by the foreman or owner, were sent to the office at Washington where they were tabulated, checked and put into the form in which I now give them to you.

The cash transactions were recorded in the ordinary way in a single entry ledger form. The only difference between our form and the one ordinarily used is a column in which all charges not cash are entered. The inventories at the beginning and end of the year, and all miscellaneous information about the farm as a whole, were secured by personal visits to the farms. All field measurements were accurately made with a surveyor's chain.

COST OF A FOURTEEN ACRE ORCHARD THE FIRST YEAR.

The third case which we have to present shows a still lower cost of growing a young orchard. In this case the crops paid for the entire cost of the orchard the first year. This orchard, which consists of 420 apple trees, set 40 feet apart each way and filled one way with 400 peach trees, covers 13.84 acres of ground. The cost includes the trees and the setting out the orchard as in the former cases. The fine showing is due to three principal factors: A comparatively low land valuation, hence a smaller interest charge, an extra good soil in a very fertile condition and well adapted to the crops grown and to good management. It illustrates a possibility under ideal conditions. The orchard is that of Mr. L. A. Toan in Wyoming County, New York. The figures, which are for 1908, follow:—

The Cost of a 14-Acre Apple Orchard The First Year.

Operation	Total Hours		Total Cost	Per Acre Hours		Cost p'r acre	Cost per 100 trees
	Man	Horse		Man	Horse		
Hauling trees	7½	8	\$1.93	.54	.58	\$.139	\$.23½
Heel'g in trees	5		.75	.36		.054	.09
St'k'g out field	26	3-4	4.01	1.93		.290	.49
Setting trees	108	3-4	16.31	7.86		1.178	2.00
Pruneing	18		2.70	1.30		.195	.33
Plowing in fall	48	63	13.52	3.47	4.57	.978	1.65
*Wiring	38		5.70	2.74		.412	.70
T't'l labor cost	252	71½	\$44.92	18.20	5.15	3.25	5.49½
400 peach trees at 10c each			\$40.00			\$2.89	\$10.00
420 apple trees at 25c each			105.00			7.58	25.00
Equipment			6.92			.50	.84
Taxes			6.92			.50	.84
Interest (100 per acre)			69.96			5.00	8.40
Total cash cost			228.04			16.47	45.08
Grand total cost			272.96			19.72	50.57½

*Protection of trees

Income and Net Profit from Crops.

Crop	Acres	Yield an Acre	Income	Expense	Total Net Profit	Net Profit an acre
Corn	4.77	10½ T. silage at \$4.00	\$202.00	\$184.49	\$17.51	\$ 3.67
Potatoes	1.93	181bu. at 50c	175.00	103.28	71.72	37.15
Beans	6.10	21.1bu. at 2.65 3-4T. straw at 6.50	370.26	185.92	184.34	30.22
			\$747.26	\$473.69	\$273.57	
					Total	Per acre
Net income from crops					\$273.57	\$19.765
Total expense on orchard					272.96	19.72
Net gain					\$.61	\$.045

In a fourth example of which we have knowledge, records kept by E. B. Holden of another Monroe County, (N. Y.) orchard, show a profit of \$10.33 an acre on a five acre apple and peach orchard similar to my own already mentioned, at the end of four years. In this orchard wheat was grown the first year and beans the second, third and fourth years. The net income from these crops together with a small crop of peaches in the fourth year left a net profit at the end of the period of \$51.63 on the five acre orchard.

SUMMARY OF THE COST OF GROWING AN ORCHARD TO BEARING AGE

Two very important factors are supposed to operate to deter many persons from going into the growing of apples; namely, the large amount of capital required for the enterprise and the long time necessary to wait for returns. The records here presented substantiate this supposition. They show that in one case it cost \$159.64 an acre to grow an apple orchard to ten years of age; and in another \$95.01 to grow the trees to five years of age; while in a third the cost of setting and growing one year was \$19.72 an acre. But the records also show that it is possible to offset this cost to a greater or less extent by growing crops between the tree rows and by filling the orchard with earlier bearing fruits. By following this plan the cost of the ten-year-old orchard was reduced from \$159.64 to \$52.70 an acre; of the five-year-old orchard, from \$95.01 to an actual profit of \$36.27 an acre; of the four-year-old orchard to a net profit of \$10.33 an acre, while in the case of the one-year-old orchard the entire expense was met the first year.

THE COST OF GROWING A 6.6 ACRE APPLE ORCHARD FOR TEN YEARS.

The orchard for which the following figures were given was set in the spring of 1903 and the records given begin with that year and end with 1912 covering a period of ten years in all. Throughout this period other crops have been grown between the tree rows, thereby offsetting to a large extent the cost of growing the orchard. The year the trees were set the crops were allowed to come within three feet of the trees. As the trees grew older this space was widened until during the season of 1912 in eight feet of space on either side of the tree row no crop was grown. This space was kept well cultivated each year.

Forty trees at the north end of the orchard are pears, but they have received substantially the same treatment as the apples and have not affected the cost. In 1904, one year after the apple trees, 211 plum trees were set as fillers one

way. The apple trees are set 36x36 feet apart, so that filled one way the trees stand 18x36 feet apart. Two thirds of these apple trees were top grafted in 1908 and 1909, not only increasing the expense of growing but delaying the bearing period. These trees have not yet begun to bear profitably. The other third of the apple trees (Dutchess of Oldenburg) have borne three small crops. The plums have borne but one satisfactory crop. The orchard is ten rows wide and 47 containing in all 467 trees.

The facts about this orchard are not necessarily cited as an example of good management. In fact there are many points about its management which illustrate how not to do it. Still I suppose it illustrates an average condition of affairs. We cannot all be Hales and Lymans. Most of us must be content to be John Smiths. Because this is the orchard of a John Smith we consider the record of it a more valuable example to the average grower.

Summary of Costs for Ten Years—Field A.—6.6 Acres
467 Trees Set 18x36 Feet Apart.

Year	Crop Grown	Net inc. from Crop	Income from orchard	Cost of orchard	Profit	Loss
1903	Corn.....	\$15.17	.....	\$109.87	.....	\$94.70
1904	Beans.....	42.57	.....	216.16	.....	173.59
1905	Beans.....	43.13	.....	83.78	.....	40.65
1906	Beans.....	120.90	.....	80.14	\$40.76	.....
1907	Beans.....	38.85	.....	84.97	.....	46.12
1908	Corn.....	37.68	.....	64.22	.....	26.54
1909	Oats and Strawberries	100.61	\$27.88	84.73	43.76	
1910	Wheat.....	60.70	38.65	96.35	3.00	
1911	Hay.....	58.63	38.00	96.19	.44	
1912	Hay.....	52.72	30.36	137.26	.....	54.18
Total	.....	570.96	134.89	1053.63	87.96	435.78

Net loss on field for ten years\$347.82

Average annual loss 34.78

Total cost an acre for 10 years exclusive of income..... 159.64

Total cost an acre for 10 years including income..... 52.70

Total net cost a 100 trees..... 74.50

Total net cost a 100 apples trees 16.10

Total cost a 100 apples trees exclusive of income 48.70

We find that this orchard has cost \$159.64 an acre during the ten years of its life, but that the \$86.51 an acre of crops grown in the orchard during this time together with

\$20.43 an acre from the orchard itself has brought this cost down to \$52.70 an acre. It is safe to say that the orchard would have cost even more than it did had it not been for the crops, for many operations charged directly to the crops would of necessity have been charged to the trees. The cost per 100 trees does not mean much as it often happens that not all the trees are covered by an operation, and as the number of trees per acre greatly affects these costs.

It will be noted from the summary that in this case beans and wheat were more profitable crops to grow in the orchard than corn. Only about one-third of an acre of strawberries was grown in the seventh year and although showing good profits cannot be taken as the most profitable crop to grow, because of the limitations of labor, markets, etc., as to the number of acres which could be handled.

THE COST OF A FIVE-YEAR OLD ORCHARD.

We have another and younger orchard upon which the records have been kept. This orchard of five acres contains 126 standard apple trees filled both ways with 375 peach trees. It was set in the spring of 1908 so that the trees have grown five seasons. The permanents, apples, are set 36x40 apart so that with the peaches between the trees stand 18x20 feet apart. A crop of beans was grown between the tree rows each of the first four seasons. The first season a full seven rows of beans 28 inches apart, were planted in the wider space; the second and third seasons, six rows and the fourth season only four rows. In the fifth season no crop of beans was grown in the orchard. The crop was very good each year until the last. One application of manure, one crop of clover and two seedings of rye have been plowed under, and in addition a liberal amount of commercial fertilizer used with each crop of beans. In 1911 the peach trees bore their first crop. The record of the five years is as follows:

Summary of the Cost of a Five-Acre 5-Year-Old Apple and Peach Orchard

126 Apple and 375 Peach Trees Set 18x20 Feet Apart.

Year	Crop	Net income from crop	Income from orchard	Cost of orchard	Profit	Loss
1908	Beans	\$ 63.37		\$130.12		\$ 66.75
1909	Beans	66.70		85.03		18.33
1910	Beans	79.81		83.39		3.58
1911	Beans	11.09	\$46.05	70.16		13.02
1912			389.38	106.35	\$283.03	
	Totals	\$220.97	\$435.43	\$475.05	\$283.03	\$101.68
	Net Gain on Field in 5 Years					\$181.35
	Average Annual Gain					36.27
	Total Cost an Acre, exclusive of income					\$95.01
	Total Net Profit an Acre, including income					36.27
	Total Cost a 100 trees exclusive of income					9.48
	Total Cost a 100 Apple Trees exclusive of income					37.70

These figures show a still lower cost of growing trees to bearing age. After paying all expenses connected with the growing of the trees, including the interest on the land at \$150 per acre, and deducting the net profit from the crops of beans and the sales from the first crop of peaches we find that the growing of the trees left us a net profit of \$36.27 an acre, or 36c. an apple tree at five year old. Had no crop been grown in the orchard it would have cost us at least \$95.01 an acre not counting the income from the two peach crops. To put it another way the beans have returned a net income of \$44.24 an acre, or \$11.06 an acre a year for four years. The peach trees are now at full bearing age and should show a good profit from this time on. At five years of age this orchard has more than paid for itself. The only possible further charge which could be made against the orchard is the crop income which might have been obtained from the land had the trees not been there. We estimate that the presence of the trees cut down the crop of beans from the land 33 per cent. As the average net income from beans is \$11.05 an acre, this would amount to \$3.75 an acre, a year, or a total of \$15.00 an insignificant sum.

In summarizing these tables Mr. Thomson, who arranged them, says: "The data can be taken only as an indication of the cost under normal conditions. The records on no two

orchards even in the same township would give the same results, as local conditions and factors which cannot be controlled affect the cost in many ways. It is surprising to note the number of things which make a wide difference in the cost of any farm crop, and it is only through a long period of study whereby the influence of these variable factors can be eliminated by averages which will enable one to draw right conclusions.”

When we consider the large and long time investment necessary, the long and uncertain period of waiting for returns, the skill required, and the many chances for loss we are impressed with the necessity of carefully counting the cost. We see nothing in the facts given here to deter one from going into the business of apple growing, where other conditions are favorable. On the contrary, they seem to us encouraging. If they warn us to a careful study of the probable costs and success, and to be conservative in our orchard enterprises they certainly will not have been given in vain.

COST OF RENOVATION.

It may be of interest to many to know something about the cost of renovating old apple orchards. This is considerable, though no greater than the returns usually warrant. The following estimates of costs have been carefully made from records obtained on several farms in New York State. The figures are per acre and are given both as probable minimum and maximum for the first year.

Plowing	\$ 2.00	\$ 3.00
Manure, 10 to 20 loads at \$1.00 or its equivalent in commercial fertilizer	10.00	20.00
Hauling manure average .50	5.00	10.00
Pruning and hauling brush	5.00	10.00
Discing or harrowing twice	1.00	1.50
Discing or harrowing 3d, or 4th time .....	.50	1.00
Cultivation 2 to 4 times .....	.50	1.00
Spraying once L. S. Material(Diltn. 1 to 9)	2.00	4.00

Spraying once L. S. Labor	1.00	1.50
Spraying 2d time L. S. Labor and material (dilution 1 to 40)	1.50	2.50
Spraying 3d time L. S. Labor and material (dilution 1 to 40)	1.50	2.50
	\$30.00	\$57.00

COST OF A BARREL OF APPLES.

Many factors enter into the cost of producing a barrel of apples some of which are not usually taken into account in reckoning this cost. As these factors vary, so will the cost of production vary.

We naturally think first of the labor cost involved, as this is one of the largest items. The orchard must be pruned plowed and cultivated until mid-summer and a cover crop sown. The trees must be sprayed two or three times, and finally the fruit harvested, packed and marketed. The apple requires constant and careful attention from bud to barrel, and all this means labor and money.

Then there are the cash costs which must be considered, the fertilizer or manure, if any applied, the package, and the spray material. Lastly we must not forget the large items of cost which are so frequently omitted, a reasonable rate of interest on the investment in the land and in the equipment to handle it, and the over head charges, such as land and school taxes and insurance on the buildings.

Our orchard consists of 6.1 acres containg 230 trees. About one-half of the trees, or 110 are 39 years old. The remainder are more than 50 years of age. As they are all in one block and handled together the charges connot well be separated; 132 of the trees are Baldwin, 44 Twenty Ounce. 38 Tompkins County King, and the remainder odd varieties. Since 1902, the orchard has had good care and attention. The records cover this period:

Table Showing the Items of Expense in Producing Apples in a Six-acre Orchard in Western New York.

Year	Cov'r Crop	Sp'ay Mat'l	Bar- rels	5per ct Int. on land	Equip- ment charge	Over- head charge	Labor Cost	Total Cost
1902		\$6.64	\$117.88	\$27.45	\$25.00	\$ 2.97	\$339.45	\$519.39
1903		11.22	164.92	28.98	25.00	2.88	249.55	482.56
1904		10.50	109.90	30.50	25.00	3.93	180.55	360.38
1905	\$6.10	12.45	88.80	30.50	25.00	3.40	158.06	324.31
1906		14.85	112.35	33.06	25.00	4.78	211.76	401.80
1907	10.00	16.85	79.80	35.56	25.00	4.89	192.30	364.40
1908		9.75	205.45	37.76	30.09	7.09	293.50	583.55
1909	8.68	19.26	196.35	41.97	38.98	5.91	280.78	591.93
1910		23.89	116.90	45.75	32.39	5.58	175.26	399.77
1911	10.50	27.54	207.20	45.75	32.39	5.58	203.40	532.34
1912		22.28	163.28	45.75	32.39	5.58	128.85	398.13
11 yr. av'ge		15.93	142.08	36.64	28.75	4.78	219.59	450.78
Av an acre		2.65	23.68	6.11	4.79	.80	36.60	75.13
A. a bl (71 bbls. an A.)		.037	.338	.087	.068	.011	.523	1.07

A cover crop was sown about every other year. When sown the charge was made against the orchard. The value of the manure applied is the only thing lacking in this table. This is omitted because there is some uncertainty as to the amount, and more as to its real value. It was applied once in three years—four applications during the period—at the rate of about 12 loads an acre. If we assume that 225 loads have been applied in the period and that the value was \$1 a load (the cost of hauling is included in the labor charges), a charge of \$25 per year should be added, which amounts to \$4.10 an acre or six cents a barrel.

Two or three spraying have been made every year. Until 1909 Bordeaux mixture and Paris green were used. Since then the commercial brands of lime sulphur and arsenate of lead have been used, doubling the cost of the spray material. The average cost of the spray has been \$2.65 an acre—over 3½ cents a barrel of apples harvested. In 1911 this cost was \$4.51 an acre and 4½ cents a barrel. The cost of the package has varied from 28 to 40 cents, and averaged about 34 cents or \$23.68 an acre.

Interest has been figured at five per cent in all cases, but as the price of the land has varied from \$90 at the beginning

of the period to its present valuation of \$150 per acre, due to its improvement and the general increase in the price of land, the amount of interest has also varied. The same is true of the equipment charge, which has also increased each year. The average valuation of the land for nine-year period was \$122.13. This means an annual interest charge an acre of \$6.11 or 8½ cents a barrel. The equipment charge, which is interest, repairs and depreciation on the machinery used in the orchard, amounts to more than 6½ cents a barrel or \$4.79 an acre. Taxes and insurance on the buildings distributed per acre for the farm, averaged 80 cents or a trifle over a cent a barrel.

Labor is the largest single item. For the first three years this was estimated on the basis of the cost for the next five years for which more careful records were kept. This labor is computed at its actual cost to us on the farm. The rates an hour were 15½ cents for men and 13½ cents for horses. The rate an hour of the man labor was obtained by dividing the total amount of money paid for labor, plus the cost of the board, by the total number of hours worked on the farm during the year. In the case of the horses a fixed charge of \$10 a month or \$120 a year was made, and this amount divided by the number of hours the horses worked, gave the rate an hour. These charges amount to \$4.25 a day for man and team. The cost of the labor to grow, pick and market a barrel of apples was 52 cents, or \$36.60 an acre with an average yield of 70 barrels an acre.

**Average Income, Cost of Growing and Net Profit a Barrel of
Apples in a Six Acre Orchard for 11 Years**

Year	Bbls. per acre	Income		Cost	Net bbls. only	Profit inc. culls
		bbls. only	inc. culls			
1902	102.6	\$1.96	\$1.46	\$.83	\$1.13	\$.63
1903	71.1	1.90	2.23	1.11	.79	1.12
1904	51.5	1.66	1.78	1.15	.51	.63
1905	48.5	2.30	2.68	1.10	1.20	1.58
1906	52.6	1.96	2.55	1.25	.71	1.30
1907	34.4	3.49	4.10	1.73	1.76	2.37
1908	96.2	2.03	2.32	.99	1.04	1.33
1909	92.0	3.00	3.38	1.06	1.94	2.32
1910	54.6	2.69	3.03	1.20	1.49	1.83
1911	99.6	2.06	2.38	.88	1.18	1.50
1912	68.5	1.87	2.18	.95	.92	1.23
11 yr av.	70.1	2.13	2.45	1.07	1.06	1.38

To sum up these items of cost we find that, taking the average of eleven years, with an annual crop of 418 barrels or 70 per acre, on 6.1 acres of old apple orchard, that spray material costs \$.037 per barrel; packages, \$.338; interest on the land \$.087, use of equipment, \$.068; taxes, etc., \$.011; labor, \$.523, or a total of \$1.07 per barrel. If the estimated cost of the manure, six cents, be added, the total will be \$1.13. This cost, of course, varies with the size of the crop. When our yield was 100 barrels an acre the cost a barrel was only \$.88. When it was only 35 barrels an acre the cost a barrel rose to \$1.73. In 1912 we grew a crop of 68½ barrels per acre for \$.95 a barrel.

To put it in another way, we believe we could grow and deliver on board the cars at our station a barrel of apples for from \$1 to \$1.25 with an average crop under average conditions. In doing this we would expect to make five per cent on the capital invested and to receive fair wages for our labor. In addition to this we should have all the culls and the windfall apples to sell at a clear profit, for the cost of producing and handling these has been included in the costs given above, as it could not well be separated. These have amounted to an average of 33 cents a barrel in the last eleven years. To reduce the matter to a still lower basis, our experience has shown that we can grow a barrel of apples for 75 cents.

We would not agree to do this, however, for several reasons. In this account, no reckoning has been made of the cost of bringing this orchard to bearing and to its present state of productivity. \$150 per acre is probably less than the actual cost of the orchard. We do not know how much this cost is, although our records on our younger orchards, throw much light on the subject. Moreover there are too many risks in a long-time investment of this nature, which have not been taken into account, such as a decline in the price because of over-production, heavy winds and hail storms, which may destroy not only the crop but the trees also, and the depredations of old or new insect pests or fungus diseases which are difficult to control. All these risks demand a much larger rate of interest than five per cent, to make it pay for a person to make such an investment for a period which cannot well be less than 50 years. We should want a guarantee of not less than \$1,50 a barrel to make such an investment temptingly profitable.

SUMMARY

Our experience has taught us that:—

1. It will require from \$20 to \$40 an acre to establish an orchard.
2. It will require from \$10 to \$20 an acre a year to maintain an orchard.
3. An apple orchard at 8 to 10 yrs. of age which has cost less than \$100 to \$150 an acre is an exception.
4. Under our conditions we can produce enough on the land by intercropping to nearly pay for the cost of growing to 10 yrs. of age, and under favorable conditions in 5 years.
5. The average apple orchard cannot be counted on to return a profit under 10 yrs. nor the average peach orchard under five years.
6. A barrel of apples costs from 88 cents to \$1.73 and averages \$1.07.
7. It costs from \$50 to \$100 an acre to grow apples in a mature orchard.

8. Renovating old orchards costs from \$30 to \$57 an acre.
[Applause.]

PRESIDENT FROST. I hope you will feel free to ask any questions of Mr. Burritt that you wish. He has given us some very valuable information.

DR. H. J. WHEELER. I should like to ask Mr. Burritt what he charges in there for management, in connection with his orchard and in connection with the other orchards which he mentions. He did not mention what the charge per year was.

MR. BURRITT. I didn't charge anything for my own orchard, for this reason: It doesn't cost me anything to manage it. I have been on a salary working for somebody else during the past six years and the management I have given it hasn't cost anything. I have therefore charged nothing for that item for myself, as my management is largely done by letter and by occasional visits to the farm every two weeks or once a month. I operate my farm with a farm manager, who is paid by share of the income from the farm, but not in the ordinary tenant way, because I own all the equipment, horses, machinery and everything, to operate the farm and keep it under my personal direction.

MR. SAMUEL FRAZER. Might I say a word on the cost of management? I am charging \$10 an acre, because we use a method in the proposition which gives us that amount. Mr. Timothy Costello, of Pen Yan has a 50 acre orchard, and he is charged with \$30 an acre. So, you see, we have got from \$10 to \$30 for an operating charge.

MR. BOURNE. When I get my tax bill the cost of taxes is a lump sum for real estate. How shall I establish what the valuation of this field of apples is and the valuation of the other fields which have other things? How shall I know what the increase of taxes will be with the increased value of the land that the apples are on, as the apples grow older?

MR. BURRITT. That is a knotty proposition, sir; I wouldn't tackle some of those things because my experience

has been that the further you go in this business the more complicated it gets, and you are apt to get discouraged. I have stuck to the simple things. If I were to start in on that proposition I should divide the taxes by the total acreage and assign them at so much an acre. That, of course, won't be quite fair, I know. Or you could make another division like this; If you have a lot of timber or land not tillable, rough land, I would divide it into tillable and nontillable and make the different valuations on that. But the only fair way is to give a different valuation to every field, only if you attempt it you are getting into complicated bookkeeping. We are doing it; we started this year. Every single field and each orchard has its own valuation, according to what it is, to what is growing on it and what it will produce, and the taxes should be divided up according to that valuation. But I advise every one to start in a simple way, if he is going to keep records. I have seen this thing a good many times, and I will say now that the value of keeping records is largely in what you learn by it. I don't care what you do, but I would guarantee that if any of you men will keep a record of this sort on your farm for one year if you threw that record into the stove just as soon as you finished it, it would have paid you big money, because you would have learned a lot of things you never knew before and never would have found out, although you lived on that farm a lifetime. Keep a record; it gives a distinctive point of view in the business; that is what we are talking about. I don't say that I would advise throwing them away by any means. I would keep them. Every year you add to the record you learn something more and you will see errors appear in the year before that will be straightened out, and in three or four years you will have it down to a system, as Mr. Frazer has, so that you will know exactly how to go at it.

I would like to say a word, too, regarding that management item. He is talking about large proposition; he has a big commercial orchard under the charge of a man, and it is right to charge that. Almost all of us, as I said, are John

Smiths and have only 50 acre farms. If you have an earning capacity of \$5 or \$10 an acre, all right, charge it, but not all of us have. I think for the average farm from \$500 up to \$1500 is a fair charge for management. I am talking about the average farm, understand. I might say incidentally that this gentleman he mentioned who charges \$30 an acre got \$2.50 a barrel for his apples.

MR. HULSE OF NORTH ATTLEBORO. I would like to inquire what your orchard it?

MR. BURRITT. The first orchard, A, was one-third Duchess of Oldenburg, the other two-third was Ben Davis, top worked to King and Twenty-Ounce. The second was one-third Northern Spy and two-thirds Baldwin. The other orchard was approximately one-half Twenty-Ounce and one-half Tompkins County King.

MR. GEORGE SMITH OF WELLESLEY. It seems to me that those apples didn't get all the credit to which they are entitled. For instance, the horses were charged with everything they might be charged with, but they didn't get credit for the manure or for the time they were used for driving purposes. The use of the horse for the man was counted, and it seems to me the horse ought to have credit for that. Then, in the buildings there are charges for depreciation, interest, everything of that sort, but no credit. The apples received no credit for the land, and the same with the value of the land. The apples were charged with increased taxes, interest, and so forth, because of the increased value of the land, but they were not credited with any of that increased value of land. If that were done in a great many cases, if the farm was situated near a growing town or city or they put a railroad through, the increased valuation would offset the cost, and the apples wouldn't cost anything. If they are going to be charged it seems to me they ought to be credited.

MR. BURRITT. This is getting interesting. (Laughter). That is always the experience, that when you take up this record proposition, the further you go the more inter-

esting points you bring out, and that is its whole value. If I had gone into every detail we would have been at the talk until the middle of the afternoon. We did credit, sir, the horse with the manure and the driving purposes. I didn't speak of that as I should have done. I didn't give the actual cost on the screen, but I gave a table of all the costs; it should have appeared, I admit, but as a matter of fact, I did credit the horse with those things and the net cost, after charging all those factors and after crediting the net return, was 13 1-2 cents an hour for the horse. As to that other proposition, I would not agree. I think you are mixing up farming and real estate. The apple orchard isn't to blame because a railroad goes through or because you are near a prosperous town and your valuation increases. That is, there is such and such a profit or loss in operating a farm and growing a certain crop for a definite period. If the increased valuation of that land is due to some outside factor, that is surely a real estate factor, just the same as if you took the money you got out of the farm and went into Boston and bought a piece of property and it increased 20 per cent. in ten years, making you a good investment. That should be taken into consideration, but I don't think it should be mixed up with the growing crop.

MR. SMITH. Yes, I agree with that, but if you charge the apples with that increased value you have made it pretty costly to produce apples, haven't you?

MR. BURRITT. No, because that is due to the increased valuation. If you are looking for business, when you get that increased valuation the presumption is that you will get a further increase and you had better sell out and buy somewhere else. For instance, on that land which I showed there with a value of about \$90 an acre it is now worth at least \$200. That is partly an increase caused by the apples being planted and the general management, but it is mostly because of the apples having increased. If there wasn't anything in it but business I would sell out the whole proposition and I could go within 50 miles and buy other

land at one-quarter of that price exactly as good, and develop it. But it is my home and I won't sell it.

MR. ROGERS OF CONNECTICUT. I would like to ask about the difference in value of the trees from the time they are set out until they are ten years old. You haven't stated the value of the ten-year-old trees. There is a natural increase from the time they are set out, and I think you haven't stated that.

MR. BURRITT. No, sir. If I did, you would all disagree with me, probably. Get this in mind: I was talking about the cost, but not about increase; I was talking about just the actual cost. I might say that each tree has increased a dollar in a year, but I wouldn't take \$50 for a lot of those trees, and yet somebody else would say that during ten years I have a tree worth more than \$100. It is a good deal a matter of opinion. As a matter of fact, our ten year orchards have cost, as I recall it, about 40 cents a tree in ten years, 40 to 50 cents in cost. I wouldn't sell one for that. But you see you have two propositions; one is cost and one is real value; what it is worth now. I wouldn't attempt to say accurately, for it varies a great deal.

MRS. DEVINS. I would like to ask Mr. Burritt if he lives on his place.

MR. BURRITT. No, madame, I do not, unfortunately.

MRS. DEVINS. You spoke of its being your home?

MR. BURRITT. Well, it is my home farm.

MRS. DEVINS. I see. I was thinking about the value of the home as such, the commercial value. I wondered why, if you lived there, you didn't credit yourself with that much. But of course it is different if you don't live there.

MR. BURRITT. Well, that does bring up a point that I might say a word about. A farm home has this value, it is a business residence for a farmer and his men. For instance, illustrating this way, suppose you went out and bought a piece of bare land and wanted to put a man on that land; you would have to build him a house. The cost of that house, merely to house the man to work the place, would be

the business end of it. On the other hand, if you wanted to go on that farm and live yourself and you wanted to have a better home than you needed, say you put up a house that cost \$2,000 to build, a livable house, for a manager to live in, a good, comfortable place, that might fairly be charged against business. But suppose you got out and built a \$10,000 house on that farm, where you might have only fifty acres, it isn't fair to charge all of that in that way. Part of it is home value, because you have other sources of income and the other part is the business value. I think that in general where you have no other source of income than your farm the home on it ought not to be too expensive, because the farm has got to carry you. You have got to keep the thing more or less of a business proposition, and that is what most of our farms are, or should be, on a business basis. If we should start any year on my farm and couldn't make what I thought was a reasonable business investment, there would be something happen very quickly. This crop or that crop must pay; if it don't, what is the trouble? If you can fix it, all right; if you can't, throw it out. I told you, I threw out two crops because I didn't see any money in them. So that everything we put into that farm, we add to the investment. It is an investment that has got to pay interest and I think we ought to put that charge on our farm first and stick to it, because that is the basis of all other prosperity. We can't have good roads and good schools and good churches and bathrooms in the house and all sorts of conveniences unless we can make our business return the money to pay, or unless we happen to be fortunate enough to have a large income outside; and even then it isn't good business, because the farm must pay. The basis of rural prosperity is the return on the investment or the business.

MR. RICHARDS OF MARSHFIELD. From Western New York, where the gentleman comes from, I believe, we get magazines, "The Fruit Grower," and so forth, that tell us they make from \$400 to \$500 an acre on raising apples.

Now, I have an orchard of about six or seven acres, a mod-

ern, up- to- date orchard, where, if I could make half of that, I should think I was doing pretty well. In raising strawberries as we do in Marshfield, that being the leading town in the state for raising the best berries, we make \$300 or \$400 an acre. Is it possible to raise what some of these fruit growers magazines tell us, from \$300 to \$500 an acre on apples and do it as you have done, using the costs that you have?

MR. BURRITT. My answer, is, that it is possible but not probable, for the average man. I wouldn't undertake any responsibility for what the various magazines say. I will undertake responsibility for what my own paper says. We don't print anything but facts. I wouldn't want to say that all the others do, although they may. I wouldn't want to take responsibility for them. As a matter of fact, on that basis if you are going to make an investment or are going into the orchard business on the basis of what somebody tells you the profits would be, we might as well all move to Oregon, because, according to the circulars we get from there, their average income per acre is about \$1500,—that is, if you believe the circulars and papers. As a matter of fact, when you boil the thing down and get down to a real solid basis, you don't find those things are true. I know, for instance, an orchard within three miles of my home where the owner has had an actual gross income of \$1100 an acre. I know an orchard of twenty-five acres today that turns off an average income of \$250 an acre above all expenses. But as a matter of fact by actual count of all the orchards in Monroe County, and not only Monroe, but Orleans and Niagara and Wayne as well, in the survey made by the State College of Agriculture, the average gross income is about \$150 an acre; and if we may guess at the expense from my own experience the average expense will run in the neighborhood of \$75 an acre. I should say that the average grower in Western New York, who is taking good care of his orchard would make \$75 an acre from his orchard. Wouldn't that be fair Mr. Fraser?

MR. FRASER OF NEW YORK. Yes.

MR. BURRITT. But of course you must rremember that most of those growers inherited their orchards from their fathers and we have no knowledge what it cost the fathers. The father of this man I speak of, who had \$1100 from one acre grew those orchards and was on the verge of bankruptcy for ten years, in order to keep that orchard growing, with no income coming in. He was all but sold out in 1890 on his mortgages. The whole income was from farm crops. About 1895 the orchard began to bear, and when the man died ten years later he left upwards of \$50,000, all made from a 100 acre farm. The father left that orchard to his two sons, who make a big gain from that farm, now, from this plant which he left them to do it with. It is like going into the business of manufacturing soap, where your father built the whole plant and equipped it and gave it to you and you say that now you are making so much money. But really, your father did it. That is the case with Western New York. Most of them were grown under circumstances the expense of which we have no accurate knowledge. But as a general thing, I think the man who has it now and takes care of it, averages about \$75.

MR. BARNES OF CONNECTICUT. In view of the fact that your estimates are from Western New York which therefore may not be wholly in touch with conditions here in Massachusetts and Connecticut, quoting orchard land at \$90 and \$100 and more per acre, I would like to say that in our locality in Central Connecticut a very short time ago, in the revaluation and classification of agricultural land for the purposes of taxation, land suitable for orchard purposes was finally classified and valued at about \$50 per acre, just for the land. In going about in Massachusetts and New Hampshire—I find what appears to be much land of good character that I think can be bought for very much less than the values that have been mentioned here as prevailing in regions further west. I would like to call your attention to that.

Also, in regard to the value management. I think, if I understood rightly, the statement was made that \$1500 for a man able to handle fifty acres of orchard was paid in some cases. I should feel that if I were making such a deal as that I should hire the man as superintendent, would want him to be able to handle very much more than fifty acres, to be worth such a sum.

MR. J. F. FROST OF BELMONT. You stated that you eliminated two crops and made a larger profit on the balance grown. Isn't that the tendency of modern farming from New York westward, to specialize?

MR. BURRITT. Now that is a great big question and I might spend half a day on it. I had to give them up since they couldn't hold up the profits along with the others, so that my income with the remaining three was greater than with the previous five.

I would like to point out in my talk that specialization must be accompanied by a good system of agriculture, with good management behind it. If I were to go into the business of growing apples today I would put seventy-five acres of general farm crop lands against twenty-five acres of orchard, every time. Mr. Fraser has done the same thing. I told you that I had purchased extra land to go with my orchard, and I bought twenty acres more to back up the twenty-five acres of orchard. Mr. Fraser purchased about 200, to back up 50 or 60 of apple orchard. I would be willing to stake my reputation and pocketbook on this, that you could produce apples on a general farm, with a general system of agriculture behind you, 25 or even 50 per cent less than the man who goes into the orchard business and has nothing else, with the possible exception of a man who has several hundred acres of orchards, or perhaps you might have 100 acres and a number of varieties of fruit, and perhaps a vegetable garden or something like that connected with it. I believe in specialization, but I think we have over-emphasized it in agriculture.

MR. FROST. But isn't that the modern tendency west?

MR. BURRITT. It is; and the modern tendency, right up to date in the northwest, is to go busted in the orchard business. (Laughter and applause).

MR. FROST. That is what I wanted to get at.

MR. BURRITT. I believe we should specialize, but we ought to back it up with a general system of agriculture. I believe in diversification; I think that if there is one thing New England needs more than another it is diversification in our agriculture. Not that she hasn't it now, but she needs this development along those lines rather than going into intense specialization. I believe in a general system of farming, three or four good sources of income, with one good, strong specialty. Push the specialty harder than anything else you want to, but keep your other things behind you, because you can utilize your labor better, keep your machinery at work on them, keep your capital doing business. I believe that is sound business judgment. We can't judge altogether from the western conditions just now, unless we analyze them very carefully. That is because their work has been in a period of development. If I am not greatly mistaken we will see many things going on in the west in the next fifty or one hundred years that have gone on in New England in the past fifty. Not to the same extent, perhaps, because they have our example to profit by and because their land is more naturally tillable farm land than our eastern land; but at the same time I think the lesson to be learned not only for America but for European agriculture is that we must have a good, strong, all-around system of farming, using system in its large sense, with a good strong specialty to lead it.

PRESIDENT FROST. It will now be necessary to bring our discussion to a close. We have some general business to bring up at this meeting. The Constitution calls for an annual meeting in Worcester in March, at which time most of the business will be carried on and the election of

officers will occur. I am going to ask Professor Sears, our vice president, to take the chair, and then there are two or three things we want to decide at this meeting. I hope you will all stay until we are through.

PROFESSOR SEARS. The president invited me to take the chair, but I don't see the chair. (Laughter). If I understand the situation, the first question is, Where shall we hold the next meeting? I would like to ask the president if he has anything to bring before us in that connection?

PRESIDENT FROST. Mr. Sevey of Springfield has something to bring forward.

MR. SEVEY OF SPRINGFIELD. Ladies and Gentlemen: Just a word. I am sure you all appreciate the meeting we have had here, and Boston has done the right royal thing. Nothing succeeds like success and we want to see you take another great forward step, which we believe you will do if you come to Springfield, for your next session. We have the finest facilities for a convention of any city in New England, not excepting Boston; we have an active Board of Trade and we have a new Auditorium which will accommodate about three times the number you have here, so that you have ample space for growing. Our hotel accommodations cannot be beaten. They tell me you have about 900 members today, the largest horticultural society in New England and the most enthusiastic at this moment, I believe. I used to bank on Maine and Connecticut, especially Connecticut, but I guess they will have to take a back seat now. But I am sure you are not going to stop here, and that being the case you must look out and ahead. You have been in the middle and in the east. Now, come into the western part and see what we have there. I want to back up these remarks by a letter from the secretary of the Springfield Board of Trade. (Reads letter).

We want you to come, not some time in the future, but the very next time.

PROFESSOR SEARS. You have all heard of the abil-

ity of the west to advertise, and apparently we don't have to go very far west to see that ability.

MR. POWELL OF SPRINGFIELD. I want to second that invitation. Springfield is going to make a specialty in the future of entertaining conventions. We are going to have the finest entertainment hall in the east, without exception, that will seat about 5,000 people, with a very large hall below for exhibits. So large a hall need not be utilized unless necessary, but the galleries around it will provide for a very large audience. We have also in Springfield, or near it, the peach center of the state, the Wilbraham Range of mountains, which go down into Connecticut and give us the finest peach land there is. Horticultural interests, while of moderate size, are developing, and we want to have the Massachusetts Fruit Growers' Association come and encourage those now starting in the industry. I want to second the invitation, because I know if you come to Springfield you will feel like coming again. We want you and we will see that you have a good time.

PROFESSOR SEARS. I am glad to have Mr. Powell second it. Are there any other invitations? You don't want to accept too hastily. Springfield is a good place, I know from experience. If there are no others I presume a motion is in order that have our next session at Springfield.

MR. RICHARDS OF MARSHFIELD. When?

PROFESSOR SEARS. About a year from now, the exact date to be fixed later.

MR. SEVEY. I move that we do hold our next convention in Springfield.

(Moved, seconded and unanimously carried).

PRESIDENT FROST. At our last meeting it was proposed that we make an addition to our by-laws to include life membership. The only membership at the present time is the annual membership, costing one dollar a year. For this we hold these conventions, hire our speakers, have some institutes and summer meetings. Everything is printed in the report which is given to every member. Also, some of

us have felt that there were quite a number of people interested in the growing of fruit who would not want to be bothered with the dollar a year. It was proposed in Worcester last March that we have a life membership to cost \$20. It was figured out that the interest on that \$20 would bring in very nearly a dollar to cover the expense. The question has been raised since then that \$20 for life membership was no bargain, but the officers have felt that they couldn't afford to give any bargains more than we are giving. We are giving everything that we possibly can for the dollar. I have talked it over with some of the people whom I had in mind to ask to become life members, and they have thought that \$20 was not too much; in fact, one man here just proposed to come in as an annual member, but said he didn't like the trouble of paying that dollar every year, and I asked him if he wouldn't wait until after today, and he said he would, gladly. I have a great many people in mind, such as ex-Governor Draper and a number of others, who will gladly come in as life members. For this reason Mr. Chairman, I am going to make a motion that we add to our by-laws a clause making life membership, on the payment of \$20.

PROFESSOR SEARS. It is understood that this has already been proposed at a former meeting, and Mr. Frost now makes the motion that we change the by-laws so that we can create a life membership for \$20. Any second? Mr. Frost said that people didn't like to be bothered with the dollar a year. I am sure that I can assure him I am perfectly willing to be bothered with a dollar a year, but I don't think that there is any question that this is a good move and that there are people who would prefer to get the thing over with for life.

(Motion seconded and unanimously passed).

MR. WILFRID WHEELER OF CONCORD. I would like to propose a motion which will come up for final action at Worcester, which will be our annual meeting, to the effect that the compensation of the secretary, who now re-

ceives \$50, be amended so that his annual compensation will be \$100. I make this motion for the reason that the business of the Association has increased so tremendously in the last year or two that the secretary really devotes a great deal of his time to it and receives practically no adequate compensation. The \$100 isn't enough, but at the present time, with our increased membership and increasing activity, certainly the secretary ought to get more nearly fair compensation for his work. I make this motion for that reason.

PROFESSOR SEARS. You have all heard Mr. Wheeler's motion, that at the regular annual meeting of the Association at Worcester it shall be proposed to raise the salary of the secretary from \$50 to \$100 per year. If put in that way it simply means that the matter will be brought up at Worcester?

MR. WHEELER. Exactly.

(Motion seconded and unanimously carried.)

MR. SEVEY. I have often asked myself and one or two others why it is that we have no State appropriation. Other horticultural societies of New England and the west, all over the country, have anywhere from \$500 to \$5,000 a year, but not one single penny does the great and glorious state of Massachusetts give our horticultural interests to my knowledge. It seems to me that our officers might be delegated to investigate this matter. Certainly it is worth while for the state to back up its horticultural interests with appropriations as much as in other line of agricultural activity.

PRESIDENT FROST. That was taken up during the past year, and there are reasons why we couldn't have any money from the state, because we are not incorporated, and also because the state money goes through the State Board of Agriculture. We appointed last year a committee on legislation to see if they could get aid from the state, and found that the State Board of Agriculture had asked for a certain amount of money for the encouragement of fruit growing. We also found that if we would work with the State Board, and the State Board secured its appropriation, we would be

given some of it. That money was used for the exhibition in November; we had a very successful and fine exhibition of fruit in this hall in November, 1912, and the State money carried it on. As I understand, this is to be an annual appropriation, and we have been told verbally that influence would be used to get some of that money for our own work. That will save us the expense of going to the legislature and trying to get a bill through.

MR. SEVEY. That's all right if we get it and it is thoroughly understood, but it should be thoroughly understood so that we can get it. Another line I have in mind—and others have, too—is the matter of institutes and field meetings. The Association has done some of that work, but has not developed it to the extent it should. We haven't had any up our way, and we want some, and if we put in a plea they say, "We haven't any funds." There is no need to consider the source, provided you get it, but I think there should be an understanding.

(Noon Recess).

SATURDAY AFTERNOON.

(Meeting called to order at 2:15 by President J. K. M. L. Farquhar, of the Massachusetts Horticultural Society.)

PRESIDENT FARQUHAR. Members of the Massachusetts Fruit Growers' Association and of the Massachusetts Horticultural Society: I wish to call your attention to the fact that this lecture is given under the auspices of the Massachusetts Horticultural Society, the subject being appropriate to the convention being now held here, and it is the second of the course of lectures of our Boston Society. Those of you who are interested in the lectures that will follow this one will have an opportunity to get programs here which will be ready for distribution and which we hope those present will avail themselves of and carry home as a memorandum of future meetings.

Before calling upon the lecturer of the afternoon I would like first to call upon Mr. J. Norris Barnes, President

of the Connecticut Pomological Society, who is present. Mr. Barnes will please come forward.

PRESIDENT J. NORRIS BARNES, OF CONNECTICUT. Mr. President, Ladies and Gentlemen: I appreciate the courtesy extended to me as a representative of the Connecticut Pomological Society. It is something of a surprise to me, however, but I am very glad to be present and bring greetings to you from the Connecticut fruit growers. Certainly I am enjoying the enthusiasm and the good work that you are giving forth here in this meeting, and it is not hard for me to imagine that I am among Connecticut people for one of our annual meetings in Hartford, in point of attendance and enthusiasm and interest which you show here. I think there are quite a number of Connecticut people here with me, enjoying the good things that you are having. We appreciate this interest which you are exhibiting and I think that it promises much for the future of the fruit growing interest in Massachusetts. I should like to make an announcement at this time that the Connecticut Pomological Society's annual meeting will be held in Hartford, February 5th and 6th, at Footguard Hall. We shall be glad to have as many of you present with us as possible and we will do our best to make the meeting worth your while. I thank you. (Applause).

PRESIDENT FARQUHAR. I think Mr. Frost of Arlington has a word to say to us. Mr. Frost?

PRESIDENT H. L. FROST. I asked President Farquhar if I might not just give you the numbers of those attending these meetings, because I thought it might be interesting. Yesterday morning there were 619, besides the exhibitors; yesterday afternoon there were 820. We figured there are about 100 exhibitors, so that you can add one hundred to these figures. This morning there were 493, and this afternoon, since noon, there have been about 550 come in. Our Fruit Growers' Association has already taken in over 300 members and it looks as though we would reach the 1,000 mark tonight. (Applause).

PRESIDENT FARQUHAR. Ladies and Gentlemen, I have much pleasure in announcing the lecturer of the day, Mr. Samuel Fraser of Geneseo, New York, who will speak to us on "Planting Fruit Trees propagated from strains of known worth." Mr. Fraser is an orchardist of reputation and one of the most successful, and I am sure we will be edified by what he shall tell us today. (Applause).

PLANTING FRUIT TREES FROM STRAINS OF KNOWN WORTH.

Mr. Samuel Fraser, Geneseo, N. Y.

In speaking to this heading I am aware of the fact that I am on dangerous ground. The problems connected with the propagation of trees are feebly understood and the selection of individuals for the purpose of reproduction is on no statistical basis. In other words, we have very little data either for or against any such policy, but it seems to me it is necessary that we begin at least to inquire as to the merits of the situation, whether there is any possibility for improvement along this line, or whether it is merely the theory of a few imaginative minds. The idea has been discussed for several years. We find it in horticultural literature as far back as 30 years ago, that there was something in the selection of buds or grafts from individual trees which were producing large yields or were favorable in other respects. Before I go further I would like to make myself clear so that I can get out of the hole, if I need to, should I be found to be in it. I claim, therefore, that in anything I say, I be accorded the same privilege as the railroad time table, subject to change without notice. In other words, our information is at present feeble and weak, but we are looking for more and expect to find it and should we later find it necessary to modify our views we shall do so in accord with the increased weight of evidence.

Our methods with fruit, at the present time, are much the same as those of the farmers in regard to such plants as timothy, clover and various grasses which are used in our pastures and meadows. One goes to the seed store and pur-

chases timothy. What is in those timothy seeds? The inherent power, the vigor, productivity, the power of germination and all the various things which go to make up a plant, are unknown. The percentage germination may be readily determined; the capacity of the individual seed to make a productive plant cannot be measured; there is no Babcock test for this particular feature, in fact, there has been very little attention paid to the necessity for such, and no doubt when there is a sufficient demand, there will be a means supplied for measuring these different values. Thus far, however, there has been little evidence that these differences occurred, and no commercial recognition thereof.

In 1903 the Cornell Station began a series of experiments with Timothy to determine the differences which existed. In the first patch some 12,000 plants were put out in rows 3 feet apart, from 22 different sources of seed; these were properly checked by having a relatively uniform sample of seed sown at intervals. The variations which occurred in this block of plants were extremely interesting. A large number of the individuals did not show sufficient ability to live more than one season. They may have been annuals or they may have been plants which could not endure the adverse circumstances which came in their way on the heavy loam soils upon which they were planted, although as a grass soil no one type is perhaps better than the Dunkirk clay loam upon which the experiment was conducted. To make a long story short, there were all kinds of differences; some plants would yield 1 pound, others would not produce one-hundredth of 1 pound of hay; they were all given uniform conditions so far as the amount of room was concerned; they were all supplied adequately with moisture and plant food. Marked differences were found between individual plants; one having small narrow leaves, another large broad leaves; one might be tall and its neighbor short; these were not due to soil conditions; they were not due to climatic conditions; they were simply due to inherent power and vigor in the plants themselves, and yet, with this fact demonstrated to a man

he would go into a nursery to buy Baldwin trees and assume that each individual tree was of equal vigor provided it was of equal size at the time. We have no proof that the one which is vigorous is necessarily a more productive or more valuable tree than the one of slightly less caliper; in other words, there is no proof that the tree which is 3-4 inch in diameter will be a more productive tree and a better money-maker than the one which is 5-8 inch, and yet, in the nursery we are invariably able to secure more money from the tree which is 3-4 inch in caliper than from the one which is 1-2 inch or 5-8 inch, in fact, the 1-2 inch tree is not worth more than half as much as the 3-4 inch tree.

Is this based upon rational judgment? Does the man who purchases know that he is securing greater value from the 3-4 inch than the 1-2 inch, or is it merely the idea that we like to get something which fills the eye, and so long as the man can get a large amount of wood for his money he feels satisfied? There is a great deal in this, for if we go into the apple market we shall find that about 90 per cent. of the sales are made upon the pleasing effect upon the eye. Only some 10 per cent of weight is given to quality, although there is beginning to be in certain markets a tendency to discriminate in favor of quality, but at the present moment 90 per cent. of the sales are made upon the effect upon the eyesight and the same is as true in nursery stock as in apple-selling; it is just as true in the selling of many other products. Is it wise? Is it the right basis? This is the question to decide. If not, we should have some better method of value. What is an adequate measure of value in the case of apple tree?

In the case of our horses or cattle we have used performance. We measure the value of our Holstein cattle by their value for the production of milk. We measure the value of our trotting horses by their ability to pull off a speed test in a given amount of time. Are we going to measure our apple trees by their ability to produce apples or not? Or is the idea of any such difference occurring in

apple trees merely the fancy of a disordered mind? We occasionally hear some enthusiast claim that a Baldwin is a Baldwin; that there are no differences; that the present-day R. I. Greening is no different from the Greening which originally stood in New England. Whether this is so or not I would like to question. If it is true the individual will not be hurt neither will the trees be hurt in any way and we shall know definitely whether to search further in this problem. It is to my mind then necessary to determine first whether there is a difference in apple trees, or whether they are unlike any other tree with which we are dealing. If we look at the lemon, orange or grapefruit we now find that the growers of these fruits have recognized marked differences in yield and other characters in certain varieties of these trees, not differences in varieties for those are really recognized and are conceded to be of very great import. No man would undertake to plant Newtown Pippin here and expect to grow an apple as he might in the Virginias; no man would undertake to grow Shockley or Yates in New England; they belong in the Southern limit of apple production, yet these differences are so striking that they are accepted on their face; we are used to them. Are there not differences just as striking among the individual trees in our orchards which we have not accepted for the simple reason that they have not been impressed upon us?

We have a little statistical data which has been collected through the energy of Mr. Shamel in California in connection with oranges, lemons and grapefruit. Permit me to direct your attention to this report which is found in the Proceedings of the Forty-first California State Fruit Growers' Convention, August 1912. The work has now been in progress for three years and some rather astonishing and striking facts have been disclosed in regard to the variation among citrus fruits and especially in regard to the characters of bud variation. It may be stated here by the opponents of the theory of differences that bud variation should promptly be excluded. To my mind a bud variation

is something which stands out as apparent to the eye at once without any statistical measurement. I do not see, however, to what degree one can accept this and yet bar out any factor which might have to do with yield, which variation could not be determined save by statistical records. Why is not ability to produce a large amount of fruit just as important a bud variation as ability to produce no fruit or ability to produce a leaf which is smooth along the edges or one which is serrated, or ability to produce a white-splashed leaf compared with one which is totally green, or the ability to produce foliage like Weir's Cut-leaf Maple in comparison with the ordinary Maple. We have accepted these differences because they appeal to the eye, but there are plenty of differences which cannot be determined except by some statistical basis of measurement and they are frequently of more economic value than those which are so readily accepted. Of all purposes for which fruit trees are grown there is none which is of more importance than that of ability to produce fruit. In other words, we do not, in my judgment, grow an apple tree in order that it may be a nice looking tree, in order that it may have good shape, in order that it may be pleasing to us when we look at it. We grow an apple tree for the production of apples which can be used as human food. We may for a time be able to produce apples which are exquisite in appearance, which are valuable for table decoration only, but I affirm that such a business will inevitably be over-done and that the prime object and the one upon which the business is based is that of producing apples for human consumption, and those who undertake to go into the fancy grade alone, for the production of apples merely for showing, will frequently find their business is quickly over-done; there is some room for this, but in my mind, a commercial apple orchard is planted solely for the production of apples for human consumption, and the great body of the consumers are the workers who can pay only a certain price and above that price apples become a luxury and not an article of food and the demand is curtailed. Therefore,

I contend that we need trees which will produce the maximum of first class merchantable fruit in the minimum time and at a minimum cost; and if we find that yield is an hereditary factor, it will become a very important matter to the future planter of commercial orchards.

To return to our citrus fruits we find then that the number of bud variations is considerable. Taking the Eureka ranch in which the Washington Navel orange is grown exclusively, or almost exclusively, and where considerable of the work was done, on a block of 150 acres, generally considered to be the most uniform grove of its kind in the State of California, the fruit from which commands an extra price in Eastern markets on account of its fine character and its consistent uniformity, a grove in which to the casual observer the trees and fruit are notable for their uniformity in appearance. A close study of the trees in this grove has revealed the fact that there are at least seven frequently occurring types of the Washington Navel orange. Five of the types are unproductive; they bear low grade fruit which is undesirable and unprofitable. Out of about 13,500 trees over 1,000 trees have been located as absolutely undesirable. In fact, at the end of three years the National Orange Co. regarded these so undesirable that they have rebudded them, using buds from selected trees of the standard type of the Washington Navel orange. These rebudded trees do not represent all of the undesirable type trees present in this grove, from the fact that only the most striking and certain cases of undesirable types of trees were rebudded. Dr. Shamel states that in these cases they felt absolutely sure that there could not possibly be any mistake. The striking feature of this condition lies in the fact that the trees in this grove were propagated from buds, but shortly removed from the two parent Navel trees in Riverside. This, of course, is the most interesting statement because it appears to throw doubt upon the whole value of bud selection and bud propagation. If such a remarkable difference should occur in so short a space of time, one may question whether there is

something more underlying propagation than we have been in the habit of assuming; in other words, it will naturally bring up the question as to whether there may not be not only bud variation in the tree itself, but whether the relative position of some of the buds on the bud stick may have some importance which we have not given them credit for. Hedrick of Geneva has suggested that there may be, and certainly is, a necessity for investigation along this line of the relative importance of position of buds. I know of no data thereon. From other data which is contained in this report of Dr. Shamel's we are led to assume that the Navel orange is in a particularly variable mood; in other words, the frequency of variance is remarkable and nothing has revealed the variation so much as statistical measurements of the yield secured. The grading and counting and weighing of the fruit from each tree has revealed the presence of enormous variation apart from those which were readily seen by the eye and one interesting thing is the frequency of off-type branches in a given tree; in other words, the bud mutation is quite frequent and easily recognized by one who goes through the grove carefully. In the Dixon grove, planted to Marsh's seedless grapefruit, where part of this work was carried out, out of a total of 500 trees, it was found that 123 were unproductive, some of them bearing fruits with as many as 96 seeds. Many of the off-type trees, produced extremely large, coarse skinned, juiceless and flavorless fruits or some were otherwise undesirable or unsaleable. In addition to these off-types they had found a type of the standard Marsh's seedless tree that bears a full crop only every alternate season, being practically barren in other seasons. In some of the standard type trees there was fruit borne which sold as high as \$3.75 a half box or \$7.50 per box, which would make an enormous difference from the income from an orchard as compared with an orchard of the undesirable type. Again, in another case, there were found three trees in one experimental plot of 25 that have borne consistently large crops of the finest qualities for three sea-

sons without any off-type fruits at any time. The unproductive types have averaged about one picking-box per tree of full fruit, mostly unsuitable for shipment; while the best types have averaged about 16 picking-boxes per tree of the highest grade of grapefruit. In other words, differences occurred in grapefruit as remarkable as those which occurred in oranges. Taking the lemon, it was found that in a large orchard of Eureka lemons a similiar condition of affairs existed. Several types of Eureka trees and fruits were observed; one, the standard Eureka type tree, was quite productive, every branch being loaded with blossoms, small and large, fruits in all stages of development at all times of the year. Another type made up of large, thrifty trees, that at first sight would seem to be superior to all other trees in the orchard, revealed on closer examination that these trees were nearly fruitless. A third type which was of compact growth covered densely with foliage, apparently thrifty and desirable, was found on closer inspection to be almost barren. All kinds of variations and differences occurred. In some in which the tree might be fairly productive, the fruit produced would be of rough, thick skin and produced mostly during the winter months; in other words, it was undesirable, and in the Chase plantation, out of a total block of 16,000 trees, over 3,000 of the most striking off-type trees have already been budded to the standard, fruitful and productive types of the Eureka lemon variety.

Do such differences occur among apples or peaches or any of our Eastern fruits? Are there not some trees which come to your mind? We have, for instance, three Spy trees on the Dunkirk loam soil and for five years we have tried to secure some well-colored fruit from these trees. The trees have been opened up; they have been pruned; they have been fertilized, but we have failed to secure any good quality fruit therefrom; they will set a large abundance of fruit, but it will not color; while this soil type in other parts of the village is producing a Spy of excellent color. Why the difference? Is it the local conditions, or is it due entirely

to the individuality of the trees? We shall know more about it later, because we have considered this land fit for Spy and have planted a small block not far from these three trees. The individuals planted, however, have been budded from a tree which has the faculty of turning off highly colored fruit.

For two years previous to going to California, Dr. Shamel was investigating these problems in regard to our Eastern Fruit and in the J. H. Hale peach orchard at South Glastonbury, Conn., during these two seasons he found that in four peach varieties which had the alternate habit of production, not only did he find fruitful peach trees bearing large fine crops in the off-season, but also that these same trees would bear a crop in the general bearing season. In other words, regular fruit-bearing habits were a characteristic of these individual trees. Would the same be transmitted to their progeny? That is the next important question. To what extent will they be transmitted? Is there anything which will interfere with their transmission or are there any factors which it is necessary to control? None of these things to my knowledge have been solved. They are all awaiting solution at the present time.

Can an individual go into an orchard and pick out the best trees? Can a dairyman go into his barn and pick out his best cows without some assistance from the scale and the Babcock test? We have had the latter so well demonstrated that we can generally answer the question with an emphatic No! The former has not been worked upon and naturally we raise the question as to whether we might not be able to go in and pick out the best trees apart from statistical measurement. We look at a tree and it meets our fancy and we say there is a good tree; it looks well; it is thrifty and healthy. We do not know whether it is thrifty or healthy because it is not working or whether it is so in spite of a large amount of hard work. Mr. R. S. Vaile of Santa Paula, California and another man decided that they would pick out the hundred best trees out of a grove of

2 000 and then keep statistical record to see how near they were correct. These were lemons. After careful consideration they selected 100 individuals as the best in the block, giving due regard to such factors as type, shape and size and number of thorns and foliage and description of the fruit, including its shape and smoothness, the thickness of the rind and the number of seeds and the various other factors which go to constitute a first class lemon. A grading record was established for the trees as the final measure of value, the number of fruit which came ripe at a certain time, whether they were green, or light green or ripe, and also sufficient data was kept in regard to the methods of irrigation and the times, the cultivation and fertilization, with the idea of determining whether such had any influence upon the bearing. In other words, all the factors which they could conceive as entering into the problem were considered. During the first year the special trees selected averaged 13.45 field boxes, 45 pounds each; while the average for the rest of the section, all misses and young reset trees having been eliminated from the count, was 10.25 boxes; in other words, there was an average difference of over 150 pounds to the tree. This striking difference, however, does not necessarily prove that the first choice of trees was perfect or sufficient for bud selection, for the special trees themselves varied from 15.4 boxes to 10.1. The fact that this large variation exists shows the possibility open to successful bud selection, for the difference between the orchard run and the special trees shows an average increase of at least 100 packed boxes per acre or about 30 per cent. The records for the second year were not complete but they brought out several interesting points. The average for the special tree was 5.5 boxes, while the orchard run was 4.5, but 11 of the special trees fell below 4.5 average of that season and 5 of the 11 were below the average orchard in the first year's record; in other words, 4 of the trees out of these 11 were consistently poor. It is also interesting to note that out of the 5 highest trees, number 9, 14, 70, 93 and

86, all but number 9 were the highest in the second year; in other words, there is a certain amount of consistency in the matter of yield and this gives grounds for hopes in the future.

To summarize this work I quote the statement by Mr. Fred Reed of Riverside, California. "I have the figures right here on a couple of trees, the accumulated data for two complete years and a part of this present year. Our tree No. 2, for the average of the three years, has turned off 768 pounds. Tree No. 4 has turned off 443 pounds. Those two trees are not so different that any one who is not an expert passing through an orchard would notice any difference in them, but there is a difference in their production in three years of 325 pounds of fruit. Up there we think we are doing pretty well to get two cents per pound, orchard run for the fruit. The difference between the value of the product of tree No. 2 and tree No. 4 is something like this: The value of product of tree No. 2 at two cents a pound, orchard run, is \$15.36. The value of the product of tree No. 4 is \$8.86. There is a difference of \$6.50. We have about 72 trees to the acre on our ranch, and if all the trees were of as good a grade as tree No. 2 the difference would be a little matter of \$468.00. I think anyone can digest the point to his own satisfaction."

Prof. Hedrick of Geneva in recent bulletins on the question of pedigreed trees, states, "It is very doubtful if apples can be improved by bud selection and the so-called "pedigreed stock" is probably worth no more than trees grown under general nursery practise;" elsewhere he notes that the yields from the 200 Rome Beauty trees at the Geneva Experiment Station, all of which were propagated from one individual tree, by their wide variation in yield, gives food for thought to those who have faith in the possibility of the selection of buds. However, the interesting point is that we have no statistical record of the performance of this parent tree; we have no knowledge of the grounds upon which it was selected; it may have been a tree like number

9; it may have been a tree which bore well one year and then fell down; this matter of record is absolutely necessary before we can prove anything. The fact that one experiment fails to reveal anything does not settle the issue at all, because one individual tree might be better, due to local conditions; it might not be that its value was due to inherent power. It will take a considerable amount of work to settle this question right, and the first thing is to prove that differences occur and occur consistently.

In regard to apples, probably no work is of longer duration than that undertaken by Professor Macoun of the Canadian Experiment Station. The number of trees involved in this experiment is not large, but the records have been maintained carefully for a period of ten years; also the conditions under which the trees are grown are considered to be sufficiently uniform for experimental purposes. The records for the period 1898 to 1908 are as follows.

Wealthy, 17 trees in the test, varied from 59 gallons gross yield to 154 gallons per tree, or 261 per cent. One of the interesting things noted is that two-thirds of the trees fell below the average in yield; in fact, this is the most significant part of the whole record; one-third of the trees did over half the work. Also, it is of interest that the highest yielding trees took the lead the first year. We often hear critics state that if we force the trees into bearing early we may injure their vigor. The results so far do not indicate such to be the case; they do not indicate either in other lines that power of reproduction necessarily means impaired vigor. We may have impaired vigor followed by increased reproduction, but the contrary is not thereby proven. Many of our strongest and vigorous families, so far as reproduction is concerned, are strong and vigorous in other lines and it will depend upon us to select those strains which are not only vigorous in reproduction, but are also able to carry out their reproduction without entailing loss of vitality.

In the McMahan white variety there were 8 trees, which

varied from 163 gallons yield to 753, or 462 per cent variation and again the best tree began business early and made a record the first year it bore which it retained throughout the test. In two McIntosh trees one produced 230 gallons and another 501, a difference of 218 per cent. In five Patten Greening trees the yield varied from 209 gallons to 502 gallons or 240 per cent. In other words, in these trials, the variation in yields between the different varieties was from 218 per cent to 462 per cent between the highest and the lowest. We may not be able to raise the average of the whole orchard to this degree any more than in the timothy breeding experiment in Cornell University where it is expected to raise the average yield under field conditions to the same degree to which it occurred in the test plats; but there in the timothy experiments it has been found to be possible to increase the yield 40 to 45 per cent under field conditions which is an enormous gain. Taking one of our own orchards which was neglected until five or six years ago, the trees being about 30 to 33 years old at the time, about 220 trees in the orchard, we find that the average yield is about 4 barrels per tree, in other words, we have one tree which has produced for the five years, 10, 4, 12, 14 and 4 barrels of apples, that is, first class fruit fit to barrel. a yield of nearly 9 barrels average. Naturally if the yield of the orchard is 4 barrels there are some trees which are not paying their way compared with such a tree as I have mentioned. We find that there are three R. I. Greening trees which have stood out remarkably for 2 or 3 years and about 6 trees more which come in as of excellent quality in regard to yield, but have some other characteristic which militates against them. For instance, two trees will always furnish a Greening which we can use for exhibition purposes in September, because they are so large that they are attractive, but this fruit does not show as good keeping quality as is found on certain other trees. We have been able to pick 6 barrels of 3-inch apples without any trouble from one tree and never run them through onto the table at all, merely

starting the men to pick the 3-inch size and put them into the barrel and head it up; this, of course, is uniform fruit; the tree had been thinned where there was an excess, but wherever the crop is not excessive we do not practise thinning. We secure, however, a certain amount of uniformity, which is a decided asset when one come to the picking season and the rush which attends it. In addition to the 3 barrels mentioned there were four which were somewhat less or which were taken off at the second picking.

We have a currant patch which averaged 6 pounds of fruit per bush during the past year, yet certain individual bushes in the same bore 21 pounds, in other words, there are a number of tops and a number which are below the average in yield. I think from this discussion we can realize that it does not matter whether it is apples, lemons, oranges, grapefruit, currants, pears or any other crop; there are a certain number of average individuals and there are some which are above and some below; there are runts and boarders in an apple orchard just as surely as there are runts and boarders in the cow stable. The case is proven in so far as that is concerned.

The next point is how can we distinguish the individuals and we know of no other means than statistical records of the products. The product recorded for 3 or 5 years is a safe indication in many cases of the possibilities of the individual; this would isolate the best and also the worst. The next factor to consider is whether the individual will transmit. In this connection I may say that if a certain individual which was 100 or 150 per cent above its fellows should produce a race which was 15 per cent better than the previous average that I should consider it a satisfactory and wonderful advance. We never secure as large an average advance as we have individual advance, but any such gain as this would be adequate to make this a very important factor in orcharding. We have propagated from a number of individual trees of different varieties. Taking the Baldwin, and in fact, the same is true of all varieties, a certain indi-

vidual will produce trees which at one and two years of age are strikingly better than their fellows; these trees have been selected in the first instance because of their yielding power. Now, we notice this variation in ability to produce a one or two year old tree. Of course, with the present standard of requirements, everyone wanting the larger tree, it will become absolutely necessary, if we wish to meet the same, to select the best-growing trees for our work. It is perhaps well to say here that any tree taken from a bearing tree will not make as satisfactory growth in the first two years as a bud taken from nursery stock would; in other words, if we should pass these trees through the nursery row for a couple of years and reproduce from them we could give a much more satisfactory appearing tree so far as the purchaser is concerned, whether it will be any better or not is a question which must be settled by direct experiment.

But to return to our individual rows we find that taking the case of the Auchter Baldwin, which is one of the best bearing trees known to Mr. Taylor and Prof. Hedrick and occurring on the Auchter orchard at South Greece, N. Y., which has been leased by the Geneva Experiment Station for ten years, that the trees propagated from this individual are uniformly poorer growers than those propagated from several other individuals grown alongside. This is not only true in Geneseo, but it is true in the nursery of Mr. McKay at Geneva. Why should this be? The individual wanting trees and looking at this row would never take them from that one; they would much prefer the row alongside, known as 4.05. In the case of the R. I. Greening we find similar results; stocks grown from the two trees 6.19 and 8.13 will produce a larger number of relatively first class trees at one and two years old than 5.03 which is grown between them. So far as an experiment this is a very good check, 5.03 produces a uniformly large number of trees about 3 feet when one year old, which are sprawly in growth at two years old and not first class in appearance; in other words, there would be difficulty in selling these trees. No one would

desire them if they saw the others, yet it is my firm conviction that 5.03 is just as good an individual as 8.13, and in the case of other trees which we have tried since, we are finding that we can get better growers than 8.13. In other words, there is a question as to whether vigor in a young tree, and productivity are correlated in any degree or whether they are antagonistic. I feel that it is possible to select individuals in which both will be found. One of the most striking illustrations of this is the strain of Duchess of Oldenburg, which has been taken from two or three owned by the Collamer Bros., Hilton, N. Y. Here we find no difficulty in securing 6 feet tall and well-branched trees when headed low and strong and stocky, which are strikingly uniform, whereas it is much more difficult with other selections to secure a height of more than 5 feet and a lower caliper. This is a strikingly vigorous lot of trees and we know that they have been wonderfully productive; the original trees are now of good age and, strange to say, are top-worked on some other variety. Has this added any vigor to this strain or is there some inherent power? So far as we can find these Duchess were selected and top-worked because of their good bearing power; in other words, have we found an individual which has ability to transmit its characters and is both vigorous and productive at the same time? One strain of McIntosh we have from Mr. Teator of Red Hook and also a Baldwin from him are strikingly vigorous, also a Baldwin which we secured from Mr. De Los Tenney of Hilton, has shown wonderful vigor in producing a two-year old. Now these trees are well checked because we frequently will run one row then repeat it at a distance of six or seven rows apart and they stand out as markedly as steps. Again, by selection in the nursery row we can get a crooked variety to grow straighter. We have a strain of Bose, which while generally recorded as a very poor grower, is producing a relatively large number of straight trees and just as strong growers as we can find in Bartlett; this, however, is the exception. We know that these Bose are from good individ-

uals; in other words, we are at the present time propagating from three individual trees, all of them of the best strain of Bosc and all excellent individuals and to us it seems that they are showing ability to produce a good tree and are from heavy producers. To what extent they will reproduce the latter power, of course, we are not yet aware. We have a number of orchards planted from individual trees; in some cases we have these top-worked; in others we have the young trees themselves. Our earliest records will be secured from varieties which have been top-worked on others. Here we find that Greenings which have been selected because they were green and maintained their green color, and because of uniformity in size and ability to yield are transmitting those characteristics. We have Greening trees which are four years top-worked which this year bore 182 and 179 fruits and every tree bore some fruit, from 40 apples up to this number. The tree number is 3.15. The Baldwin, 3.03 has also shown ability to make a rapid growth and come into bearing early; in other words, we have a large number of trees which are four years top-worked which have borne a nice lot of apples this year. Incidentally, I may say that I am not at all in favor of top-working. We find that this merely delays bearing instead of causing the trees to bear earlier; in addition, it is a considerable amount of work and very unsatisfactory. It will often take three years in order that all of the block of trees may be worked over. It results in dwarfing the tree and on the whole is detrimental. It does not matter whether the top-working be done in the orchard or in the nursery row, the evil results of excessive pruning are apparent in both cases. In one block of Hubbardston which we top-worked we found a remarkable variation in the color of the wood produced, that is, on some trees the wood would be of a light-brown color, and on others a reddish-brown. There was so much difference that we finally decided to select a certain type for all future propagation in order to get more uniformity. What caused this breaking-up? I do not know, whether it was the influence

of the stock on the scion or whether it is merely that the variety Hubbardston is ready to break up in this particular character. Whether it would have any bearing upon the fruit I cannot say. We have not yet proceeded far enough to determine this feature. In the case of the Northern Spy we notice considerable difference in the trees, a certain Spy produces wood, which is light-brown in color, extremely thin and willowly and in such cases the trees do not seem to make as much growth as in others. Another type of Spy which is much stronger in growth has reddish-brown wood. Now, whether these things can be correlated with productivity or not I cannot say; we have not proceeded far enough to determine any such conditions, but there is no question so far as furnishing wood is concerned that the reddish-brown tree which we find in our own orchard is the one from which we ought to work; the light-brown tree gives a much smaller growth and would not be as acceptable to the average purchaser; whether it will be as acceptable later to the orchardist I cannot say, perhaps it may be, perhaps not. I may say that the Spys sent out by Mr. R. L. Hemenway of Bridport, Vt., have the light-brown colored wood and his Spys have sold as high as \$14.00 per barrel; a number of them have this character and make a relatively short growth in the orchard. It would seem to me that there is excellent opportunity for the selection of types of Northern Spy, in fact, there are so many strains that we can practically find varieties in this variety. It is also a possibility that we shall find that certain strains are better adapted to certain districts than others. Of course, there is no apple in which soil has a greater influence than the Spy. If planted on very heavy land it grows a close-bunched tree, shooting upward straight and thick and bushy, fruit being greasy and lacking in color and quality. On the other hand when grown on shaly land, especially limestone shale and soil not too rich, we shall find the tree making a much more spreading growth and higher color resulting. There is not the same necessity to prune, although the man who prunes in the

former case will merely add to the troubles, unless it be a certain amount of judicious work in the summer. Excessive winter pruning would merely result in disaster.

A few of the best colored Spy trees in Geneseo, or rather trees producing the best colored fruit, are inclined to be of the light willowly order and not the thicker wood growth. Here, it would seem to me that the orchardist and the nurseryman might have different ideals, for from the nursery standpoint, where one desires to sell wood, one would naturally select scions from the heavy growing tree. At the present time we have strains of our own and from Bridport, Vt. and also one from the Bradley tree in Wyoming County; it was from this tree that Mr. Pat Gleason, formerly well-known as an extensive apple operator used to select his fruit for a great many of his shows and it was fruit from this tree that won the prize at the Paris Exposition. One would judge looking at this tree that it was not ideally located, for Spy; it is situated down on the valley floor, on a gravel loam soil; the tree has been planted in among others rather close and shaded somewhat, and yet, it has a local record for producing some of the highest quality best colored fruit grown in our vicinity. Is it local conditions or is there individual merit in the tree? We hope by planting from this to secure data, but when? Ten years from now? Perhaps twenty? We cannot hurry this work. it is a slow piece of business at the best. We cannot tell definitely anything about it, until we have data which can be secured only at the expense of considerable time to say nothing of money. Is the game worth while? That is the question of a great many. One thing certain: By selecting buds and wood from such trees we know that our variety is true to name; otherwise, we are losers if there is no benefit from heredity, because the same buds from the nursery would produce a larger tree at the end of two years than we can possibly secure from these individual bearing trees; and it is quite possible that my friend, Prof. Hedrick of Geneva is right when he tells me that I am merely wasting my time

and money by chasing after trees of this nature; in other words, I am gratifying a dream, but I have faith and am going to pursue my vision.

Now, I am going to leave this, because two or three have asked me more or less about the business of planting trees, and what is probably of equal importance, the care of the tree after you have it. Some prefer a one year old, some prefer a two; some prefer a big tree, and some would prefer this 5-8 inch tree. Nearly all trees are sold by height, measured from the point of insertion of the bud to the tip, and their caliper taken at two inches above the bud. That is the diameter and they are sold as 11-16 inch, 5-8 inch and 1-2 inch or whatever they happen to be and their height. If you want to know how to order intelligently, you can buy that way. You get an idea then of the size of the tree. Also, it is well to know their age. A great many men write me that they want buds. Here are two trees (indicating). Which would you take? So far as the roots are concerned, the roots are of equal age. The only difference is that this one is a root graft, and this one is a bud. In the case of the budded tree the seedling was planted in April or May and in August or September a bud was put in the stem. The following spring the top was cut off and the bud grew and made the trunk and eventually the tree. In this case a root was taken and a graft or small piece of wood of the desired variety was put in it. It was planted in May, just the same as the seedling and grew into this tree. Which do you want, how do you know which you want? (Laughter). Don't you think there is a lack of knowledge as to what you want? Some men want the bud, some want the graft. We try to give them just what they want, then they are satisfied? They may be, and they may not be, but in many varieties we can grow a bigger tree in the time from a graft than we can from a bud. Why? I think that explains a fundamental principle in causing an orchard to come into early bearing. In the case of the graft we planted the little tree and it grew and was never touched; it was left alone. In the

case of the bud, we grew the seedling tree for a year and then cut the top off and lost all that year's growth and it never got over it. And if you want a very good illustration of the effect of pruning, severe pruning, just take two or three trees and top-work them. If you can get any more discouraging situation in an orchard that to top-work them I don't know of it. In other words, top-working apples appeals to me about the same way as when a little boy came in and told his mother, "Mother, Tommy Jones says Daddy has got a big head." "Well," she says, "go on, go on. There is nothing in it." (Laughter). Don't get into top-working. The less pruning you can do to the young tree until it bears, the better, and the sooner it will bear. I have no use for summer pruning, and I don't think you need it. I am talking now from New York, my own conditions. You can use what you like of it, but it seems to me that anywhere the less pruning you can do, the better. Shall I prune when I plant the tree? No. Plant your tree, take off the limbs you don't want. If you can form your head, do so. If you don't want all the limbs, decide which you are to save, three limbs and a leader, perhaps, and if you can possibly make the head when you plant it, do so. Take everything else off, but don't cut back limbs you leave; don't cut them back. Why? I know that you all differ, and that is what I want; I want a good discussion. Now why? This terminal bud will start into growth ten days earlier than any of those lower down and you can't afford to lose that ten days especially in the first year. In your heading try to have limbs distributed at least six inches apart on the trunk. If you begin your heading at 18 inches, then go up 10 or 12 higher for your next limb and so on. Make No. 1 at 18 inches or probably 2 feet, No. 2 at two feet 6 and then 3 feet, probably; get your head distributed. If you get them all close together and the variety is Spy, when it comes into bearing it will tear right down and crack open. The distance the limb is from the ground will never be greater than it is to-day. As the limb gets thicker, the lower

portion grows nearer the ground. I believe in low-heading. It is business. I believe in three or four limbs, and the leader in certain varieties, varieties which are apt to tear down, varieties in which you want shade in the tree, such as Greenings, where you want to keep them green. I believe in an open-headed tree in varieties where you want color, especially if your conditions are adverse to spreading the tree. In other words, with us, if our soil is heavy, our Spy tends to grow thick, branches bunched together. Under such conditions I would try to make an open-headed tree. As a rule then for our conditions the Spy head is open, the Baldwin is open, the Greening and the Wealthy would be left with the center in.

My contention is that if you will leave the limbs alone and not cut them back, they will fill up with fruit spurs and come into bearing quicker. We have Baldwins five years planted bearing 1 1-2 bushels. There is an orchard nearby which has been handled in this way, an orchard of Hubbardstons, which at four years picked half a barrel. Some of the Baldwins did the same at five and every tree in the orchard was bearing.

We are going to follow a system which is suited to the times, and are not going to follow the previous methods. Until a tree was in bearing I would not prune it any more than to probably take out a limb that was interfering. The early bearing induces a normal spread of the branches. We have trees five years planted, Greenings, which are bearing and have a ten-foot spread. We have Greenings which have been propagated from individual trees which give me faith in the value of selection, because we selected Greenings which maintained their green color and on the young trees, apples which were left on until November retained their green color. Every tree of one block, 3.03, were bearing at four years, one of them had 179 fruits and another 182. With some trees you will have to take a couple of years to form the head, the limbs may be too close together to leave them all.

The ordinary nursery trade calls for a tree to be trimmed up to that 30 to 33 inches high, which I think is a mistake, but the trade calls for it. The head is then too high.

Now as to planting. If the trees are dry when received throw them into water, root and branch and leave them there 24 hours before planting, taking them out as needed or heel them in, in wet ground. Plant just as soon as you can after you get the tree; don't wait for the land to dry off so that you can cultivate it. Get the trees in early and pound them tight. Don't go chopping off a lot of roots. I wouldn't take off any more roots than I had to. If the root is damaged I would cut it back a little, but I wouldn't take any more off. Dig your hole as small as you like, jam the roots in and pack them tight; get the biggest man you have and keep him busy tamping. If you don't get them tight that way, take a fence post and tamp them tight. The main thing is to place the soil in touch with the root so that the water will move from the soil into the plant. Now, it can't move through an air space, and you want that plant to grow just as quickly as you can in the spring. If they are pounded tight, moisture circulation is established and the tree begins to grow as soon as possible; do everything you can to bring about that result. Leave the buds on, which grow first, leave all the roots on, get it in the ground as soon as you can and cultivate it just as much as you can, once you have it in. Then you can grow an apple tree. You will not only have them growing until July, but you will have them growing until August. Then you can make it grow, in spite of what I heard yesterday, that your trees quit in July. I never have had trees celebrating the Fourth in that way. Laughter). I would have them take a new lease of life right off, and do business.

Funny things happen sometimes: I had some trees returned by a lady in Ithaca. She bought a small order and I was very much surprised to have a letter back saying that those two-year-old trees that I sent her were four-year-olds.

I said that was impossible, I knew where they came from, and I would give her a dollar a piece for every four-year-old tree she sent me. They had made a fall growth, as well as their spring growth, and those folks didn't know it. (Laughter). Now, know what you know; be sure of what you know, and then you are ready to go ahead. Know that you are right and go ahead, in this business. The whole thing will depend upon yourself; you will have to pay for it. Get all the advice you can, and use your own judgment and get wise to all the propositions you can before you go in, and if you don't know, if you are not positive what you ought to do, you ought not to go in the fruit business; keep out. You can go out of the business all you like, enough will stay in. I don't think that as an organization we ought to go telling that everybody should go into fruit-growing. We don't want everybody in. We want those men in that will do the most good. This idea of filling the country up with a lot of people is not real economy, not rational. We don't necessarily want the little farm well tilled; we want the efficient farm well tilled. In our section a 200-acre farm properly run will turn off more stuff to the city than will four fifty-acre farms with families thereon. The measure of economy is the amount you produce, and the cost at which you produce it. There is an economic side, and that economic side is going to prevail in spite of everything. There is the economy which unwittingly you will be forced to recognize, and the man that has conditions right for growing Greenings should grow Greenings; the man that has conditions for growing Gravensteins should grow Gravensteins. Find out what you are going to do; find out what you are capable of doing, and then do it. There are climatic conditions that you can't change, and those you must recognize; there are soil conditions that you can influence, but which you must consider, and the adaptation of variety to your conditions is just as important as the recognition above mentioned. You must consider all and then go ahead.

I thank you. (Applause).

PRES. FARQUHAR. Ladies and Gentlemen: I think that Mr. Fraser may have left the platform too soon; I think that he is so thoroughly convinced of what he knows that there are a great many people here who would like to get opinions of him, and I am sure Mr. Fraser will be glad to reply to those who may have such questions to ask him.

MR. H. L. FROST. I would like to ask Mr. Fraser what varieties he would carry a leader in.

MR. FRASER. Rhode Island Greening for one. I would have the leader in Greenings for the simple reason that the best market for the Greening requires a green apple. They will pay more in New York for a green Greening than for one that has a blush, for good and sufficient reasons, and we can secure more shade with a leader in and also stop the trees spreading easier by leaving it in. I would leave it in the Wealthy, under all conditions, because the tree is apt to break down. I would leave it in McIntosh where it does well. I would leave it in the Twenty-Ounce, under most conditions. Does that answer it, Mr. Frost?

MR. FROST. Yes. Is that the whole list you would recommend leaving the leaders in?

MR. FRASER. I don't know. Give me varieties that I have worked with and I will answer.

MR. FROST. How about the Yellow Transparent?

MR. FRASER. On the Yellow Transparent I think I would, because of the Fire Blight. I have grown the Yellow Transparent, both in New York and New Jersey, and I haven't been very particular about it. I have rather let the tree head itself, because it was planted as a filler.

MR. FROST. Duchess, Spy, Baldwin?

MR. FRASER. Duchess. I wouldn't mind; not particular about that. But on Baldwin, I wouldn't, for our conditions; I wouldn't leave it in. I would rather have it out. On Spy I would rather have it out.

MR. FROST. Wagener.

MR. FRASER. Leave it in.

MR. FROST. Jonathan.

MR. FRASER. We don't grow it; I am not well enough informed about the Jonathan.

MR. FROST. King.

MR. FRASER. You can leave it in the King. I don't mind about the King, the tree tends to grow open and when it is in good shape and the fruit colors well I should leave it in and if it wasn't I would open it up. The King wants a lot of color. There is one thing that you must realize. The eastern part of the state of New York and New England have a great deal more sunshine than we have in western New York. Bear that in mind. You may have more trouble from sun scald than we. The Ithaca Station reports 85 days of sunshine for the year at Ithaca, while the Hudson River stations report 180 days. We have got conditions there which may render our management somewhat different than yours.

MR. H. E. CHASE. I would like to ask what assurance we have that the people of New York will always want a green Greening?

MR. FRASER. I think we have a good one. If you go into New Jersey you will find them planting the English Codling and the Monmouth Pippin. They look something like a Greening; both are large and the Monmouth Pippin has a red cheek, and the women of New York have recognized that those red-cheeked things that they bought for Greenings are not nearly so good cooking apples. In other words, the Monmouth Pippin masquerading as the Rhode Island Greening isn't a very good proposition, and the women are beginning to discriminate, and just as soon as the Monmouth Pippins are grown and sent into New York the women are going to say, "No; no more of the Greenings like those." That is the proposition. There are business reasons underlying this Greening business.

MR. MOORE OF ARLINGTON. You speak of a large percentage of trees not bearing fruit in the orchard. May I ask if they grow wood at the expense of the fruit,

and if so, if you have ever practiced root pruning? I ask this question because I planted some Japanese Plums and there was one tree that made three times as much wood as any of the others, but it didn't bear a plum until I cut it, say, six or eight feet—I have forgotten just exactly the distance from the bottom—and I dug out clear around it eighteen inches deep and cut off every root I found. I dug that channel, and from that time on that tree bore excellently.

MR. FRASER. Summarizing the question, it really means would root pruning not be a remedy for the trees which are making a large amount of wood and bearing little fruit. I have never tried it. I have felt that we didn't need it to any extent. I haven't tried it to any extent in this country. I am familiar with it in Europe, under their conditions. Over there I know how much it is used, but I have not seen it in use here to any extent, and I don't think it is a commercial proposition. That is only my personal opinion, though. I think it might be used in small plantings with profit. I think if you are going into a commercial proposition it is very much easier to girdle the trees, rather than prune the root. You can, of course, girdle them very, very quickly and you are sure to make them bear. Just take a ring of bark off the trunk or limb in June, an inch, or ten inches if you like—it doesn't matter on a big tree—you can do a lot on a old tree, taking out quite a chunk without harm. It will heal over in a day, while the sap is running. It will do very little harm at that time. At other times it will kill the tree.

MR. BOGUE OF NEW YORK. May I be pardoned if I answer the question of the gentleman who spoke about the Japanese plums? It is purely a technical question and I want to assure him that what he did on that plum was just right. The Japanese plum requires more of that than any other variety, because it is a surface feeder and he did just the right thing to cause it to fruit.

MR. HULSE. I have seen an old orchard badly sun-

scalded. I would like to know whether to have a tree doctor, or shall we cut them down and re-set them?

MR. FRASER. Where is Whetzel. (Laughter). Why, Professor Whetzel has done a great deal of work in regard to fire blight and canker, which are somewhat similar to the sun-scald, and he has cut out the injured bark and tarred over the cut surface and practically renovated several orchards in Western New York. He has done a lot of work in that way, cutting out to the sound, healthy wood, giving good cultivation and spraying, and brought the trees back. There were some excellent Kings near Ithaca which were nearly dead and he has brought them back.

MR. H. L. FROST. This is from the question box: Would you put peaches in among apples on a south-south-west, rather sharp slope?

MR. FRASER. That is a local question. Now, I have no use for them among apples, personally, but that doesn't answer the question for New England. Perhaps someone here will answer that better than I can. I have no use for them because the peach trees shade the young apple trees, and the latter do not get the right spread. It makes them contracted, and if you have Baldwin trees you want them to spread all they will. The Baldwin grows up close enough, so I have no use for peaches. Greenings will grow out, but on the whole I do not like them together. Perhaps some other gentleman will answer that in more detail.

MR. WILFRID WHEELER. What do you do with your one-year-old tree when you set it out? Do you cut it at all?

MR. FRASER. (Indicating on young tree on platform). What will I do with this? Take the top off at about 33 inches from the bud and rub off every bud below 18 inches and let the rest start, i. e., those between 18 inches and 33 inches, and the next year form the head, if it has started enough limbs. If not, you will have to take a little more time to get it going. That is the proposition with the one-year-old.

One other thing I might mention. In our own planting now we put a wire guard on the tree immediately after planting. The one from which we get the best result is made by the Clinton Wire Cloth Company, New York, they are the lowest priced. The guard is 18 inches by 13, and we feel that it will last five years. It costs us five cents, put in place. We would rather do that than mound our trees or take any other means, tar paper or some such thing, to keep the mice off. Just keep the trunk clean of limbs for 18 inches. We look at our trees twice a year for borers, and if we find them we take them out while they are small. Does that answer it?

MR. WHEELER. Yes.

MR. M. C. BURRITT OF NEW YORK. What general planting would you advise, one-year, or two-year old?

MR. FRASER. For general planting? Two or three gentlemen in New England who have tried the one-year old claim that they prefer the two-year-old. For commercial planting in New York I am using the one. I don't think it matters a great deal, so long as you get vigorous trees, whether they are one year or two year. And, by the way, the two-year root graft is the same age as the one year bud, and the three year root graft is the same age as the two-year bud. These trees are practically the same and probably unless the differences were shown to you you wouldn't know one from the other.

MR. FRASER OF MASSACHUSETTS. I would like to ask Mr. Fraser if he would preserve the suckers on his trees and cut them back, to form a shade for the boughs?

MR. FRASER OF NEW YORK. We have tried to cover the branches in old trees which have been allowed to run away out to the end by saving the suckers which start on the side and topping them back and leaving them in, trying to make fruit spurs. We have tried that, and I think it is quite practicable in some cases, especially those that come out of the side in this way (indicating), which can be made to clothe the limb, so to speak.

MR. FRASER OF MASSACHUSETTS. In case there might be danger of a branch breaking, might not one of these suckers be trained as a leader?

MR. FRASER OF NEW YORK. I have never done it, but I don't see why it couldn't be done. There may be someone here who has; I have never done it.

PRES. FARQUHAR. Any other questions?

MR. FRASER. Mr. President, I would like to take this occasion to thank the members and the people of Boston on behalf of my colleagues and myself for your kindness, your hospitality and the manner in which you have entertained us and greeted us, and I certainly am very glad to be here to express to you on their behalf and on my own our appreciation thereof. (Applause).

MR. H. L. FROST. Might I ask Mr. Frazer if he has ever experimented with dynamite in any way for the young trees?

MR. FRASER. Look here: You will get all my bad doings out of me yet if you keep at it. (Laughter). I have made so many mistakes, that I don't want to own up to all of them. I have made as many mistakes as anybody else, and some more. I knew a gentleman who wanted to plant an orchard in Vermont last spring and desired to use dynamite. He wanted me to look it over. He dynamited and we are not sure yet as to what the results will be. But I am afraid that in many cases we got a hole which remained below ground, and when the water dried out we had a hole which the roots couldn't bridge, with the result that those trees sank considerably during the season, to their detriment. Also, in one or two places where the hole has been made at the time of planting instead of probably six months before there has been a higher mortality than in the case of trees not dynamited. So that under some conditions you may have trouble from dynamiting in that way. Also, I would question the value of planting apples on land that needs to be dynamited to make it apple soil. I question very much whether you are not going to be beaten in

the game. We have considerable faith in Western New York in under-drainage of our lands in order to make them fit for apples, much more than we have in dynamite, although I am willing to be shown.

MR. NELSON OF WELLESLEY. What is your idea about scraping?

MR. FRASER. Oh, if you are attacking a run-down orchard for the first time, and you think you have a lot of codling moth under the bark, I would scrap them. It will be all right. As a general orchard proposition, where the trees are well sprayed, I don't think it pays.

MR. FRASER OF MASSACHUSETTS. I would like to ask Mr. Fraser what he thinks about putting a potato crop in the orchard. In bringing back an old orchard that has been neglected for a number of years and hasn't been plowed for fifteen or twenty years, would you advise that, to help cultivate the land?

MR. FRASER OF NEW YORK. Is it doing well now?

MR. FRASER OF MASSACHUSETTS. No.

MR. FRASER OF NEW YORK. Are the trees past redemption now?

MR. FRASER OF MASSACHUSETTS. The trees are redeemable.

MR. FRASER OF NEW YORK. I would be inclined to try it. I would like to see it first, but I would be inclined to try it.

MR. FRASER OF MASSACHUSETTS. The reason I ask is more because I feel that there may be some that have not tried it. I have tried it with great success, and the profits derived from the potatoes paid for the cultivation of the orchard.

MR. RICHARDS OF MARSHFIELD. I would like to ask the speaker's opinion as regards orchard planting in sod and kept in sod.

MR. FRASER. All I can say is that there may be conditions where that is good business. Since you are running your business you ought to be able to determine from

your greater knowledge whether your conditions are right for that. It has already been mentioned that Mr. Grant Hitching at Syracuse, N. Y., has a very profitable venture in an orchard in sod. Mr. Cox and Mr. Vergon of Ohio have very good results from orchards in sod. In other districts there seems to be a feeling that is fairly well proven that cultivation is better. I think it is a local problem.

MR. ROBERTS. Is it better to cut back an old orchard, or set out a new one?

MR. FRASER. We found on some of our big trees which were occupying the land for a long time that where ever a man had to go up over 30 feet to get the apples the cost ran up to 60 to 75 cents a barrel to pick them and it was better to cut them off right at the ground.

A VOICE. Why not discharge the man that cost so much as that to pick them?

MR. FRASER. Well, I thought I would make sure that he wouldn't be doing that work any more. (Laughter and applause).

MR. FAVRE. In setting out an orchard for Baldwins would it be advisable or better to intersperse those with some early varieties, or set them in all in one block?

MR. FRASER. With the object of cross-pollination? We have no evidence that Baldwins need a pollinizer. Personally, I believe that the Rhode Island Greening does in an unfavorable year in Western New York, and for that reason for Rhode Island Greenings I have planted Baldwins as pollinizers, and in no case have we any varieties wider than four rows. I have used Baldwins four rows and Greenings four rows, Baldwins three and Greening three, although I suppose that if I didn't have the particular type of soil that I have I couldn't do it. The Baldwins do the best with us on a sandy loam, and the Greenings do best on a clay loam, and it is only because we have a loam soil that we are able to do this. But I don't think that the Baldwin needs any other variety.

MR. SYLVESTER. I would like to ask Mr. Fraser how he feeds those trees to get half a barrel of apples at four years old?

MR. FRASER. We have given them the year they were planted about three-quarters of a pound of a mixed fertilizer around the tree, acid phosphate, muriate of potash and nitrate of soda, something like 5-8-8, three-quarters of a pound to one pound to the tree, the first year, and some manure in the fall, and then we have grown a crop in between which we have fertilized, potatoes or beans, and we have tried manuring the land every year, six loads to the acre. We have put on half a ton of slag to the acre lately, and just kept them humping generally. (Laughter). If a tree wasn't growing, why, it got looked after. I would use a little nitrate if necessary, to keep them growing in the spring, and all the manure you can get. It is a good, safe proposition.

MR. H. L. FROST. Would you give us the varieties you think need pollenization?

MR. FRASER. I have no evidence of any which have a direct need, other than the Rhode Island Greenings, of the varieties we are growing, which are Greening and Baldwin and Spy, although with the Spy I should put a pollenizer if we had one which blossomed at the same time. But it is difficult to find one that blossoms with it, usually. The fillers we have are Wealthy, Yellow Transparent, Twenty-Ounce, Hubbardston, McIntosh, Maiden Blush, Boiken and Wagener. I don't know that I have any evidence that they need pollenizers, but there are enough varieties planted so that they will get it if they do.

MR. VOLES. I would like to ask, on a sandy soil, very gravelly, sandy soil, if there is any use to try planting apple trees with about a foot of loam over it? It is coarse sand underneath about a foot of loam?

MR. FRASER. Plenty of moisture in it, or not?

MR. VOLES. Well, I can get plenty.

MR. FRASER. I think that would be a better question

for the Bureau of Soils or the soil man in your station, because he would be familiar with the local problems. But we have lots of sandy land growing apples in different places. I don't know that I could answer that to any advantage to you.

MR. KITTREDGE OF MOUNT VERNON. I would like to ask Mr. Fraser what he thinks is the best cover crop for a young orchard?

MR. FRASER. Under our conditions we have tried a number of things and have tried to rotate. In years when clover was dear, like last year, we have used four pounds of Dwarf Essex Rape, costing us 24 cents an acre and we got a fine growth, a big mat of stuff, which turned in plenty of humus. I have tried Hairy Vetch, and in the case of a young pear lot I pretty nearly brought disaster on the whole business, because the Hairy Vetch got to taking the water away from the young trees, and since half that block was in vetch and half in buckwheat, we had a very good test. The buds on the portion in Hairy Vetch started badly in the spring and then went back and were a whole month late, seemingly due to the fact that the Vetch took the water supply from the pear and injured the proper maturing of the buds, the dry fall causing that condition. Therefore I regard Hairy Vetch as quite uncertain. I got the same results in New Jersey, so that I have cut it out entirely. Now, we are trying probably buckwheat and clover, rape and clover, or we will put in half a pound of cowhorn turnips and two pounds of rape and two of crimson, and two of red clover, or, if the red is very dear, a couple of pounds of alsike clover. You can use all kind of things, and all the pigweed and redroot, and any other things that you can get to grow. I think the best compliment ever paid me was at a Grange meeting where they got me in and a man said, "What have you got in that field along the Mount Morris road?" And I said, "That is a currant lot." He said, "Currants! Why, I think it is the most disgraceful condition there is in Geneseo. You can't see anything but pig-

weed, and that would hide a horse." I said, "That is just what I was looking for." (Laughter and applause).

A MEMBER. I have an orchard twenty years old, of Baldwins, and I want to graft it over into an early summer apple. Is it feasible to do it?

MR. FRASER. No, sir. If you have got that bug, just try it once and watch, and if I were you I wouldn't try it more than once. (Laughter and applause).

MR. WARREN OF WHITMAN. I should like to ask Mr. Fraser, if you had a chance to buy a parcel of land which had never been plowed because it was hilly, what could you afford to pay for it if you wanted to put it into apples? It will bear apples, no doubt about that.

MR. FRASER. I don't know what you could afford to pay for it, but I would rather go and take land somewhere that I could control the situation a little better, personally. I don't know that I can answer that, as to what you could afford. Personally, if I had it and I thought you were a good customer, and your money was sure, I would let you have it. (Laughter).

MR. CARTER. I would like to ask the speaker if he can give me any formula for feeding young trees for early bearing.

MR. FRASER. I think, gentlemen, the whole thing is just seeing what the trees will respond to. Now, my formula is no good; I haven't any. Try something on a piece, if they respond to acid phosphate and muriate of potash and nitrate of soda, and it is keeping them going, put it on. We have used basic slag, putting on half a ton to the acre, and we left enough trees without it to check by, which we could see the difference in just as though we had marked it out, where the fruit and foliage and everything else was different. But I don't think it would have given the returns unless it had had the land built up with several crops of weeds and organic matter and had manure at different times and been underdrained and a lot of other things. There are just six letters in the formula: B-r-a-i-n-s. Brains.

(Applause).

MR. RICHARDS. What do you think of dressing an orchard, putting on stable manure? All the college men advise putting on sulphate of potash and ground bone. I have used them together. I want to know just which is best in your opinion

MR. FRASER. I haven't any opinion. Perhaps I might give you a story, if you ask for my opinion on that. A poor old colored woman was brought before the Court for abusing her child. The Society for the Prevention of Cruelty to Children had a very strong case and it looked bad for her. The Court said, "Have you anything to say?" She answered "Can ar arsh your Honor a questhum?" The Court nodded assent. Turning and looking at the Judge she said, "Was yoor Honor ever the parient of a puf-fely wuthless colored chile?" (Laughter and applause). You see, the authority needs to be competent. (Laughter).

MR. POWELL OF SPRINGFIELD. Mr. Fraser said that in pruning his two-year-old trees he wouldn't cut off the terminal bud, but in pruning the year old he would cut it back. If you are going to set the trees like Greenings where you want a leader, what is the object of cutting back and training up a new leader?

MR. FRASER. I cut it back because I want to start branches below. That is the only reason. If some had started already I never would have cut it back in the case of the Greening. Only on that particular tree there were none, and so I topped it back to start some, that is the only reason.

A VOICE. Which would you prefer; stable or barn-yard manure, or commereial fertilizers for an apple orchard?

MR. RICHARDS OF MARSHFIELD. I hope you will answer that question; you haven't yet.

MR. FRASER. I would put them all on. (Laughter). I will tell you just the way it is: If you go to call in a Chinese doctor, the first thing he does is to look over the patient and see what he can bear. If he has two cash then

he has so much medicine; if he has 100 cash, then he can have so much more, and if one doesn't kill you the other will. (Laughter). I would size it up by the gentleman's pocket-book, and if he wants to try them all, try them all. If he must spend the money let him go to friend Wheeler and bring his money and buy a carload and use it all.

A VOICE. That is a practical question.

MR. FRASER. It is.

A VOICE. Some of these college men here in Boston tell us, and have told us in years past, that those people who use commercial fertilizers in growing their apples will grow a great deal better apple than we in our section, who use barnyard manure. For the last three or four years I find that those apples that grew in stable manure, on land manured continuously for the last twenty years, were keeping better, with better shape and color, than those that grew on some other soil. So it is a practical question for me and a question which I am not fully decided on.

MR. FRASER. I think the question really comes back to the individual involved. The fertilizer problem is a local one. If you are getting good results from any one thing, I would stick to it. I can't really answer for sure. I know just what I would do in my locality. I know that for my peaches I will put certain things on, for my peaches I will use basic slag; I am satisfied. A man can't sell me acid phosphate for it. On my apple trees, if I have manure I will put some on, and I know I will put on basic slag. I have proven to myself that that is paying me. In a few years I may find that I need to change, and just as soon as I can prove to myself that I can change with profit, I will change. I find that it pays me to lime some pears, because I have limed part and have not limed part I am going to lime more. The only way I can see that the question can be solved is to go to the land with the question. I am using fertilizers of all kinds and all the manure I can get; but I am getting returns, and I do feel that fertilizer with manure will frequently give better results than manure

alone. In many cases they will give better returns combined. Really, to be candid with you, I think that you will have to solve it yourself.

A VOICE. I understood when I got up to ask you a question in regard to that grafting I spoke of, that you objected to it. Why do you object to that method of grafting? I didn't learn anything from your answer. It was in regard to that twenty-year-old orchard that I want to graft over.

MR. FRASER. Why, on any work of that nature that I have seen, unless the trees are already low, they are apt to shoot up, and there is considerable work and a lot of difficulty. I don't want to run that question down, because it is entitled to a proper answer. Top grafting is an awful lot of work. I tried it on a lot of trees, and I am sorry I did it. I am giving you my honest conviction on the proposition. If I could possibly avoid it I would never do it.

A VOICE. I realize it is going to be a lot of work.

MR. FRASER. Not only a lot of work, but you will have limbs in there for five years that won't be working and you will be fussing over it with two varieties on the trees and an awful lot of trouble and bother, and I don't think it is worth while in these days; I don't think it is worth while, don't think it is commercial.

A VOICE. You don't think but what we can grow good apples that way?

MR. FRASER. No question but that you can grow them. The only question is, can you grow them commercially at a profit?

A VOICE. If that were the only piece of land you owned, would you do it?

MR. FRASER. What variety?

A VOICE. Baldwin.

MR. FRASER. I would never do it; I would never change.

A VOICE. That is all right for you, but I know I want

the other kind. You want Baldwins and I want the other kind.

MR. FRASER. Can you not possibly find some man that wants Baldwins and sell to him and buy a piece of land with the money?

A VOICE. I could sell him the trees, but not the land.

MR. FRASER. I would make business business, and cut out sentiment. I don't think sentiment is business.

PRES. FARQUHAR. Any other questions while Mr. Fraser is still on the platform?

MR. EDWARD B. WILDER. We have heard a very instructive address today and it is very hard to express our appreciation of all the information that has been given to us but I would like to move you, sir, a most hearty vote of thanks to Mr. Fraser for his lecture and also for the discussion here on these very vital themes.

A VOICE. Second the motion.

PRES. FARQUHAR. You have heard Mr. Wilder's motion, moving a vote of thanks for Mr. Fraser for this practical and valuable discussion. All those in favor of this motion will signify by rising.

(Motion carried unanimously by a rising vote).

(Convention Adjourned).

APPLE PACKING DEMONSTRATION.

The Apple Packing Demonstration in room downstairs where the Round Table Talks were held was a decided success. Prof. Rees of the Agricultural College Extension Department had a throng about the packing table before and after the lectures as well as at many other times and many new people learned first principles.

TRADE EXHIBITION.

The Trade Exhibition completely filled the large hall and every conceivable thing for use in the fruit business, from the high powered gasolene tractor to the extra discs for spray nozzles was on exhibition, and the different makes of the same article could be compared under the same roof, a new situation in Massachusetts. The constant streams of visitors more than pleased the exhibitors who showed their satisfaction by sending more than one new member to the Secretary's desk.

ROUND TABLE TALKS

PEACH GROWING IN WESTERN MASSACHUSETTS.

L. W. Rice of Wilbraham.

First choose the site of the orchard. This should be a place of good elevation with good air and water drainage, which some times is hard to find and purchase. The land should be cleared of all trees and rocks. This can be accomplished best, and with least expense, by using dynamite. An orchard can be raised if the stumps and rocks are not all cleared away but in the end the cost of clearing is saved in broken tools, loss of time, and unpleasantness while spraying and cultivating. It is a pleasure to work in an orchard that has been well cleared, while one in which the stumps and rocks have been left is constantly trying one's patience. We want to so carry on our business that the work in the orchard will be a pleasure; and it is a pleasure to work in a good orchard. If the land contains any wet places they should be tile drained. These should be placed 3 1-2 feet deep, so that the roots of the trees will not displace them; also, so as to drain the soil deep enough to give the roots plenty of room. The land should be thoroughly plowed. This is a slow tedious job on rough land. It is best to plow the land in the fall, for then it will be finer and in better shape than if left until spring. If, however, one is unable to plow until Spring, and it be a dry Spring, harrow every morning what was ploughed the day before. In this way the lands holds the moisture.

Next comes the problem of selecting the trees. This should also be done the previous fall in order to obtain the desired varieties and grades of trees. In selecting varieties it is best to choose such as will ripen in succession so as to hold the market and distribute the labor over as long a period as possible. A good succession covering the period

from about August first to September 15th is as follows:—Greensborough, Waddell, Carman, Hiley, Belle of Georgia, and Elberta. Chairs Choice comes later than the Elberta, but has been nearly a failure here. Don't plant it. A few years ago it would have been very desirable to get something later than the Elberta, but now so many peaches are put into cold storage and held until after the bulk of the crop is marketed that later ones do not bring as high prices as formerly. A No. 1, 4 to 5 foot yearling tree is a good grade for orchard planting.

If one is ready to plant the trees within a few days after they are received they may be left in the box. The box should be put into a shed or barn cellar and covered over with hay or straw to keep the trees from drying out. If not ready to plant the trees at once, open the box, cut the bundles and cut the body of the tree off for about 20 inches above the bud, cutting off all limbs. Cut off the broken parts of the roots also, and dig out the borers. The trees should then be placed in a trench deep enough so that they will be covered above where they are budded, taking pains to sift the dirt in around all the roots. Do not allow the roots to dry out. If possible the trench where the trees are to be placed should be in the lot where they are to be planted, as they are much handier and save time in carting. When it comes to setting out, it is well to have a barrel of water on a stone boat in the lot to wet the roots in. As to distance apart, the writer plants apple trees 32 by 40 feet, and plants two peach trees between one way, and one the other way, making the trees about 16 by 13 feet. This, no doubt, is too close for some localities, but here where the life of the peach tree is so short it is far enough apart. Dig the hole deep enough so there can be 2 or 3 inches of good top soil placed in the bottom. Then set the tree in the hole so that the place where it is budded will be a little below the level of the ground, sift the good soil in around and over the roots and tread firmly. Care should be taken not to injure the roots while treading. Put about a pound of bone.

or other good fertilizer into the hole and mix thoroughly with the soil. Next fill the hole nearly full leaving a little hollow with the tree in the center, so that when it rains the water will have a tendency to settle around the tree instead of running away from it.

Cultivate and hoe the trees as you would care for a field of corn until the last of July or first of August. Sow oats and turnips or some other cover crop such as vetch or clover if you can grow it. If the land is steep so that it is liable to wash, plow furrows along the side of the hill, beginning near the top and turning furrow down hill to catch the water. Plow furrow so there will be fall enough to carry the water off. Plow similar furrows along the side of the hill as often as is necessary to take care of the water. These furrows should be plowed deep and cleaned out with a shovel. Then scatter a little fertilizer in and on the furrow and sow oats rather thick and rake in. The oats will help keep the furrow from washing. When the trees get so large it is impossible in some places to plow the furrows along the side of the hill all the way, plow them so as to catch the water and if need be plow straight down the hill to carry the water off. It is much better to have a few deep gullies washed that can be filled up with stone, than to have a lot of the top soil washed off as would probably be the case if the water was allowed to run down over the surface of the hill.

Trim the little trees in August, forming the shape of the head. Trim a peach tree just opposite from what you would if you were raising a tree for a saw log. A tree with from five to seven branches at the crotch will not be nearly so apt to split down as one with only two or three branches. If the tree is so shaped as to make it impossible to form a good head, tie up one of the best branches so it will grow up straight. Later cut off all the rest of the tree and form the head out of that branch. Late in the fall, just before it freezes up, bank the trees with dirt 10 or 12 inches high. Be careful to pack the dirt firmly. If pieces of turf are thrown up loosely mice are apt to get in and nest and gnaw

the trees. This banking not only protects the tree from mice but it keeps the water from running or standing around it. Then again if it is an unusually severe winter and kills the tender tree back, it will not usually kill it below the top of the mound. That leaves plenty of live wood between the bud and the top of the mound, from which new limbs will start, and a new head can be formed from one of these.

The writer used to raise a crop of corn or potatoes in the orchard the first year and gives clean cultivation to all the land every year after until the last of July or first of August. Experience has taught that it is mighty hard in this locality to raise a cover crop after the trees are three or four years old, that will add much humus to the soil. So now am trying to raise some legumes the first few years to store up humus for the orchard later.

The second spring cut off one-half or two-thirds of the last years growth. Along in August or the first of September thin out the branches where they are too thick. From this time until time of fruiting do not allow the branches to become too thick for it is fruit that we are after. If the head is thick the fruit may set but it will drop. After the trees come into bearing they need very little trimming, except to cut off broken limbs and cut out the dead wood, with a little thinning of the head occasionally.

ORDER OF SEASON'S WORK.

Along in February we begin to trim the old trees leaving the young ones until the last, as they are more apt to be killed back, and the longer we can leave them the plainer they show where they are killed. We pick up the brush on a wooden shod sled without any pole in it. This brings the load near the ground and takes very little room in turning. Just as soon as it does not freeze much during the night, we begin to spray with lime-sulfur. In other words, we leave it just as long as possible and still get through before the leaves get started too much. We then plant what trees we have bought. This should be completed in April, but in favorable seasons if the work is not finished before the 10th or 12th of

May the trees will grow all right. Make it a point however, to get the trees planted just as early as possible.

Next comes the fertilizing of the older orchards and the harrowing. This may or may not be the first harrowing. Just as soon as the ground is dry enough we start the harrow, working one way one week, and crossways the next. Let neither haying nor hoeing interfere with the harrowing but keep at it every week from early spring until the last of July or first of August. When the fertilizing is done, we dig the borers, and hoe the young trees. In August and first part of September we trim the young trees.

If we are blessed with a crop we begin to harvest it toward the last of July. Before harvesting begins we go through the orchard every five or six rows tying back the limbs and raking out the stone to make a road so as to get through with a one horse wagon. This wagon should be so rigged as to carry 40 or 50 baskets. Two men can draw a great many more peaches in a day on a wagon of this kind than on one that will carry 15 or so. At this time of all times we want the work to count. The peaches are picked and set beside these roads. Later the men go through and pick up the baskets and draw them to the packing shed, which is located in the orchard. Plan to keep all the work as near together as possible. Then it is easier to look after and if it is necessary to change part of the help from one kind of work to another, there is not so much lost time. For instance, if the packing shed is right in the orchard and one wishes to load a wagon of 200 or 300 or more baskets in a hurry, he can call a gang of pickers and in a very few minutes the load is ready to go.

The peaches are picked by sight, not by touch, for the latter way takes too much time. Divide the pickers into gangs and put a foreman in charge of each gang. The size of the gangs depends upon the kind of men that make up the gang. If they are men of experience that will work anyway then the foreman can take charge of 7 or 8, and pick himself. If however, they are inexperienced pickers and are men that are in the habit of working under a boss, don't

give the foreman more than 6 or 7 and tell him not to pick a peach himself. Don't try to economize by giving the foreman too many men, better hire another foreman. Being near our market we let the fruit ripen on the trees, therefore some of it gets the best of us and drops. The first thing every morning the men go through the orchard and pick up what have fallen. In this way they do not destroy them while working, and they are ready for the day's retail trade and the peddlers.

By going through the orchard in the winter and picking the dried or rotten peaches, and burning or burying them, and by going through the Greensborough just before they begin to get ripe and picking the rotten peaches, we have had very little trouble with peaches rotting on the trees. Let us go back for a few minutes to the trimming of the tree? We have made it a spreading tree to allow the sun to get at the fruit to give it high color. Therefore in order to save many of the trees from destruction we are obliged to bolt many bad crotches and wire from one limb across to the opposite one. This can well be done by using about No. 108 screw eyes which are screwed into the wood. Wire across with about No. 12 wire. Many limbs can also be saved when carrying a heavy load by tying one limb to another with soft strong string. Care should be taken when tying trees in this way not to tie too short, but to allow the limbs to bend well over before the string supports them. If they are tied too short it makes the bend in the limb too sharp, and it will break right above the string. After the crop is harvested these strings should be cut off to prevent them from injuring the trees. The fertilizer should be bought in the late fall or winter, so that it can be drawn during the slack season, and be on hand when needed. It is well to have a little nitrate of soda on hand, then if the trees are making a slow growth and the fruit begins to drop too much, put on some, or if a tree here or there does not look quite thrifty, doctor it with a little nitrogen. Do not put on too much at a time but put it on two or three times if necessary.

After the peaches are unloaded at the sorting shed, they

are sorted by women. We insist that the fruit be handled with care both by pickers and sorters. One woman has charge over the other sorters. This woman also has charge of the retail trade. The peaches are sorted so that most of them are No. 1's or No. 2's. However the very ripe ones and the specked ones are sorted out, also the very large ones, which are marked extras. Make the peaches the same grade all through the basket. Toward the top place the red side of the peach up, and round the basket. A basket finished off this way is pleasing to the eye. After the peaches are sorted they are loaded on the wagon or wagons, according to the number of baskets on hand. One 3 horse wagon carries 336 baskets. This wagon was built specially for hauling peaches. In the rush season it makes two trips a day or rather in 24 hours to Springfield wholesale houses, a distance of about ten miles. It starts about one o'clock A. M. and returns about 9 or 10 o'clock. The wagon is again loaded and another team goes with it, returning in the evening or night, according to the travelling. This time the wagon is loaded by lantern light ready to start in the morning.

Now we have gotten the peaches to the wholesale houses, where they are sold on commission. Right here I want to say a word about the wholesale men. We read so much in the farm papers about the wholesale men, as if they were our enemies, trying to rob us, and so little about the help they are to us. How could we handle our crops without them? I consider the wholesale men my friends and helpers. If I did not have confidence in them I should want to go out of the fruit business to-day. I believe that there are just as upright, honest men in the wholesale business as there are in any other, raising peaches not excepted. Furnish them with the best of produce and they will be anxious for your patronage, and get the best prices that they can for you. Let us hope that occasionally, at least the farm papers may have a word of praise for the wholesalers.

At harvesting time a man has a great deal to look after, and is very busy. The better his system, the easier and

better he can take care of his business. Having put a woman in charge of the sorters he can go into the sorting shed and look around. If he sees that the baskets are not full enough, or are too full, or that the sorting is not done right, he does not have to hunt up the one that made the mistake, but simply call the attention of the woman in charge to the error. She looks after it. If a customer comes and wishes to buy a few baskets of peaches he can just say, "The lady will wait on you." He can then go into the orchard and look around. If he finds that a tree has been skipped, that the peaches are being picked too green, or not close enough, or are being too roughly handled, or again if he wants a gang of men to go somewhere else to work, he simply has to tell the foreman who looks out for the rest. In this way a man can handle an enormous amount of work. While men who have large gangs of men working all the year round have a system, we who have a large gang of men for only a few weeks are apt to handle them in a slipshod way.

Buy your baskets early, that is, just as soon as the Winter is far enough advanced so that you are reasonably sure of a crop. So to get the hauling out of the way and have the baskets on hand. Then too they are generally a little cheaper at this time, than at harvest time. While harvesting keep close watch of your stock of baskets and the amount of peaches to be picked. If you see that you are going to run short order more just as soon as possible. For sometimes, it is difficult to get baskets at this season. If you have not baskets enough to hold the crop, and cannot get them, then you must let the peaches rot on the ground, and you have had the expense, labor and anxiety all for nothing. Better carry over 1000 baskets than be a hundred short.

In some fields, the trees, especially apple trees, are badly damaged by deer. The writer built a fence around an eleven acre field, using woven wire 55 inches high at the bottom and put two barbed wires about a foot apart on top making the fence about 6 1-2 feet high, putting the posts a

rod apart at a cost of 82 cents a rod, put up. One of our good assessors told one of the men, "We can assess him more for that field next year for putting that fence around it." That is the way we fruit men have to take it. The State protects the deer. We try to protect our trees from the deer, and the assessor comes along and gives us a whack for doing it.

In our own locality it looks as though we were going to have, or rather already have a pest much worse than the deer and harder to fence, the pheasant. In the spring of 1911 there were many buds eaten in the writer's orchard. He was satisfied in his own mind that it was pheasant's work, for they were often seen in the orchard, but never caught budding. However, one of my neighbors saw one budding in his orchard a few days ago. This bird is getting to be very plenty in this section. Twenty-two were seen in an open field a few weeks ago. The writer has an orchard where there was about 550 peach trees set 10 years ago this spring there are less than 200 left. In another orchard of about 750 peach trees set 7 years ago this spring there are 360 left. Yellows are to blame for nearly all of these trees being pulled out. The best stump puller that ever came into this section is a four horse team combined weight about 6000 pounds. I hope that each one may get some idea from this session that will help him in his business, and that this will be a prosperous year for all.

The Round Table Talks on Small Fruits by F. A. Smith of Ipswich and on Pears by Richard Hittinger of Belmont were not written out so they are not printed in the proceedings.

A special vote of thanks is due President Farquhar, of the Massachusetts Horticultural Society for the decorative plants so freely furnished.

SULZER BILL

**The Apple Package and Grade Bill Signed by the President
August 3, 1912**

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that the standard barrel for apples shall be of the following dimensions when measured without distention of its parts: Length of stave, twenty-eight and one-half inches; diameter of head, seventeen and one-eighth inches; distance between heads, twenty-six inches; circumference of bulge, sixty-four inches outside measurement, representing as nearly as possible seven thousand and fifty-six cubic inches, provided that steel barrels containing the interior dimensions provided for in this Section shall be construed as a compliance therewith.

Sec. 2. That the standard grades for apples when packed in barrels which shall be shipped or delivered for shipment in interstate or foreign commerce, or which shall be sold or offered for sale within the District of Columbia or the Territories of the United States shall be as follows: Apples of one variety, which are well-grown specimens, hand picked, of good color for the variety, normal shape, practically free from insect and fungous 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 ten per centum below the foregoing specifications shall be "Standard Grade minimum size two and one-half inches," if the minimum size of the apples is two and one-half inches, in transverse diameter; "Standard Grade minimum size two and one-fourth inches," if the minimum size of the apples is two and one-fourth inches in transverse diameter; or "Standard Grade minimum size two inches," if the minimum size of the apples is two inches in transverse diameter.

Sec. 3. That the barrels in which apples are packed in accordance with the provisions of this Act may be branded in accordance with Section two of this Act.

Sec. 4. That all barrels packed with apples shall be deemed to be below standard if the barrel bears any statement, design or device indicating that the barrel is a standard barrel of apples, as herein defined, and the capacity of the barrel is less than the capacity prescribed by Section one of this Act, unless the barrel shall be plainly marked on end and side with words or figures showing the fractional relation which the actual capacity of the barrel bears to the capacity prescribed by Section one of this Act. The marking required by this paragraph shall be in block letters of size not less than seventy-two point one inch gothic.

Sec. 5. That barrels packed with apples shall be deemed to be misbranded within the meaning of this Act:

First.—If the barrel bears any statement, design or device indicating that the apples contained therein are "Standard Grade" and the apples when packed do not conform to the requirements prescribed by Section two of this Act.

Second.—If the barrel bears any statement, design or device indicating that the apples contained therein are "Standard Grade" and the barrel fails to bear also a statement of the name of the

variety, the name of the locality where grown and the name of the packer or the person by whose authority the apples were packed and the barrel marked.

Sec. 6. That any person, firm or corporation, or association who shall knowingly pack or cause to be packed apples in barrels, or who shall knowingly sell or offer for sale such barrels in violation of the provisions of this Act, shall be liable to a penalty of One Dollar and costs for each such barrel so sold or offered for sale, to be recovered at the suit of the United States in any court of the United States having jurisdiction.

Sec. 7. That this Act shall be in force and effect from and after the first day of July, nineteen hundred and thirteen.

EXPLANATORY NOTES

The Package

The size of the barrel will be found in the first paragraph, and is now in general use in the barreled apple sections.

The Grade and Sizes

These specifications are found in Section 3. There is but one grade. This grade is divided into three sizes governed by the minimum size of the apples in each grade. A limit of tolerance of ten per cent is provided to allow for errors in packing. This means that if you are not more than 10 per cent below the specifications, your pack is deemed up to the legal standard.

For example, if you pack your apples "STANDARD GRADE MINIMUM SIZE 2 1-2 INCHES" then the apples in the barrel must be "apples of one variety, well grown specimens, hand picked, good color for the variety, normal shape, practically free from insect and fungus injury, etc." (See Sec. 2) or not more than 10 per cent below these specifications, and must not be less than 2 1-2 inches in transverse diameter. They may be as much larger as you desire. Exactly the same principles apply to the 2 1-4 inch and 2 inch size.

Branding

All barrels marked "Standard Grade," etc., must also have branded upon them (1) the variety, (2) the name of the locality where grown, (3) the name of the packer or person by whose authority the apples were packed and the barrel marked. (Sec. 5, sub. second.)

The brand on the head of the barrel should read something like this:

Standard Grade		Standard Grade
Min. Size 2½ inches		Min. Size 2½ inches
Baldwin	or	Baldwin
Grown in Western New York		Grown and Packed by
Packed by John Jones		John Doe
St. Louis, Mo.		Rochester, N. Y.

An opinion from the Acting Solicitor of the U. S. Department of Agriculture also advises us that the following or similar words may be used as a part of the brand "Packed in Accordance with the Act of Congress approved August 3d, 1912."

These words may be worked into a small rubber stamp and should lend strength to the brand. As the law has not yet gone into effect, you are advised to use "Packed in Accordance with," etc., rather than "Packed Under the Act of Congress," etc.

MASSACHUSETTS
FRUIT GROWERS'
ASSOCIATION



REPORT OF THE
20th Annual Convention
HELD IN
THE AUDITORIUM
SPRINGFIELD
1914



THE GAZETTE PRESS
WARREN, R. I.

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INTRODUCTION.

To those who overcame the embargo placed on the meeting by the terrific weather and the traffic conditions, the Springfield Convention of 1914 will go on record as a red letter event. The local committee did their work well and are certainly to be congratulated upon the results of their labors. We would especially thank at this time the city authorities, the Board of Trade, the Hampden County Improvement League, the commission houses and all others who took such an interest in making our stay so pleasant. Springfield is an ideal city in which to hold conventions, with all its modern conveniences, its truly wonderful municipal group and its cordial hospitality.

Let us repeat for the benefit of the new ones that each member is to consider himself a committee of one to show this report to some interested neighbor, explain the advantages and get him to join, as the larger the membership the more the Association can accomplish. The Secretary is always glad to receive memberships at Marlboro.

Our Exhibitors

Owing to the extremely cold weather during the week of our convention in Springfield the attendance was much smaller than expected and proved a great disappointment to the trades people who had the finest trades exhibit ever shown at a N. E. Fruit Growers' Convention. We owe these exhibitors much and ask every member to trade with the following dealers, all of whom bought space of us, and encourage them to be present again at our next convention.

Barrels & Barrel Stock,

O. M. Pratt, Holderness, N. H.

Barrel Header and Accessories,

Goodell Co., Antrim, N. H.

Dynamite,

Atlas Powder Co., Boston.

Fertilizers,

The American Agricultural Chemical Co.,

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Coles & Co., 109 Warren St., New York City

H. J. Perkins Co., Springfield, Mass.

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Bacon-Farnum Co., 27 Lyman St., Springfield, Mass.

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B. G. Pratt Co., 50 Church St., New York City

Nursery Stock,

- J. W. Adams Nursery Co., Springfield, Mass.
The Barnes Bros. Nursery Co., Yalesville, Conn.
Breck-Robinson Co., Lexington, Mass.
Harrisons Nurseries, Berlin, Md.
The New England Nurseries Co., Bedford, Mass.
Stark Bros. Nursery Co., Louisiana, Mo.
The Van Dusen Nurseries, W. L. McKay, Prop.
Geneva, N. Y.

Orchard Implements and Spraying Supplies,

- Bateman Mfg. Co., Grenlock, N. J., & Springfield, Mass
Brackett, Shaw & Lunt Co., 62 No. Washington St.,
Boston

- The Cutaway Harrow Co., Higganum, Conn.
W. & B. Douglas, Middleton, Conn.
Fairbanks-Morse Co., 109 Lyman St., Springfield, Mass.
Fitzhenry-Guptill Co., 49 No. Washington St., Boston
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International Harvester Co., Somerville, Mass.
Rumsey & Co., 234 Congress St., Boston
Van Nougherys Machine Works, Albany, N. Y.

Seedsmen and Spraying Apparatus,

- Joseph Breck & Sons Co., Boston
O. H. Dickinson, 243 Worthington St., Springfield, Mass.
Ross Bros. Co., Worcester, Mass.

Twentieth Annual Convention

OF THE

MASSACHUSETTS FRUIT GROWERS' ASSOCIATION.

Auditorium, Springfield, Mass.,
January 15, 16 and 17, 1914.

The Twentieth Annual Convention of the Massachusetts Fruit Growers' Association was called to order at 11 o'clock a. m. by the President, Mr. Harold L. Frost.

THE PRESIDENT. If the convention will come to order we will now begin our proceedings. Unfortunately, due to the weather I imagine, a great many of our members are not present who intended to be with us today. Yesterday the main switch house of the Boston & Maine Railroad was burned and I understand that not a single train ran into Boston, and one of our members told me he had to come across country to Worcester and over the Boston & Albany, and I suppose a large number who intended to be here, have been prevented by similar difficulties.

The first address this morning will be by Professor M. A. Blake, Horticulturist, of New Brunswick, New Jersey, on "Experiments and Observations with Peaches." We are very proud to have Professor Blake here, as he was formerly a Massachusetts man, and I think we can claim we started him, even if we didn't finish him up in his career, and we hope to see him come back and make Massachusetts a good, big peach state.

There are really only two peach men that we know,—Professor Blake and Mr. Hale of Connecticut, who I think is here with us. We hope that Mr. Hale will ask Professor Blake questions and help lead us in the right direction, so that we will get a great deal of information.

I now have the honor of presenting Professor Blake who will give us all there is to be known on peaches. (Applause).

PROFESSOR M. A. BLAKE. Gentlemen, Members of the Massachusetts Fruit Growers' Association: It is with a great deal of pleasure that I address you this morning. I am reminded of a story, which some of you I know have heard. A city man was asked to lecture in the country. He had lived in the country when a boy, and he desired very much to impress that fact upon his country audience, and he went on to say that he had been born in the country and could almost say that he grew up between two hills of corn. At this point someone in the back of the room remarked aloud, "Punkin, by Gosh!" (Laughter).

The first fruit growers' meeting I ever attended was a meeting of this Association in Worcester in the winter of 1903. At that time I was a senior in the Agricultural College, and I guess Professor Waugh thought I would learn more in a day at that meeting than I would in a day at the college.

EXPERIMENTS AND OBSERVATIONS WITH PEACHES

Prof. M. A. Blake, Horticulturist, New Brunswick, N. J.

The New Jersey State Agricultural Experiment Station began a thorough study of the peach growing industry in New Jersey in 1905. The work was commenced by Dr. G. F. Warren in the form of a general peach survey of the state to determine the methods of culture then in practise and to determine just what problems confronted the growers.

The survey was followed by the establishment of an experiment and demonstration orchard of 1200 trees set at High Bridge, N. J. in the spring of 1906.

A second experiment and demonstration orchard of 675 trees was established at Vineland, N. J. in the spring of 1906 by the writer. This planting was increased by 534 trees in 1908 and by about 500 additional trees in 1912.

The experiment station assumes the entire control of

these orchards and ships the fruit to the large wholesale markets.

In general the experiments conducted in these orchards consist of spraying and fertilization tests, pruning and orchard heating studies; observations of the effect of the weather at the different seasons of the year; notes upon the behavior of a considerable number of varieties beside practical and scientific studies of innumerable details of orchard practise.

The Experiment Station has tried to put itself into a position where it could offer assistance to the practical grower upon any of the details of peach culture from its own direct practical experience as well as from its results of scientific study.

It is not possible, of course, to give the detailed results of all of this work in New Jersey in an hour's discussion and besides at a meeting of practical growers such as this, I believe that brief statements of experiences and facts are likely to prove of most interest and value.

THE LOCATION OF A PEACH ORCHARD

In the northern counties of New Jersey where conditions most resemble those of New England a peach crop is most certain at elevations above 600 feet. This fact was very clearly demonstrated in 1912. There was practically no fruit in Northern New Jersey upon orchards that were below 600 feet elevation, while at elevations from 600 to 900 feet there were good to heavy crops. This condition occurred generally regardless of variety or system of orchard management and from what I was able to learn, the same condition prevailed in Pennsylvania and Connecticut. Southern New Jersey was an exception. Special conditions due to location prevail there so that elevations of from 100 to 200 feet may be equally as satisfactory as elevations of from 600 to 700 feet in northern New Jersey.

Although a location somewhat above the surrounding land level is desirable, it should not be one that is exposed to severe prevailing winds. Orchard operations are much more difficult in such a case and the danger of damage to trees, flowers and fruits is greatly increased.

SOILS

A deep, well drained sandy or gravelly loam soil is believed to be ideal for peaches. This fruit will succeed upon a wide range of soils if they are well drained, but by all means avoid a wet, or poorly drained soil.

SIZE OF TREES FOR PLANTING

There is some difference of opinion as to the relative value of the various grades of trees for planting.

My experience has been that in general a medium to a medium large tree is most desirable or, in other words, trees that will caliper five-eighths to three quarters inch. Larger trees will make a good growth if dug carefully from the nursery and are not cut back too severely when set. Trees three-eighths to one half inch in caliper may make about as much growth the first season as slightly larger trees, if soil conditions are favorable. But, on the other hand, if the smaller trees have been culled out from among the large trees in a nursery some of them may be naturally weak trees. The very small trees with small fibrous roots are also more easily injured if subjected to dry conditions at any time before they are planted.

DISTANCE APART TO SET TREES

Peach trees are quite commonly planted at all distances from 15 feet up to 20 feet. Some have also been set closer than 15 feet apart and also at a greater distance than 20 feet.

The advantages claimed for close planting are that one has a much larger number of trees per acre and by keeping them cut back they are easier to spray and harvest the fruit from and the yield will be as large or larger than from a smaller number of large trees.

The trees in the Experiment Orchard at Vineland, N. J., which was planted in 1907, were set 15 feet apart each way to test out the close planting method. The trees have been cut back annually to keep them within bounds so they could be properly cultivated. These trees have cropped regularly since 1910 and have produced good crops, but I would not advise practical growers to set trees as close as 15 feet.

It is not only a question of greater difficulty in cultivating and in harvesting the fruit but in a dry season the trees will suffer more from drought than trees planted farther apart. In New Jersey we also believe that an important feature of good orchard management is to maintain the organic matter in the soil and this is most commonly done by means of cover crops. Where the trees are set as close as 15 feet it is impossible to produce a good cover crop each year after the trees come into bearing. Soil conditions and the locality determine the maximum size of peach trees, but from my experience I believe that 20 feet each way is a good distance to plant trees.

There is one orchard at Rancocas, New Jersey with trees set 22 feet apart each way and the branches touched about the sixth year. This orchard has also produced some remarkable crops.

Have sufficient distance between the trees to allow of good cultivation, the growing of a cover crop and economy in harvesting the fruit.

A close planted orchard must have special attention, for if it is neglected, even for a brief time, trouble is certain to occur.

VARIETIES

The question of what varieties one should plant commercially is a most important one and success or failure commonly depends upon the selection that is made.

In 1899 an inquiry among the peach growers of Northern New Jersey showed such varieties as Crawford Late, Mountain Rose, Old Mixon, Stump and Reeves' Favorite to lead in popular favor. To-day, the first five to be mentioned would be Elberta, Carman, Belle of Georgia, Champion and Hiley with Lola, Iron Mountain and Fox Seedling also in favor.

The New Jersey station has about 80 varieties under test at the Vineland orchard, 40 of which have already fruited a number of times.

The varieties which have proved to be the hardiest during winters of low temperature are Greensboro, Waddell, Carman, Lola, Alton, Early Wheeler, Hiley, Belle of Georgia and others of this type. Elberta, Frances and Champion

are medium hardy while Early and Late Crawford, Mountain Rose, Reeves' Favorite and Fox Seedling are tender.

During the past spring, however, other facts in regard to fruit setting of the peach were noted which may well be mentioned in a discussion of hardiness. Most varieties of peaches are self fertile or in other words their flowers are capable of setting fruit when fertilized with their own pollen, so that comparatively little attention has been given to the pollination of this fruit.

Cold, wet, weather prevailed at Vineland, N. J. last spring during the blooming period of peaches and Greensboro failed to set scarcely any fruit. A test of the pollen of a considerable number of varieties of peaches in the laboratory showed that the pollen of some remained viable for a longer period than others and the Greensboro pollen the past spring was one of the weakest.

OTHER WEATHER TROUBLES

Injury to peach buds and twigs are weather troubles often experienced by peach growers in localities where low winter temperatures prevail.

We are told that a late wood growth is the thing most to be feared in such localities but I believe that a too severe check to wood growth especially in midsummer is equally as bad. Much of the winter injury to trees in general follows a dry summer and fall. Old trees suffer more from bark splitting and winter injury than young trees. Therefore maintain cultivation in the orchard until about August 1st. in eastern districts. Georgia and Ontario districts may vary from this rule.

Twig and bud killing by low winter temperature is seldom serious in New Jersey in well managed orchards of hardy varieties but considerable collar rot as a result of winter injury does occur. This injury is in the form of bark killing on the trunk at or just below the surface of the ground. Unless the injury is very severe the trees do not begin to die until about midsummer when the fruit becomes shrivelled and the trees gradually die. If the injury is very slight so that the bark is simply yellowed and spongy the fruit is often forced up to an unusually large size as would

be the case following artificial girdling. Such fruit can be detected by the enlarged dots or lenticels. Even slightly injured trees however are likely to grow weaker each year and finally succumb to bark beetle and further winter injury.

Mounding up the soil about the trunks of the trees just before freezing weather in winter is quite effective in preventing injury of this sort upon well drained soils.

Forced or abnormally large peaches may occur from a different form of winter injury. Instead of a whole tree being affected at the collar a single branch or twig may be injured at some one point in such a manner as to interfere with the downward circulation of sap, which will result in unusually large fruit beyond the point of injury.

During the past season in New Jersey healthy peach trees also bore specimens that were small and sometimes shrivelled. The unusual feature about this was that these specimens persisted upon the twigs until the normal fruit had ripened. Close study of the matter revealed the fact that the stems of such specimens had been injured by cold after the fruit had set in such a manner as to nearly shut off the circulation of plant food into the fruits from the twigs; only a sufficient quantity reaching the fruits to enable them to stick to the twigs.

COLOR IN PEACHES

High color in peaches is as important as quality from a commercial standpoint. It has been shown that the red color in apples is due largely to sunlight and the degree of maturity. Peaches are no exception to this rule as one may readily determine for himself.

Some Belle of Georgia peaches were bagged at the New Jersey Experiment station last spring so that no sunlight reached the fruit. At ripening time these bagged specimens did not show a single trace of red color.

The light colored specimens often produced upon young trees are due to shading by the dense foliage. Peaches in localities where there is a considerable amount of fog or smoke are less highly colored than peaches grown where bright days and low humidity prevails.

Abnormal colorings in shades of purplish red sometimes occur following injuries of various kinds.

PEACHES

A considerable number of fertilizer tests with peaches are being conducted by the New Jersey station. Among these is a test of three sources of potash, muriate, high grade sulphate and kainit. Thus far, however, no apparent differences have appeared between these different treatments.

Comparative tests have also been made between stable manure and nitrate of soda as sources of nitrogen.

Statements have been made that stable manure should never be applied to the peach orchard. Such statements should be qualified. Soils poor in organic matter and nitrogen can be fertilized with stable manure with good results. The grower is obliged to use some judgment in orchard fertilization. If a soil is rich in organic matter and nitrogen, the application of stable manure might prove to be an injury instead of a benefit.

Chemical fertilizers are more economical than organic manures in most instances, but their success is dependent upon a good supply of organic matter in the soil. You may have an abundance of plant food but if moisture is lacking the fruit will be small. Fertilization then is largely a matter of what your soil needs and what is the most economical source of supply.

INSECT AND DISEASE TROUBLES

As practical growers you may be interested in the insects and diseases with which we have to contend, in New Jersey and what methods of control are practised.

The more common insects causing injury to the peach are the San Jose scale, peach tree borer and the plum curculio. The bark beetle only causes injury upon weak trees and the peach aphid is not serious. The San Jose scale is now kept in complete subjection by applications of lime sulphur.

The best remedy for the peach tree borer to date is a sharp knife and a piece of wire. Numerous materials have been suggested for painting the trunks of the trees to keep out borers but most of these are delusions. Any material

which cracks as the bark expands with growth is unsatisfactory and the bark of the peach is also very susceptible to injury by such materials as coal tar.

Tanglefoot proved most effective for the first year in some tests by the New Jersey station, but by the second year it had also effectively injured the bark upon the trunks of the trees. Therefore, be cautious about painting any material upon the trunks of young trees to repel borers and do not draw conclusions from one season's results.

Good results can be secured against the plum curculio by spraying with arsenate of lead if favorable winter harboring places for the insect about the orchard are cleaned up as it does not pass the winter in well cultivated orchards. This insect is rather difficult to kill by arsenical poisons but by using 3 lbs. of a good arsenate of lead paste to 50 gallons of water it can be accomplished. A lead containing at least 15 percent of arsenic oxide is required for quick killing. The first application of lead should be made just after the petals fall from the blooms and the second when the calyx is being shed or when the fruit is about the size of a green pea.

The most common peach diseases occurring in New Jersey are leaf curl, peach scab, brown rot, peach yellows and little peach.

Peach leaf curl is readily controlled by a lime sulphur spray applied at a strength sufficient to control the scale. Success also depends upon the time and thoroughness of application. The disease attacks the leaves as soon as the green tips appear beyond the bud scales and once inside, it continues to develop and distort the leaves as they expand and is then perfectly protected from any fungicide. Spray before the leaf buds make any growth for effective control.

Peach scab and brown rot are now readily controlled by applications of self-boiled lime and sulphur. Peach yellows and little peach are both causing some damage in New Jersey but they appear to be slightly decreasing at present. The nature of yellows is still unknown but it will probably be determined within a few years, as rapid strides are being made along plant pathology lines.

However it is doubtful if this will help us very much at first in its control.

We can now recognize early stages of yellows and little peach and we know that they are sometimes distributed by the nurseries.

The New Jersey station is trying to co-operate with the nurserymen and is helping them to secure buds free from disease as far as science can determine this.

The individual trees in the State experiment orchards are under close observation at all times. Last summer the station offered to supply buds to nurserymen from trees in the experiment orchard which were known to be healthy. Only a limited number of buds could be supplied to each nurseryman, but this was sufficient to provide stock from which to propagate in the future. Over 30,000 buds were distributed upon request.

My talk has been a somewhat general one and it may be that I have failed to go into detail sufficiently. If so, I shall be glad to attempt to answer any questions which anyone may have to ask.

THE PRESIDENT. I think you will agree that Professor Blake knows his subject, and I hope you will feel free to ask all the questions you wish. We want to make this a very informal meeting. Are there any questions?

MR. R. W. REES. I would like to ask what form of nitrogen has proven the most satisfactory.

PROFESSOR BLAKE. I will say that we have used nitrate of soda in all our experiments. I think there is a question as to which is the most economical to buy, but if you use chemical fertilizers entirely, you need plenty of organic matter in the soil. If the soil is deficient in organic matter, you can't get the best results with chemical fertilizers, and if you can't get organic matter by means of a cover crop, it will have to be secured in some other way.

MR. W. D. ROSS. In regard to Tanglefoot on the bark, I would like to ask the Professor whether he knows of experiments by putting on paper, and then putting the Tanglefoot on the paper, and whether that would be any protection to the bark.

PROFESSOR BLAKE. It might be possible to put on something that would prevent the injurious material in the Tanglefoot from going into the bark, but we haven't made

any experiments of that kind. There must be something in the Tanglefoot that is gradually absorbed by the bark and which is injurious to the peach tree. Tanglefoot is being used on shade trees, (which have thick bark), without injury, so far as I know, but the bark of the peach tree is thin and may absorb these materials more easily.

MR. I. I. MARGESON. Is there any injury from spraying with arsenate of lead?

PROFESSOR BLAKE. We have never had any injury from spraying with arsenate alone just after the petals fall. At the time the calyx is being shed we always use self-boiled lime-sulfur with the arsenate of lead. I think there might be more danger from the arsenate of lead spray after the trees are in full foliage, if no self-boiled lime-sulfur were used, but from the studies in New Jersey it would seem that there would be no advantage in spraying with arsenate of lead after the period when the calyx is being shed.

MR. L. W. RICE. Did I understand you that there was no difference that you could see between sulphate of potash and muriate of potash? You are recommending the use of muriate because it is cheaper, aren't you?

PROFESSOR BLAKE. Yes. Of course, it might be that one of these forms might give somewhat different results on different soils, but so far, with us, there has been no difference between the two. I might say that in our experiments we have limed the soil rather freely where these tests have been made.

MR. MUNROE MORSE. You spoke of using self-boiled lime-sulfur for spraying after the trees start in the spring. Would there be any difference in the result if I used a solution of the commercial sulfur?

PROFESSOR BLAKE. Our experience with the solutions of the commercial lime-sulfur has not been satisfactory. If we used mixtures that were any more concentrated than about 1 to 125, we found burning was liable to occur; and mixtures more dilute than that did not control the peach scab as well as the self-boiled. I believe the Delaware Experiment Station will have something new to report upon the use of concentrated lime-sulfur before very long; they think they have found the element that causes

the burning and claim that if that is corrected, the material is safe to use even upon peaches. That was the announcement made at Washington in November. With us, a mixture of flowers of sulfur and lime will control peach scab but will not control brown rot as well as the self-boiled.

DR. F. E. GILSON. I have had some success in handling borers by digging them out and putting wood ashes on them, and my neighbors who have made a success of raising apples have done the same thing, and I have had no trouble.

PROFESSOR BLAKE. Do you put the wood ashes in the hole around the trunk and leave them there?

DR. GILSON. Well, it varies. Some of the borers are from the surface down. I put it above and below, perhaps three or four inches, a shovelful both sides of the tree.

PROFESSOR BLAKE. Several of our growers who have tried that method have had trouble with the bark where the ashes went up against it. Of course, some wood ashes would be more caustic than others, but we are afraid to use it.

DR. GILSON. I use it very frequently with my apple trees. I don't know how far I would dare go on small trees, but on large trees I have had no trouble with it.

MR. KELSEY of CONNECTICUT. What would you give as the reason for what you term "collar rot"?

PROFESSOR BLAKE. The trunk of the tree where the bark of the root joins the bark of the top is usually termed a collar of a tree, and in the case of injury where the bark dies at the base of the apple or peach tree, the term "collar rot" has often been applied to that injury. I think everyone agrees now that the decaying of the bark largely follows winter injury, whether on apples or peaches. We know, in New Jersey at least, that this trouble practically never occurs unless the bark is first winter-injured. It become rather yellow and spongy, and decays.

MR. KELSEY. Nearly always on the south, southeast or southwest side?

PROFESSOR BLAKE. No, I wouldn't say it was confined to any one particular side. Sometimes the tree is completely girdled by winter-injury. We do have some bark splitting occasionally on old trees in cold weather, but

mostly it is in the form of this bark killing at the collar.

MR. MUNROE MORSE. When speaking about elevation, I suppose you meant elevation above sea level?

PROFESSOR BLAKE. Yes. above sea level.

MR. MORSE. Suppose the general level of the ground was 100 feet above sea level and you had an orchard perhaps 150 feet above that, wouldn't that be secure from frost as well as 600 where the general elevation was in proportion?

PROFESSOR BLAKE. Not in some seasons. For instance, two years ago in Huntington County in New Jersey there were no peaches at all at elevations from 200 to 300 feet,—none whatever. Now, at elevations from, say, 600 to 900 feet, there were good crops, and I think this was general even in Pennsylvania and parts of West Virginia. That might be called an exceptional season, perhaps, but I believe that for northern New Jersey a man would do well to locate at 600 feet or a little higher. Of course, that might not apply to your localities here. Remember, I stated that 100 to 200 feet in southern New Jersey was just about as good as 600 feet in northern New Jersey, owing to the specific conditions according to locality.

THE PRESIDENT. I would like to ask Mr. Hale what he thinks of New England conditions.

MR. J. H. HALE OF CONNECTICUT. I don't think any more about such things, because every year upsets my "think."

MR. MORSE. You spoke, Professor, about crops at 600 to 900 feet. What was the general elevation of the land at those elevations? Were the orchards placed on hills rising a great deal above the general elevation, or was the whole land at that elevation.

PROFESSOR BLAKE. Our experimental orchard at High Bridge is about 700 feet above sea level. It is about a mile and a quarter from the town of High Bridge, and the town is about 400 or 500 feet elevation. And orchards north of us, on the hillsides and high points, were from 700 to 900 feet, and they all had good crops.

MR. MORSE. And they were a good deal above the general level?

PROFESSOR BLAKE. Yes. There were orchards on slopes where, at the upper or the highest side of the orchard, the trees had full crops, and as you went partway down the slope the fruit was all in the tops of the trees, and at the bottom of the slope there was scarcely any fruit at all. The distinction could not be any more marked than it was there in 1912.

MR. R. H. RACE. Now, we want to get at the practical side of this thing. If you lived in Berkshire County, where the thermometer got to 15 or 25 degrees below zero, as it did night before last, what would you do about setting out a peach orchard?

PROFESSOR BLAKE. Well, I think where the thermometer goes down to 25 below it is quite a lottery. I think you have a good chance if it doesn't go below 15 or 18, if you have good elevation.

MR. RACE. We have got elevations from 1000 to 2600 feet.

PROFESSOR BLAKE. Well, I couldn't say exactly what would be the effect of winter temperature at an elevation of over 2000 feet. I think there is a limit to the height you ought to go. I would not recommend selecting a location severely exposed to the strong prevailing wind, for I believe you may have as much damage from a strong, high wind in spring and summer as from anything else, so I wouldn't recommend an exposed slope where the wind was very severe. I have seen orchards in full bloom exposed to a very high wind, and many of the petals would be actually stripped off by the the high wind. I do think, however, that elevation is quite important, especially above the general land level.

MR. E. M. IVES OF CONNECTICUT. I know a location in the town of Templeton in this state, where peaches were grown successfully last fall at an elevation of 1200 feet, which is of course away up above the country around. I don't know about the year before that. Is such an elevation in the northern end of the state likely to be a successful position for an orchard?

PROFESSOR BLAKE. That is a hard question to answer, as I do not know the conditions of the locality.

From my own experience, I would prefer to locate at elevations from 600 to 900 feet at least, north of central New Jersey, but there might of course be localities where this rule would vary, as I know it does in New Jersey. I would also avoid if possible a very severely exposed side, as I would be afraid of damage from severe winds and rough weather under such conditions. I think there must be growers here from Wilbraham and other points whose experience would be valuable in answering your question.

MR. IVES. There is a windbreak—I don't recall the direction—but there is a belt of timber which is higher and protects it from exposure on the side. I think, that would be most likely to get the severest weather.

PROFESSOR BLAKE. Well, that might help. There must be men here who are growing peaches as far north as that at an elevation, who might be able to help this matter out.

THE PRESIDENT. Is there anyone in the audience who would volunteer any information on the subject?

MR. E. F. COPELAND. I think I have raised more peaches than any other man in our county, and I am 1200 feet above sea level. Years ago, when I had a small orchard, I took pretty good care of it and had good success 15 years out of 17. Yesterday morning was the lowest I ever saw it—23 degrees below at my place—and I am sure it knocked out the crop, but we have had it very severe, when it was 16 or 17 below, and we had a good crop, or anyway enough would come through to give us a fair crop.

MR. F. HOWARD BROWN. I would like to ask Mr. Copeland whether the temperature was taken in the orchard, or at the house. Wasn't the orchard quite a little higher than the house.

MR. COPELAND. The thermometer will register about 4 degrees higher where the orchard is at 1200 feet, than at my building. Now, I can't tell you why, but there are orchards within a mile and a half of my place that some seasons haven't had any, when I have had a full crop. It may be that there is a wind current that helps me.

PROFESSOR BLAKE. I think a good circulation of air is important in preventing winter injury or frost injury.

MR. J. H. HALE. Mr. President, that remark of Professor Blake's brought me to my feet. While absolutely correct in a broad, general way, and while what he has stated about elevation is practically correct, there are times when you don't want too much wind. Within the last 36 hours, the peach growers of Connecticut who have been trembling at all, have been those on the elevations, and I believe if there are any buds found dead when this thaws out, we shall find it is on the higher elevations and the live ones will be in the valleys or less high places or less exposed places. In more than 40 years of peach growing I have stood for the high ground, but in that time I have had peach trees die in the high lands, and crops in the lower lands. The high wind of the last 36 hours has probably killed them on the high hills, and not in the valleys, so that you can't lay down any absolute rule as to location. But as a general proposition, seek the hills.

PROFESSOR BLAKE. Here is another point that would help out: We know that a good deal of winter injury comes as a result of drying out the twigs, and if you have a very cold, very dry wind and the orchard is severely exposed, you may have injury, where, if the air were quiet, you would not. That is my point in making the statement that I would avoid a severely exposed location. I would not recommend a high hill where it is too severely exposed, because you may have damage, as Mr. Hale points out.

THE PRESIDENT. Are there any other questions? This will be the last time that we will take up the subject of peaches at this meeting.

MR. C. W. CARPENTER. I would like to ask what form of phosphoric acid the Professor uses for fertilizer.

PROFESSOR BLAKE. We have used several forms,—acid phosphate, ground bone, basic slag and ground rock. We have an experiment starting now which is for comparison of ground rock, acid phosphate and basic slag. The trees have only been set a few years, however. In the old orchard we have used ground bone and acid phosphate entirely upon all the plats.

MR. NORRIS. If you could get plenty of stable manure, where the bedding was sawdust, would you be

afraid to use it on peaches? It is pretty acid, but I tried it for the humus.

PROFESSOR BLAKE. If it contained a good deal of sawdust, it wouldn't give you as much organic matter as though you had straw for bedding. I think that where anything is applied that might make the soil acid, it would be desirable to have lime to correct it. With us, lime is comparatively cheap, so that it may not be quite as much of a problem with us, but I would not be afraid to use manure with some sawdust if the soil was well limed.

MR. NORRIS. Using about a ton or so of lime to the acre?

PROFESSOR BLAKE. Yes.

MR. NORRIS. It costs us about \$7.00 here, I think.

PROFESSOR BLAKE. It doesn't cost us over \$5.00; but I believe if a man has a truck crop or some other crop that needs stable manure very much, he can use it with better economy on that crop and that if he supplies plenty of organic matter by means of a cover crop, he can get good results with commercial fertilizer.

MR. NORRIS. I wanted to use it in the peach orchard. I didn't dare use it on the vegetable crop, because I have had too much trouble. I have got to use it on the peaches, or throw it away.

PROFESSOR BLAKE. Well, the peaches will certainly do well upon a soil that is fairly well supplied with lime. I think a very acid soil is not so favorable.

THE PRESIDENT. I am going to ask you, if you have any questions that you would like to have answered, to write them out and leave them with the Secretary, and we will have them brought up whenever the opportunity occurs.

[An adjournment was taken to 2 o'clock. The President announced a banquet to be held on Friday evening, January 16th and a meeting of the Directors at 1.00 o'clock]

AFTERNOON SESSION

The convention was called to order at 2.00 p. m. by the President, Mr. Harold L. Frost.

THE PRESIDENT. Here are some apples which I got from one of the commission men here in Springfield. I asked him to show me one of his barrels of apples, and he showed me a barrel that was put in as a Number 1, grown in the Connecticut Valley, and I asked him to tip it over for me. Now, he didn't pick it out, but I picked it out myself, and it looked mighty fine on top, but the apples in the centre were like this (exhibiting to the convention a number of very poor apples). I was wondering what that grower would do if he bought a barrel of flour and found a peck or two of wormy flour in the middle.

This same commission man showed me where nails had been driven into the head to hold the tags on. One of our members here this morning said those nails were driven into the head of the barrel so that the apples wouldn't roll around. (Laughter). Here are some of the apples. (Exhibiting to the convention apples with nail holes in them). That is what is discrediting the rest of us apple growers here in New England.

On the right are three barrels of apples which this same commission man brought here, and one of those barrels shows the apples were put in a flour barrel and the barrel was evidently never cleaned. Now, when the commission man opened up the barrel, the apples were covered with the flour, and the purchaser left without buying.

I won't mention the name of that grower, but it was given to me, and he is growing nice apples, but is not spending any time packing them. That barrel on the right was grown in the Connecticut Valley and bringing \$6 a barrel at wholesale, while that other one they had hard work selling for \$3. We tried to figure the cost of those two barrels. We figured one with a second-hand barrel at 20 cents and

packing, 20 cents, a total of 40 cents; the other barrel we figured at the price of a new barrel or 40 cents, and the packing, 25 cents, a total of 65 cents. But the 65-cent barrel sells for \$6 and the other for \$3. Now, who is making the more money? What must a customer think of us when we pack apples that way!

I also want to show the first Hood River apple I ever saw that was covered with scale (exhibiting apple to convention). That only shows that they are up against it almost as badly as we are when it comes to sending out sealy apples.

I have asked Vice President Sears of Amherst to preside over this meeting this afternoon, and I now take pleasure in turning the meeting over to Professor Sears. (Applause).

(Vice President F. C. Sears of Amherst presided during the remainder of the afternoon session).

PROF. SEARS. Ladies and Gentlemen: The Vice-President is expected to do anything that nobody else wants to do or has time to do, and that is the reason your President has turned this meeting over to me,—not because he didn't want to preside, but because he hasn't time to preside this afternoon.

As you probably know from the program, the meeting this afternoon is held jointly with the Hampshire, Hampden, Franklin Beekeepers' Association, and we are to have a program on the general subject of bees; more particularly, bees in connection with fruit growing and horticulture. The first speaker this afternoon is Dr. Burton N. Gates of Amherst, who will talk to you on the subject, "Bees indispensable to Modern Horticulture." Dr. Gates, (Applause), whom I take great pleasure in introducing to the meeting.

BEES INDISPENSIBLE TO MODERN HORTICULTURE.

Dr. Burton N. Gates, Amherst, Mass.

Mr. Chairman, Ladies and Gentlemen: The program, as the Chairman has said, is more for the benefit of the fruit growers, yet we find that the beekeepers are becoming fruit growers, and the fruit growers are essentially or necessarily becoming beekeepers. It is then, from the standpoint of the two phases of agriculture that we will consider the subject this afternoon.

I want first to dispose of the horticulturist's end of the question, the end of it which I shall treat, because Professor Chenoweth will discuss the advantages of bees in fruits more particularly. Now, there is one point of view which I want to bring forth when talking to beekeepers or horticulturists on the importance of bees in any horticultural pursuit—using the term in its broad sense—and that point of view may perhaps differ somewhat from the point of view taken by many, and is based on a certain broad psychological principle, if I may so term it.

You know that some years, for instance—let's take this city of Springfield, for example—there may be a pest of house flies; house flies may be extraordinarily prevalent, or mosquitoes may be a pest in this section of the country. Then, in the following year, the mosquitoes will be few in that same locality. You know, if any of you are hunters, that in some years game is plentiful and in the succeeding year the same kind of game is scarce in that same locality. The same with fish. If you are a fisherman, you know that in different years the fish may be plenty or few. Two years ago, for instance, lobsters were scarce and the price was high; and this last summer I believe they were more plentiful. It is the same with plant life,—weeds for instance; and all this illustrates the point I want to bring out, namely, that all animal life and plant life is subject to a fluctuation. It will go up, then decline a little and perhaps come up again and perhaps decline away down so that it is especially

scarce, and then come up again. Now, you can't get away from this fundamental principle of high and low, the "up" and the "down" period, because all life has the periods of "up" and "down."

It applies to the human species as well as to wild life. For instance, in India human beings are thinned out by disease or famine; then the disease is suppressed, it has its "down" period; then the curve of the human race comes up again, and if that were to be drawn out in a graphic curve, you would have a curve which would be alternately up and down.

That principle of "up" and "down" applies particularly to the horticulturist, because the average horticulturist depends, even today, for the fertilization of his fruit, for the pollination of his fruit, upon insect life over which he has no control and which are subject to conditions, such as hard seasons or inclement weather or disease, which bring about this self-same curve of "up" and "down" as applied to the those insect fertilizing or pollinating agents upon which the fruit grower so depends.

To sum it all up in a few words, the horticulturist may plough, he may fertilize, he may thin, he may spray and do all of those things which are recommended to produce the best crops, but, after all, isn't it more fundamental that he should provide for the transferring of pollen from flower to flower where it is necessary? Isn't that more important than, or quite as important as, any other branch of horticultural technique.

The thing, then to do, it would seem from the beekeeper's standpoint at least, is to control that curve; instead of allowing it to go up and down, to control it and bring it up to its highest efficiency, hold it up there, so that the frequency or number of bees in the orchard or the vineyard or in the melon patch or the cucumber patch—wherever they are needed—will be "up" at the highest level, and will be maintained there. That is the one point of view in all this discussion of the relation of bees to fruit growing and vegetable growing, which I want to bring out very strongly, and the way for the fruit grower to protect himself is by securing and maintaining a few colonies of bees—not depending up-

on his neighbor's or upon the wild bees which may abound in the nearby woods.

I want just to outline the various ways in which beekeeping is applied to horticulture. There are two or three new phases of this question. For some years, however, bees have been quite indispensable in the market crop of cucumbers which are grown around Boston in the cucumber greenhouses, and at a very conservative estimate there have been 2000, and probably 2500 or more, colonies of bees put into the cucumber greenhouses around Boston, a condition which is particularly local and almost peculiar to Massachusetts. Very few other states utilize any such number of bees in a particular horticultural pursuit.

This opens up a view of beekeeping in Massachusetts which is also peculiar to this state, namely, that there must be beekeepers to supply this demand; and I am sorry to say that Massachusetts men are not holding up their end, because we know they are buying numbers from New Hampshire constantly, and even from southern localities.

Another use of bees in horticulture is, of course, in the orchard, and I will show on the screen some orchards in which bees are kept.

Another utility is in raspberry growing or small fruit growing, and that has been recognized.

Up and down the Connecticut Valley here, and elsewhere, those who grow cucumbers for pickling purposes—and it is by no means a small industry—are maintaining bees or borrowing from neighboring apiarists, in order to secure the crops of little cucumbers.

Right here in the vicinity of Springfield is a melon grower who ships his product to the most important hotels in the country and who produces annually a large crop. He told me that it cost him practically \$2.50 per colony, and he uses two colonies a year, and he is able thereby to secure the maximum crop of melons.

One of the recent adaptations of the industry in horticulture is in cranberries. The cranberry crop is worth at a conservative figure, at least \$1,000,000 a year to the state, and perhaps even more. Through the work of Doctor Franklin of the Cranberry Experiment Station Bog at South

Hanson, it has been proven that bees are of no slight importance in the setting of a satisfactory cranberry crop. At least, they apply this fundamental principle of holding insect life up to its highest efficiency as a pollinizing agent.

Another phase of the utilizing of bees in plant life which doesn't apply particularly to Massachusetts, but is especially so in Ontario and perhaps some other localities, is that it has been found that in order to secure a satisfactory crop of clover seed, bees must be maintained. The seed growers have found it necessary to have apiaries of at least 100 colonies of bees about every mile or mile and a half throughout the territory where alsike clover seed is grown. A very significant fact comes out in that connection, namely, that if there are 100 colonies as a centre at some point, on the first mile radius the clover seed crop is the heaviest. After you pass that first mile and come to a distance of a mile and a quarter or a mile and a half, there is a lessening of the clover seed crop, and when you reach a point two or two and a half miles away from the nucleus of the apiary, the crop is considerably smaller. So, on that basis, I was told last winter by a practical grower, the tendency is to place about 100 colonies every mile or mile and a half, in order to secure the maximum crop of seed; it is a great protection.

With these few suggestions, then, concerning the adaptation of bees in the growing of plants, I want to turn more particularly towards the way in which we keep bees; and show you, especially those who have not yet commenced to keep bees, some of the internal mechanism of the bee hive and demonstrate some of the habits of a colony. We will then turn to the lantern slides, after which, if you wish, I will operate this hive as a beekeeper would. It is supposed to contain a colony of bees. I will also show you pictures which concern the construction of a hive, so that if you utilize hives, you may know all the superior features of this hive here.

(Dr. Gates continued his lecture with accompanying slides)

MR. STAPLES. Would it be best to have them close together, or scattered.

DR. GATES. That is a very pertinent question. Location was a topic which we hoped would be discussed here this afternoon, but the speaker, I understood, is ill. I think that protection of the bees is of the first importance. The beekeeper tries to locate his apiary where it is shielded from winds. We know that a wind-swept apiary doesn't produce honey, and the brood doesn't come there, so if your orchard doesn't afford more than one place which is near shelter, the bees had better be located in that sheltered spot; if, on the other hand, your orchard is very extensive and you can secure several places in which to scatter the bees, it will be well to do so. You can work from this standpoint: We know that bees fly ordinarily two miles for their honey, and from the experience of those seed growers in Ontario it would seem that the maximum efficiency may be obtained at a radius of about a mile, and I presume there are very few orchards in this locality which would have to depend on more than a mile radius.

There is another aspect, namely, that the care of the bees is much easier if you have them focussed in one spot.

I will now open the hive which I have here. It is a novelty to some of you, perhaps. (Illustrating on hive) The base on which the hive rests is known as the bottom board, and there is only one feature in a bottom board which needs to be emphasized, namely, to have it solid and of good weather-resisting wood. They are usually made of cypress. As to thickness, you should specify that the board be $\frac{7}{8}$ of an inch in thickness, reversible, so that you may have an entrance $\frac{3}{8}$ of an inch one way and $\frac{7}{8}$ of an inch the other. This is as near standard as anything we have been able to obtain.

The hive proper is the brood chamber. The standard hive for the country is termed the ten-frame Langstroth hive, invented by a man from Greenfield and Colrain. The most satisfactory dimensions will be 16 $\frac{1}{4}$ inches. While there are both 16 and 16 $\frac{1}{4}$ inch, we recommend the 16 $\frac{1}{4}$ because it gives a little more leeway in operating frames. An effort will be made at the National Beekeepers' Convention next month to standardize the Langstroth 10-frame, which beekeepers have been looking forward to.

Then there is what is known as the division board, merely a thin board which can be shoved around in the inside to give more or less frames. You can use any number of frames by shoving the division board around, and the hive then serves as an 8-frame, 7-frame, 6-frame or whatever you wish. The division board is not very well liked by the large beekeeper.

(Doctor Gates here gave a practical illustration of the correct and the wrong ways in which to reverse the frames when wishing to examine the other side or end).

One thing I would like to impress upon you, and have you impress upon your friends, and that is that there is no such thing as an artificial comb. There has been a prize of \$1000 offered for a good many years for the production of a pound of artificial-comb honey, and that prize has not yet been claimed, and probably won't be. There is, however, a story current that there has been artificial comb produced, which without doubt originated from the foundation which is Mr. Manufacturer's foundation. It is pure beeswax run between rollers, impressed with the six-sided cell, which is truly a foundation and is not in any sense of the word a comb, but merely a basis or septum on which comb is built, and all the bees do is to draw it out on one side and the other and build the comb on this support. It is used by beekeepers to support and strengthen the comb and secure regularity, as he wants his cells all uniform and regular.

Here is what is known as a full sheet of foundation. The wires are used to further strengthen the comb and make it rigid when the bees have drawn it out.

The bee hive usually contains 10 frames. There are varieties using 8 and 12 frames, and even 13 frames, but the 10-frame hive is standard.

This which goes above the brood chamber, is called the "super".

Since there is an inherent tendency to store honey above the brood chamber, beekeepers take advantage of that and secure honey in the super. It is merely a frame in which there are these boxes which, as I have said, hold approximately a pound.

Then there is the section box. Where they secured the name I don't know, except that they are a section of the

super. Each of those section boxes rests in a carrier, so that you get four sections in a carrier. There are two shapes—the square and the oblong. To secure those sections against separating in any way, springs are placed in the super.

The cover which we most prefer is the telescope cover, with a metal roof, but this which we have here is not of that kind, I am sorry to say, for I would like to show you one. This which is here will show you why we prefer the telescope cover, for in this form the wind drives the rain in underneath. It is called the gable end cover. To be sure, there is a bead here which is intended to catch the rain drops and drip them off on the outside, but it doesn't always work, because the cover turns and twists. The telescope cover which I mentioned consists of two parts, the tent which goes inside, and the cover which telescopes down on the outside, and the roof is of metal.

I will show you how to put the cover on in a manner which will not kill the bees. (Dr. Gates illustrates on model)

Are there any questions.

MR. NORMAN. How do you keep the hive from blowing away?

DR. GATES. If it is in a windy situation, put a stone on top.

MR. NORMAN. Does that hold the super in place?

DR. GATES. Oh, yes, if you use a heavy enough stone. With the telescope cover, the cover is less liable to blow off. But nearly every aviary has a stone on top of each hive. We don't like to have the bees kept in a place where covers are liable to blow off, however.

PROFESSOR SEARS. We will now call on the next speaker, who will give us an address on "The Benefits of Orchards to Beekeepers", and I take pleasure in introducing to you Mr. Wilbur M. Purrington, of Haydenville, Mass. (Applause)

MR. PURRINGTON. It is fair that both sides of the subject should be heard. We have had from Dr. Gates a very entertaining and instructive lecture on the uses of bees, and you will hear still more from Professor Chenoweth of the Agric. College on their usefulness to you, so I think it is well that some orchardist should set forth to the beekeepers the benefits of the orchards to the apiaries, as well.

THE VALUE OF ORCHARDS TO THE BEEKEEPER

By Wilbur M. Purrington.

It is my good fortune as a keeper of bees to be located in the Hampshire foot hills some six miles from Northampton just across the narrow Mill River from the large fine orchard of Baldwin apples of Edwin and E. Cyrus Miller; who with their forefathers have been growing apples in that same locality for more than one hundred and fifty years.

Within three miles of my apiary there is also the farm formerly owned by Prescott Williams of one thousand trees famed locally as the big orchard of years ago and at least ten other farms with orchards of from fifty to three hundred trees, so that there are within the flight of my bees more than five thousand apple trees. I am surrounded in May with apple bloom" as a lodge in a garden of cucumbers."

To the south the hills slope away to the meadows along the Connecticut river while to the north and west they rise to ten or twelve hundred feet; and as the trees bloom first in the lowlands we have a succession of blossoms from lowlands to highlands prolonging the period during which the nectar may be gathered.

I am in a position therefore to appreciate the orchard value to the apiary, and while only an amateur naturalist have observed for hours and hours with greatest interest in my apiary of some fifty colonies, the awakening of the bees with the opening of the fruit bloom, the rush of flight, the high pitch of the note of wings humming in the hurry, the emergence of young bees covered with down like a chicken fluttering before the hives to mark the location be-

fore setting off for the fields, and the appearance of the drones foretelling the coming swarm.

It is easy to see that the great value of the orchard to the keeper of the bees lies in the added supply of nectar, its abundance, the season at which it arrives and its delicious quality; for the honey from the fruit bloom tastes as the blossoms smell. Men may talk to me of honey from the wild sage of Colorado, from the eucalyptus of California, from alfalfa of the middle west, from the wild raspberry of Michigan, from linden and clover or even from the wild thyme growing in luxuriance on the slopes of Mt. Olympus, but the nectar from the apple bloom in these New England hills has an aroma all its own, superior to every other and like to nothing else so much as to liquid sunlight in an orchard in bloom.

To the beekeeper of any experience the greatest interest centers in the sources of nectar, its abundance, the duration of the flow and the season when it arrives. No plant is too small, no tree too large, from the creeping Run-away Robin of our gardens to the Basswood by the river to escape the notice and calculation of the keeper of the bees; who sends forth his messengers everywhither seeking in the open bloom for the delicate sap that rises about the pistil of the flower, where it is swept by the hairy tongue of the bee into a tiny globule, pumped into the honey sac, and borne homeward to the hive on wings as swift as beams of morning light. Or if the young in the hive are calling for food the fielders will visit the flowers for the pollen, robbing the anthers of their baskets of pollen dust, raking it off with the front legs and stowing it with restless hurry into the baskets upon the hind legs, hastening back they will pack it into the cells about the brood red, yellow and light green like butter in tubs ready for the nurse bees to feed the young with the water brought by the water carriers from the sand by the brook; for unlike the leaf eating insects whose young are reared in the trees and feed upon the tender green, the young of these wholly beneficent bugs are entirely reared in the hive to our gain and not loss.

Now to the bee-keeper who has watched the winter supply of honey dwindle in the spring when the brood rearing begins in earnest; who has noted too the loads of pollen

from the poplar and willows, with the scant supply of sweets from the maples, dandelion and wild cherry coming in, the opening of the fruit bloom, beginning with cherries and pears and on to apples brings relief, content and joy.

For by this time the hives are filling with young bees that must be fed. Daily, hourly, they arrive; by tens, by hundreds, by thousands and the remnant of winter stores disappear as by magic.

Now if the orchard bloom be extensive, the weather fair and not too cold, the activity of the hive is multiplied, food is gathered in abundance and the surplus honey is stored in the cells along the tops of the frames and by the sides of the hive; the queen stimulated by this richest of food offered constantly by her attendants is laying eggs like steam, five hundred, a thousand or twenty-five hundred per day if there be room, the hive is filled with bees with more hatching or emerging every hour, the spirit of the hive begins to build the new queen cells along the frames of comb, the hive prepares for the coming swarm.

If the orchard be large and the weather continue fair some of this delicious honey may be forced up into the boxes in the super although this is rarely the case with me.

But the flood of nectar in May has a secondary effect beyond the amount of honey gathered for the life of all the apiary has been stimulated to the production of thousands of bees which will be ready three weeks later for the white clover coming in the warmer weather of June.

And the mention of clover brings us to the second consideration of the value of orchards for the bees, which lies in the use of the clovers for cover crops and the use of ashes for fertilizer which also brings in the clover. The red clover is often used but is of little use to the bees for the tubes are so narrow and so deep that only the bumble bee can reach the nectar at the bottom unless it be very abundant. On the other hand the alsike clover offers every advantage of the red for forage, humus, and nitrogen, and in addition thereto afford excellent forage for the bees as the tubes are much shorter.

If therefore the orchardist would consult the interest of the bees which as you have heard are his very efficient aids, he will use the alsike in preference to the red and as far as

possible give them a chance at the blossoms before plowing under; for while it may not appear to be of any advantage to him to have them visit the clover as he does not raise seed, yet the more that can be done to make strong and profitable the bees the more there will be ready during the fruit bloom to insure the setting of the fruit.

The same with the use of ashes or of other orchard dressing which will bring in the clover, for clover is the chief source of nectar in this region and were it not for that there would be but few bees here except those in orchards kept by the up to date men for the fruit bloom alone.

PROF. SEARS. Are there any questions to be asked about Mr. Purrington's most interesting talk?

MR. STAPLES. Might I ask the time which elapses between the laying of the egg and the maturity of the bee?

MR. PURRINGTON. It is three weeks. The egg is laid, we will say, as soon as the blossoms open, or about the 15th of May; within three days it is hatched into a larva; eight or ten days more and it is capped over, and emerges at the end of the three weeks, which brings the date to about the 7th of June. For a few days then the bee is a nurse-bee, all downy like a young chicken. In seven or ten days it comes out of that, so that with the opening of the clover blossoms, about the 20th of June, we have all those bees which the fruit bloom has brought.

MRS. HOWE OF MARLBORO. Do you find that the honey is as good when the bees are feeding in the alfalfa?

MR. PURRINGTON. I have had no experience myself with that phase of it—I am only an amateur—but I know some say they will yield very abundantly a very thin, white honey, which is considered excellent by those who produce it. But I know well it isn't as good as that from the apple blossom—it can't be.

MRS. HOWE. It is cut just before the bee is ready to make honey, and I would like to find out if it would pay to let it go a little bit longer, whether the value of the honey would be enough to pay for doing that.

MR. PURRINGTON. It would be to me; it might not to them.

MRS. HOWE. I would like to know the quantity per annum.

MR. PURRINGTON. Perhaps you had better ask Mr. Nichols. His wife's father has carried on some interesting experiments in regard to clover and other things. But personally I think it would be fine if you could persuade all growers of alfalfa to wait until it had finished blowing, before cutting.

QUESTION. I would like to ask if it would pay to feed the bees in the spring, before the blossoms come out, so that when they come out, the apple blossoms would be developed.

MR. PURRINGTON. There is an objection to that which all honest men like beekeepers bear in mind, and that is that their first store in the spring goes into the brood nest, and when there comes a rush of honey—which increases the activity of the queen—the bees are likely to take the stores out of the brood nest to make room for the brood, and carry it up. When it is cloudy weather and the bees have nothing to eat, then you have got to feed them, but the almost universal practise is to feed them in the fall. The comb along the outside will be filled with stores and many people take the comb out, put it into an extracting apparatus, where the top is sliced off, and crank is turned and the honey thrown out, and you will find it in the tumbler, and then they will feed 25 or 30 pounds of it in the fall, which is the proper way, and there is no hazard of getting sugar syrup when you want honey.

MR. R. H. RACE. I would like to ask what the bees take away from the plant, in that which we call honey. They rob the plant of something; what is it? Is it something which is essential for the growth of the fruit, or can we spare it just as well as not, with no robbery done, no loss anywhere?

MR. PURRINGTON. Well, let's take the squash blossom, where the bee is easily seen. Standing upright in the middle of the bloom is the pistil, with the little lump at the bottom which is afterward the fruit. Right around that is a little moisture which exudes, and the bee tumbles in and disturbs these quantities of pollen that are all about in there, and gets it on himself and carries it off, and with his little

hairy tongue he goes around in the little tube and sweeps up the moisture into a little globule. That is nectar. It isn't honey. It is raw; it is not particularly pleasing to the taste, and that is what he carries away. I never heard of its being termed robbing of the blossom.

MR. RACE. And it don't spoil the fruit?

MR. PURRINGTON. Oh, it adds to the fruit.

MR. RACE. There is the essence of something that they take away, that they call honey, and if it is there, it must be essential for something. I don't know much about it, only it strikes me that they might rob the flower and perhaps destroy it.

MR. PURRINGTON. Oh, no. It is only like taking the fragrance from the violet.

PROF. SEARS. That tree has got sense enough to know that it is a good thing to have bees, and it puts the honey there to induce them to come there. (Applause).

MR. RACE. Well, we will accept that.

PROF. SEARS. I now have the pleasure of introducing to you the next speaker of the afternoon, Mr. E. M. Nichols, who will address you upon the subject "Beginning with Bees and How to Secure Stock." (Applause).

BEGINNING WITH BEES AND HOW TO SECURE STOCK

Mr. E. M. Nichols, Lyonsville.

It is a habit to regard bee-keeping from the commercial standpoint and measure its profits solely by the amount of honey produced thus many of us have overlooked the real mission of the honey-bee in life, which is properly to pollinize blossoms.

From an entirely mistaken notion that bees puncture fruit, some fruit growers have been opposed to the keeping of bees by their neighbors, and little knew that by so doing they were injuring their own best interests. If for no other reason than to insure the proper fertilization of fruit and other blossoms, every farmer, fruit grower or gardener should keep a few colonies of bees upon his grounds.

There are a great many so-called bee-keepers who have from one to five colonies of bees tucked into some back corner, and perhaps once or twice a year they are visited, dug out of the weeds and brush just enough to make sure that they are not all dead. Now this is by no means a fair deal. The farmer would not think of treating his stock or fruit trees in this way if he expected results, consequently, we should give the bees proper care if we expect results. Results are measured by care and attention.

It is well to start in bee-keeping on a small scale, and increasing the colonies as you become more experienced in the work. In two or three years you will be able to handle successfully many colonies, whereas at the beginning you might have resulted in failure.

If it is the purpose to make bee-keeping a profession or to get a large stock at once, some time should be spent in the yards of a successful bee-keeper, or avail yourself of the short course in bee-keeping at the College, under the direction of Prof. Gates; then the bee-keeper will learn more in one season than in years of unaided work.

Still another way to start, is for several fruit growers to co-operate and employ an experienced person who can act as circuit bee-keeper, going from place to place during the busy season and caring for the bees. In so doing the orchardist would soon acquire sufficient knowledge to enable him to successfully care for his own colonies.

By all means procure modern hives, as this will make the work in the apiary much easier, as the frames and other parts of the hives will be interchangeable, and in securing new stock for repairs you should have no difficulty in replacing the old. It would be well for the prospective bee-keeper to secure a supply of hives and fixtures during the winter or early spring. This will enable him to get better prices, and also to assemble the hives and fixtures, having them in readiness before the rush of the busy summer's work is at hand.

The standard outfit for the American bee-keeper is the $16\frac{1}{4} \times 20$ in hive or ten frame Langstroth hive, supers may contain $4\frac{1}{4} \times 17\frac{7}{8}$ inch bee-way comb-honey sections.

There are several ways to secure bees. One way is to buy a hive of bees of a neighbor or dealer, and by the aid of

new hives make artificial increase by dividing or shaking the bees.

Another way is to purchase bees by the nucleus colony, of three or five frames each; that is, brood and bees on full drawn combs, with a queen; and thus increasing full colonies.

A third way is to obtain your bees in the combless package of two or three pounds each, with a queen; liberate them on frames of full sheets of foundation in the new hive, and thus increase to full size colony.

By any one of the above methods one can get a much larger gain or increase in less time by feeding a thin sugar-syrup each day, by means of some good bee-feeder. This will stimulate brood rearing and encourage the bees to build comb very fast; this should be continued until the hive is well filled. With proper care and favorable conditions I have made a gain of five colonies in one summer from a three frame nucleus in the spring.

Owing to the fact that foul brood already exists in a great many localities, I can fully recommend the beginner to purchase bees in the combless package. Although this is practically new, it has been sufficiently tried out by the large dealers and improvements added from time to time, so that now bees are being transported successfully from North to South and vice versa.

I have shipped bees by this method to Prince Edward Island and Nova Scotia, during some of our hottest summer weather with a very small percentage of loss.

Whichever way is chosen to start, procure bees from an apiary in a locality that is visited annually by the State Inspector of Apiaries, or his deputy.

Of the various races of bees there are none that will equal the Italians, as they seem to possess in a larger measure than any others, all desirable traits. They are not only gentle but of a beautiful color, and are very prolific. They do not run all over the combs when disturbed as do the blacks, and they are less liable to be troubled with bee moth or disease. If properly cared for in the matter of ventilation and shading their hives, they are not much given to swarming.

MRS. BROOKS How would you divide your brood

when you were putting it into another hive?

MR. NICHOLS. I would divide about even.

MR. COPELAND. Perhaps you can give us some information in regard to alsike.

MR. NICHOLS. In regard to clover, I will say that we had an old, worn-out piece of land that was worth worse than nothing to us, because we had to put a cow into it and we had the trouble of putting her out there in the morning and then going and getting her in the evening, and we could have kept her in the yard, which would have been just as valuable. We plowed that land and gave it a good, thorough cultivation and then started it to clover. We used sweet colver there, and in the first place we put on a good application of lime and used chemicals, basic slag, nitrate of soda and potash. When this clover was growing, the best part of the plot, in the low land, was 6 feet and 5 inches tall. It afforded a good cover crop for the land, and, as most of you know, it takes its nitrogen from the air, and it brought the land up very quickly. Now, we let it grow until it was nearly through blossoming. It begins to blossom early and lasts a long while if it is allowed to stand until the bees get through working it. So we had a double crop—used it as a cover crop and got the honey too. In regard to other kinds, I don't know how it would work. I think that if it were to be used for feed, the farmer would probably cut it before it blossomed.

MR. WINSOR OF RHODE ISLAND. What do you mean by sweet clover? Is it a different variety from alsike?

MR. NICHOLS. Well, I see Professor Brooks here in the audience, who is one of the best informed men in the country, and he will no doubt be glad to answer that.

PROFESSOR BROOKS. The sweet clover is really not a clover at all. It is closely related to alfalfa. It is not so valuable for silage or hay as the true clover, although there are many who say it is not very difficult to teach stock to eat it. It has, however, a strong, pungent odor which, at first at least, repels the animals; they don't like it. As Mr. Nichols has said, it grows to be six feet tall; it is thick stemmed and pretty woody when matured. It is a valuable plant for soil improvement or for a cover crop, for renovating comparatively unfertile soil, and a very valuable crop

for honey, as it blooms for a long time and furnishes honey of fine quality. It is, perhaps, not quite so good as some white clovers, but it is very good indeed. The honey from it is light in color; not quite so thick, not so heavy as that from white clover, but it has a very attractive flavor. There are two kinds of sweet clover—the white-flowered and the yellow-flowered, and the white-flowered is the more valuable of the two, whether for soil improvement or as a source of honey.

VICE PRESIDENT SEARS. We will now go back to where we started, on the question of bees from the standpoint of the orchard man and Professor W. W. Chenoweth, Assistant Pomologist at the Mass. Agricultural College at Amherst is going to talk on "Importance of Bees in the Pollination of Fruits." (Applause).

IMPORTANCE OF BEES IN THE CROSS POLLINATION OF FRUITS.

Professor W. W. Chenoweth.

In presenting this subject there are three fundamental principles I desire to discuss and if possible to prove:

1. Cross-pollination of our orchard fruits is always desirable and frequently necessary. 2. The wind is not an efficient agent in distributing the pollen. 3. Bees are the all important agents in effecting cross pollination of our orchard fruits.

For proof of these statements we must rely upon: 1. General observation, which often times is as reliable as experiment, depending of course upon the observer. 2. Results of actual research. 3. Common sense reason and deductions based upon the above. It is upon the results of research that I desire to lay greatest emphasis. And an attempt has here been made to bring together all essential material relating to this subject that has so far been obtained by our experiment stations. I must beg your indulgence in presenting some of these experiments somewhat in detail as it is done for the purpose of placing before you the conditions under which certain results were obtained

and will therefore enable you to form more accurate judgment as to the reliability of the evidence. However, before attempting to present this data I wish first to discuss briefly the morphology and physiology of the flowers of our fruit trees.

The term fruit as it is ordinarily used means the pulpy mass connected with and surrounding the seeds of our various orchard plants. It develops primarily as a protection to the growing seeds which are the vital products of the plants.

Seeds are the result of the union of two unlike cells known by various names, but for our discussion we may call egg cell and sperm cell. These cells are produced in different organs in the flowers, sometimes in different flowers, more commonly in the same flower. Our common tree fruits such as apple, pear, peach and plum produce complete, perfect flowers. Perfect because they contain the essential organs of reproduction; complete because they contain all the floral parts, pistil, stamens, petals, sepal.

The essential organs of the flower are the stamens which bear the pollen grains or sperm cells, and the pistil made up of ovary, style and stigma which bear the ovules or egg cells. These are soft single cells found in the ovary which is the tube like portion forming the base of the pistil.

When the ovules are ready to be fertilized the stigma prepares itself for the reception of the pollen. Usually this is effected by a gellatinous exudation making the surface sticky and forming a medium in which the pollen is readily caught. This deposition of pollen on the stigma is known as pollination. When the pollen grain on the stigma produces its pollen tube, which is an outpushing of the coat of the cell and this tube penetrates the stigma, passes through the style, enters the ovary, attaches itself to the egg cell and when the nucleus of the sperm cell or pollen grain has passed through this tube and has become fused with the nucleus of the egg cell then fecundation or fertilization has been brought about. This stimulus is necessary to start the growth of the flower parts which ultimately develop into the seed and fruit.

If these uniting cells, the egg and the sperm are borne by the same plant, or in the case of our orchard tree fruits

by trees of the same variety, the process is known as self-fertilization and the plant is said to be self-fertile. If, however, these cells must be from different plants, or as in our orchard fruits from trees of different varieties the process is cross-fertilization and the plant is said to be self-sterile.

If plants are naturally self-fertile the question of pollination is as a rule quite simple; but if nature demands cross-pollination the problem becomes more involved. There must, in most cases, be some means to prevent self-fertilization and there must be some agency of transferring the pollen.

Thomas Andrew Knight a famous plant breeder of a century ago concluded from observation and experiment that nature intended the crossing of plants of the same species; but it required the master mind of Darwin to show the true value of cross-pollination and to work out the many interesting methods nature uses to bring this about.

Some of the more common methods by which plants avoid self-fertilization are; different periods of ripening of pollen and ovule, difference in length of styles and stamens, the placing of essential organs in different flowers, but the most common is the sterility of the pollen, i. e. the pollen born in a flower is impotent when placed upon the pistils of same flower or upon a flower of the same pomological variety.

Since our fruit crop depends almost if not altogether absolutely upon pollination and consequent fertilization, it is of vital importance to know the habits of our orchard fruits with respect to this important function.

Fortunately a few men have seen fit to investigate this problem and I now invite your attention to a brief consideration of their work.

M. B. Waite*acting with the U. S. Dept. of Agriculture made the first extended orchard studies relating to this problem. His first work was with pears and his experiments were conducted about as follows. Strong manila paper bags were placed over clusters of buds and by fastening tightly to fruit spur, all chance of foreign pollen entering was excluded. In order to offset any charge that these flowers were

*Div. of Veg. Pathology, U. S. Dept. of Ag. Bull. No. 5. U. S. Year Book 1898

under unusually abnormal conditions other clusters were enclosed in bags of cheese cloth and still others in bags made of coarse mosquito netting. These last two would permit of free circulation of air and would not therefore place the enclosed flowers under unnatural conditions. It might be stated here that the results obtained from the use of the three types of bags were essentially the same, at least no marked difference was noted.

Of the more important varieties tested it was found that Angouleme, Buffum and Flemish Beauty were reasonably self-fertile; Bartlett, Bosc and Seckel partially self-fertile, the trees tested varying from self-sterile to 4.4% self-sterile, while Anjou, Clairgeau, Clapp's Favorite, Keiffer, Lawrence and Sheldon were self-sterile or practically so as none of these showed greater degree of self-fertility than 0.4%. It was noticed in these tests that trees of the same variety showed quite a wide range in their ability to self-fertilize. Bartlett for example showed a range of 0.% to 4.4%. This individual variation is no doubt due in a large measure to the vitality and vigor of the tree. While these results are not to be taken as final nor as applicable to all seasons and localities the very fact that of all the varieties tested more than half are practically self-sterile under the conditions imposed is rather significant.

The above results obtained in New York are corroborated by observation and experiment in the old Dominion orchard at Chestnut Farm, Virginia. This old orchard originally consisted of some 22,000 standard Bartlett pear trees and were at the time of this experiment 1892, eighteen years old. This orchard had never borne a full crop. The largest crop was an average of three pecks per tree. Blight, root rot and other causes had removed about one sixth of the original planting. These missing trees, had in the earlier history of the orchard been replaced. By mistake, in replanting, two Clapp's Favorite and a Buffum had been set among the Bartletts. Also near by were a few old trees, the remnants of a former variety pear orchard which had been very productive and because of this the larger planting had been made.

The Bartlett trees near the old variety orchard and those near the two Clapps and Buffum always bore good crops

when there were any pears in that section and the drooping branches of these trees testified to the truth of the manager's statement respecting this. The same experiments were tried here as in the New York orchards. Also much cross-pollination by hand was done. In no case where Bartlett pollen was applied to Bartlett pistil did fruit set, while a very large per cent of the flowers cross-pollinated set fruit.

Mr. Waite also investigated the apples, using the same methods as with pears. He found that a very large per cent of the varieties were either self-sterile or only partially self-fertile.

Mr. Fletcher's * work extending over a period of three years in both Michigan and West Virginia corroborates Mr. Waite's results with respect to Keiffer and Bartlett pears. Mr. Fletcher confined his efforts to these two varieties and the results from the thousands of blossoms experimented with should be conclusive. Neither of these varieties show sufficient self-fertility to warrant setting them without provision for cross-pollination.

In 1897 Professor Waugh at that time with the Vt. Exp. Station **began a series of experiments with plums to determine if they were self-fertile or self-sterile. Some of this work was done in Vermont and some in the large orchards of Mr. Kerr of Denton, Maryland.

His method of procedure was essentially the same as that of Mr. Waite. Large clusters were enclosed in paper bags. When the pistils were receptive some of the bags were removed and the flowers hand-pollinated with the pollen found in the bag or in enclosed flowers. The remaining bags were allowed to remain until petals had dropped. No appreciable difference was noticeable in these two methods of treatment. Altogether some 55 varieties of native and 5 varieties of Japanese plums were tested. The results show that for all practical purposes all species of native plums are absolutely self-sterile, and while it is generally believed that some varieties of the Japanese group are self-fertile the varieties here tested were self-sterile. All

*Va. Exp. Sta. Rept. 1909-'10.

**10th, 11th and 12th An. Rept.

general observation confirms this conclusion especially regarding certain species of native plums.

Professor Waugh's studies in pollination also included the apple. The method of procedure was essentially the same as with the plums. Of the varieties studied, Baldwin, Esopus, and Fameuse showed some degree of self-fertility, while Ben Davis, Rhode Island Greening, King, Spy, Red Canada, Wealthy, Westfield and Williams proved to be self-sterile.

In the spring of 1898 Prof. Lewis* of the Oregon Experiment Station began the investigation of the apple. His method was practically the same as that of Professor Waugh except that in each case the bags were removed from one half of the cluster when the pollen was ripe and the pistils of the flowers were hand pollinated, using the pollen from the enclosed flowers. The bags were then returned to keep out any foreign pollen. The remainder of the bags were left untouched until the petals had fallen, at which time all of them were removed. In addition to this work in self-pollination much work was also done in cross-pollination. Altogether results were secured from 87 varieties, 59 of which were found to be self-sterile, 15 self-fertile and 13 partially self-fertile.

Of the varieties important to the New England fruit grower Baldwin, Ben Davis, Esopus, Fameuse, Grimes and Newton were either self-fertile or partially so, while Gravenstein, Jonathan, King, Maiden Blush, Rhode Island Greening, Tolman and Wealthy were self-sterile.

The only difference between the above results and those obtained by Prof. Waugh are a larger set of fruit in the self-sterile sorts and self-fertility of the Ben Davis which was reported self-sterile by Prof. Waugh. This difference only serves to emphasize the statement that the degree of self-fertility of any variety is subject to variation depending upon vigor, location, season, etc.

Senator Dunlap **one of the large fruit growers of Illinois says that in his state where there are many large orchards of 40 to 80 acres of a single variety seldom or never

* Ore. Exp. Sta. Bull. No. 104.

** 2nd. An Rept. Mo. State Board of Hort.

bear large crops, while mixed orchards in the near vicinity often produce bumper crops. He further states that where orchards are set in small blocks of different varieties that the first and second rows along side another variety bear the larger crops and that the crop decreases toward the center of the block.

V. R. Garner¹ of Oregon investigated the sweet cherries in 1911, 1912 and 1913, and reports that of eleven varieties studied Lambert and possibly Knight may be classed as self-sterile, Wood, Elton, Rockfort and Windson are partially self-fertile and Willamette, Napoleon, Coe, Bing and Black Republican are self-sterile.

Dr. Whitten² of Mo., Prof. Beach³ of N. Y., Prof. Sternes, Ga., Prof. Reiner⁴ of N. C., and others have shown through exhaustive trials that a large percent of our grapes are incapable of setting fruit unless cross pollinated. This is especially true of the native-Vinifera hybrids and the Muscadines.

The general opinion seems to prevail that peaches and European plums are self-fertile. There is little actual data outside of general observation to be had relating to these two groups of fruits.

Fletcher reports⁵ as a result of experimental work and from reports of several hundred fruit growers that of the European plums, Golden Drop, French Prune and Italian Prune are risky being variable in their power to self-fertilize. Of the peaches *Susquehana* is classed with the above varieties of plums, while Gold Drop is classed as self-fertile.

The effect on the fruit itself resulting from cross-fertilization was investigated quite thoroughly by many of these men. Waite and Fletcher agree that the size and form of the pear is modified by crossing and that the normal typical fruits and usually the finest and largest specimens even in self-fertile varieties are crosses. Both Waite and Lewis studied the effect of crossing the varieties of apples. Waite found that the unsatisfactory character of the fruits

¹ Ore. Exp. Sta. Bull. No. 116.

² Univ. of Mo. Bull. 46.

³ New York Exp. Sta. Bull. 157, 169, 223.

⁴ North Carolina Ag. Exp. Sta. Bull. 209.

⁵ Cornell Exp. Sta. Bull. 181.

obtained from self-pollination was even more pronounced in apples than in pears. The crosses correspond to the better specimens in the tree while the self-fertilized fruits correspond to the undersized, poorly colored specimens. Prof. Lewis goes a step further and gives actual figures obtained from comparison of a large number of specimens. The following table shows the effect of cross-pollination of the Yellow Newtown a self-fertile variety, and Esopus a partially self-fertile variety.

EFFECTS OF CROSS-POLLINATION

Ore. Exp. Sta. 1908.

Newtown

Pollination	Av. wt. of fruit	Seeds
X self	73 grams	.05 grams
X Bellflower	104 "	.40 "
X Esopus	147 "	.66 "
X Jonathan	162 "	.65 "
X Grimes	173 "	.60 "

Esopus

X Self	100 "	.13 "
X Newtown	126 "	.65 "
X Ark. Blk.	128 "	.68 "
X Jonathan	144 "	.70 "
X Baldwin	157 "	.71 "

No comment on the above is necessary as the figures speak plainly enough.

AGENTS OF CROSS-POLLINATION

While working on the problems of self-fertility of the various orchard fruits some of the investigators also made a definite study of the means used in bringing about cross-pollination.

It has been mentioned that Mr. Waite used a coarse mosquito netting for covering pear blossoms; such a covering would not materially interfere with cross-pollination if the wind disturbed the pollen, but would, if properly adjusted, exclude insect visitors. His results show no variation from those in which the clusters were enclosed in paper bags. Fletcher used this same covering for large trees and while a few more fruits were set than on trees covered with sheeting he attributed it to the fact that where blossoms were closely pressed against the netting insects were able to cross-pollinate them.

Prof. Waugh also used the mosquito netting in his work with plums. His records show no variation from those obtained where paper bags were used, except in the case of the Cumberland which set two fruits, and these he maintains were the result of insects as some of the blossoms were found pressed closely against the netting.

Prof. Waugh also prepared glass plates 1x3 inches by smearing one side with vaseline. These were exposed in the plum orchard and later a count made of the pollen collected. The first column in the table designates the glass plate, the second the distance from a tree in full bloom, the third its position and height from the ground, H meaning the plate had a horizontal position and V that it was vertical to the tree and facing the wind, the fourth the length of exposure and fifth the amount of pollen both as single grains and as masses.

WIND AS AN AGENT IN CROSS-POLLINATION.
Vt. Exp. Sta. 1900.

Plate No.	Distance from tree	Position and height	Time of exposure	Amt. of pollen grain, mass.
A	10	H. 6 ft.	24 hr.	0 0
B	15	V. 6 "	24 "	1 0
C	10	V. 6 "	24 "	25
D	under tree	H. 0 "	2 "	0 1
E	8	H. 2 "	20½ "	7

Most of the pollen found on the plates was in the form of masses rather than single grains. This shows its sticky, doughy nature, also its non-adaptability to being carried by the wind.

Prof. Lewis repeated this experiment in his work with apples with results as shown in table below.

WIND AS AN AGENT IN CROSS-POLLINATION.
Ore. Exp. Sta. 1908.

Slide No.	Dist. from tree	Height of slide	No. Pollen grains after 24 hours
1	4	on ground	16
2	12	6 ft.	9
3	15	4 "	11
4	15	6 "	8
5	20	9 "	6
6	30	6 "	7

Keeping in mind the relative size of a stigma and one of these glass plates one can readily see that if the fruit crop depended upon cross-pollination by the wind the chances for a bumper crop would be remote indeed.

Still another experiment tried out by Prof. Lewis shows rather significant results. A seven year old tree having 1500 blossoms stood about 20 ft. from trees in heavy bloom. The flowers of this young tree were emasculated (i. e. all floral parts, except pistils were removed.) The result was that five fruits set on the tree. A watch was kept on the tree to see if insects visited it. During the time when the pistils were receptive eight bees visited the tree, while more than twice that number were seen in a half hour on another tree 20 feet distant.

Scientists have long pointed out the fact that those plants which depend upon the wind to bring about cross-pollination are as a rule distinguished by having an abundance of powdery pollen, by the absence of nectar glands and also by having flowers that are not showy. While on the other hand those plants that depend upon insects to bring about cross-pollination are characterized by having showy flowers, nectar glands and sticky or doughy pollen. Also many of these flowers emit a perfume. Whatever value, if any, may be attached to this generalized statement it is curious to note that the plants under discussion, the orchard fruits, without exception belong to the last named class.

INSECTS AS POLLINIZERS

The foregoing experiments indicate quite clearly that the wind cannot be depended upon to bring about cross-pollination of our orchard fruits, consequently with its elimination it necessarily follows that this important work must be done by the insects found in our orchards at blooming time.

Prof. Waugh kept a record of the various insects seen visiting the plum blossoms. In 1898 twenty-eight species were counted; of these eighteen species were Hymenoptera or bees. In 1899 there were sixteen species of which seven were bees or their allies and nine species of flies. While no actual figures are given the general statement is made that of all the species the honey-bee is by far the most important.

Mr. Gardner in reporting his work on sweet cherries cites the case of an orchard which had not as yet produced a heavy yield. The crop of 1912 was 13 tons. Acting upon his recommendation the owner of the orchard in 1913 cut branches from seedling cherry trees at blooming time and placed them in buckets of water throughout his cherry orchard. In addition to this several colonies of bees were placed in the orchard. With no better season and with the trees only one year older the crop was 39 tons. Mr. Gardner in commenting on this attributes a large part of this increased yield to effective cross-pollination and bees as the agent.

Mr. F. Howard Brown, Sec'y of this Association writes me that the severe winter of 1911 and 1912 together with foul brood very greatly reduced the number of bees throughout the state. In his own case only one colony survived. In the spring of 1912, the weather during blooming time was cool, cloudy and rainy, with only short intervals of sunshine. During these short periods of sunshine the bees would come out and visit a nearby cherry tree, but would not venture into the peach orchard some 300 feet distant as only one honey bee and a few bumble bees were seen among the peach blossoms.

This colony of bees was moved into the center of a small block of peach trees so that when they did come out they would work upon the peach blossoms. The result was these trees set all the crop they could carry through the following dry season. While other peach orchards that bloomed equally well, but did not have bees in them failed to set a crop.

Mr. Brown feels confident that this single colony of bees is responsible for his 1912 peach crop in this particular orchard and recommends all fruit growers to keep bees as a sort of insurance.

By carefully studying the habits of bees during the blossoming time of our orchards the Ohio Experiment Station has been able to give us a rather definite idea of the amount of work that may be accomplished by a single colony of these useful insects.

TABLE SHOWING ACTIVITY OF BEES AT BLOOMING TIME
OF PEACH AND CHERRY.

Ohio Exp. Sta.

Time	No. hive	Outgoing workers per min.	Returning workers per min.	Loaded with pollen	Loaded with honey
8.30—9 A. M.	1	35	30	22	8
	2	40	31	20	11
11.30—12 "	1	40	42	8	34
	2	48	51	5	46
2.30—3 P. M.	1	78	81	2	79
	2	84	95	2	93

When we remember that the bee may visit several flower clusters in a minute, we realize that thousands of flowers will be visited by the workers of a single colony in a day. They cost the fruit grower nothing. They take from his trees nothing that he can utilize and they render a service invaluable.

By actual count in orchards, favorable located, the honey bee has been found to outnumber all other insects 20 to 1. This is no more than we should expect if we remember that the common bees are the only insects that live through our severe winters in considerable numbers. At blooming time colonies of bees number around 15,000 while practically all other insects which have been so reduced in numbers that only eggs or single females successfully passed through the winter have not had sufficient time to multiply and produce large numbers. And herein lies one of the very strong arguments in favor of the honey bee.

While flies, butterflies, moths, ants and beetles are usually found in our orchards it is quite generally believed that these accomplish little or nothing in the way of cross-pollination. The flies, butterflies and moths are often seen hovering about the flowers or reposing upon them, but they do not burrow down into the flower for the nectar nor crawl around over the stamens and styles collecting pollen as do the bees. Nor do they confine their attention to any one species as is the habit of the bees, which by the way is one of the very strong recommendations of the honey bee as an agent in cross-pollination. The smooth bodies of ants and beetles totally unfit them for cross-pollination though they may be useful in self-pollination.

The value of the honey bee to the orchardist is continually increasing. Modern methods of orchard care tend to destroy large numbers of the wild insects—spraying, pruning, and clean culture which are now the rule in all well ordered plantations render insect life in the orchard more precarious than formerly. As long as men were content to grow a few mixed varieties of fruits in the back yard or along stone walls, the wild bees, other insects and neighboring apiaries were capable of effecting cross-pollination—at least after a fashion. Now, however, with the development of large commercial orchards this task has grown beyond these casual agents and if profitable crops are produced adequate provision must be made for a thorough cross-pollination.

The spraying of fruit trees while in full bloom has given rise to much discussion between bee men and fruit growers, and as a result many states have enacted laws forbidding this practice. The bee men have maintained that their bees were badly injured if neighboring trees were sprayed with arsenical poisons at blooming time. While the fruit men claimed various advantages and belittled the complaint of the bee men as of secondary importance as compared with the fruit interests.

General observation has as a rule shown that the bee men were in the right, and instances are noted where great damage has resulted to bee owners. All the research so far made corroborates this. The Ohio Exp. Station* has secured results which warrant the conclusion that bees may be and frequently are injured by spraying blossoming trees with arsenicals. Not only are adults that visit the sprayed blossoms killed, but the nectar and pollen carried to the hive has been known to destroy both the adults and the brood resulting quite frequently in the destruction of whole colonies.

Prof. Beach**found that spraying apple trees with arsenicals while in bloom often resulted disastrously to bees. Both adults and brood being poisoned. It was also shown that the application of spray mixtures to open

*Bull. 68.

**N. Y. Exp. Sta. Bull. 196. 27th.

blossoms may stop the further development of the flower and might under certain conditions seriously reduce the crop.

SUMMARY

A thoughtful consideration of all the evidence before us, it seems to me, fully warrants the following general conclusions:

1. All tests wherever made and all general observations agree that many varieties of apples, peaches, pears, plums, sweet cherries and grapes are unable to set a crop of fruit when limited to their own pollen.

2. Some varieties of the above named fruits are partially self-fertile and a few are apparently wholly self-fertile though the degree of fertility varies between rather wide limits depending upon location, season, vigor of tree, etc.

3. All investigators agree that as a general rule the fruit resulting from crossing even in self-fertile varieties is larger and better developed than self-fertilized fruit. This is explained by saying that foreign pollen furnishes a greater stimulus to growth because it is more acceptable to the pistil and not because it transmits size character of the variety from which it came.

4. All evidence at hand contradicts the theory that the wind renders any dependable assistance in bringing about cross-pollination among the above named orchard fruits, while it does emphasize the importance of the honey bee as an agent in rendering this great service to the fruit grower.

5. It has been shown beyond dispute that spraying open blossoms with arsenical poisons is injurious to bees. The orchardists who persist in this practice secure little if any benefit which would not result from either an earlier or a later application. Also he runs the risk of injury to the unfertilized open flowers in addition to leaving thousands of poisonous cups which kill the goose that lays him golden eggs.

6. The character of the weather at blooming time is the final determining factor of the fruit crop. Cool, cloudy, or rainy weather at this season not only affects the development of the pollen, the growth of pistil and consequent develop-

ment of ovules, but the action of insects is also reduced to the minimum, thereby lessening the chance for cross-pollination. It has been shown that excessively cool weather at blooming time often renders self-fertile varieties incapable of self-fertilization though they still retain the ability to be cross-fertilized.

In conclusion it seems safe to say that the fruit grower cannot afford to make very extensive plantings of any of the orchard fruits under discussion without making provision for abundant cross-pollination. This is most easily and practically done by choosing commercial or standard sorts that will bloom at approximately the same time, setting these varieties in small blocks of only a few rows each and by establishing a few colonies of honey bees near or in his fruit plantation.

MR. W. M. PURRINGTON. How many hives ought there to be in an orchard of, say, 100 trees?

PROF. CHENOWETH. I don't know that I can answer that very definitely, but I have heard it stated that a colony of bees to 50 trees would be plenty. It would perhaps be better if you had more bees than that. I should think one colony to 50 trees would be satisfactory.

MR. PURRINGTON. Even in cold and cloudy weather?

PROF. CHENOWETH. No; probably not under those conditions. Then you would probably need more bees, and I think that in that sort of weather you would want your bees scattered, because in weather of that kind the bees won't go very far from home, and if your fruit plantation is very large it would be better to have the bees distributed over the plantation.

I will refer you to the experience of the Secretary of this Association as given in my paper, which will explain some points—this last one, at least.

MR. PERKINS. I would like to ask if you have published, or if there is any bulletin which will give practically up to date, substantially what you have said, as well as any other late experiments on this whole subject?

PROF. CHENOWETH. There are bulletins from the Oregon Station; the 10th, 11th, 12th and 13th Annual Re-

ports of Vermont; the New York Station has published two or three. The one from Oregon is the latest, and has been published and distributed within the last six weeks or two months.

MR. PERKINS. Thank you. Now, I want to ask an abstract question, on pears. What would be the effect of planting 500 Beurre Bosc trees all by themselves? I have an orchard of several thousand trees and was thinking of putting in some Beurre Boscs. They are sterile, as I gather from your figures. What would you suggest as some other pear tree to use for purposes of cross-pollination?

PROF. CHENOWETH. If I were going to plant 500 trees, I don't believe I would want to put them in solid blocks unless I had many others growing near. If you have others near, you would perhaps get a fair degree of cross-pollination, but I should think you would get better results if you alternated, with probably two or three rows of Beurre Boscs and then a row of, say, Anjou.

MR. PERKINS. I want to get something in the way of a fall fruit.

PROF. CHENOWETH. The Bartlett is self-sterile. It doesn't follow that it won't cross-pollinate, because it does, but it won't pollinate itself. The Bosc would also pollinate your Bartletts; also the Bartlett and Seekel cross-pollinate very nicely.

QUESTION Could you tell me anything about experiments on, for instance, the Northern Spy, as to what any experiments have shown as to their being self-pollinating?

PROF. CHENOWETH. That is a self-sterile variety. Professor Waugh recites a case of a large orchard in Vermont that never has borne a paying crop. It is a large, old orchard, and he attributes it entirely to the fact that the only other variety planted in the orchard is the Rhode Island Greening, and that blossoms and is gone before the Spy comes into blossom. The Spy is a late-blooming variety, and in order to cross-pollinate that, you have got to get some varieties that would blossom rather late. We have no record at the College of the blossoming period of the Spy, but we have of Ben Davis and Baldwin, York, Wealthy, McIntosh and a few more, and they all blossom at approximately

the same time. If there is someone who is familiar with the blossoming habits of some late ones, I should think you could get those and that you ought to have some of those with your Spy.

In regard to the Bosc, it doesn't necessarily follow that because it was self-sterile in New York, that it would be in Massachusetts, but it is risky.

QUESTION. The way to do is to try, I suppose.

PROF. CHENOWETH. No. I think the way to do would be to provide for cross-pollination.

QUESTION. With a fairly large variety—say a dozen or fifteen standard apple trees—would we stand a pretty fair chance of getting some ourselves?

PROF. CHENOWETH. Yes, you would have abundant opportunity for that.

QUESTION. It is an extremely interesting subject, and I have found it difficult to get anybody that seemed to know much about it.

PROFESSOR SEARS. This gentleman has asked where he can get certain information. I would suggest that if he joins this organization, he will get all of this from the reports we send out.

QUESTION. Will it have these very figures?

PROF. CHENOWETH. Yes; and I have given also the authorities from which I have taken the figures, or which I have consulted in preparing this paper. That, I think, will be the most valuable part of it, because you can go then to your source and can get it in much greater detail than I would attempt to present to you here.

MR. NORMAN. I would like to ask the speaker if there is anything in the idea that bees follow flowers of one color, and if it might be that, if you let the cover crop blossom at the same time as your trees, the bees would neglect the fruit and go to the cover crop.

PROF. CHENOWETH. I think Mr. Purrington can answer that.

MR. NORMAN. I ask that question because of a specific instance. We have a pear orchard of perhaps four acres in extent and have a cover crop in which rape predominates. This spring we failed to plow it until after it blossomed. It has big, yellow flowers, and lots of them. It blossomed a

little bit ahead of the pears and it continued to blossom until the last of the season of the pear blossoms, and the bees began to work on the rape and they seemed to continue to work on it, and we had no pears. We set the orchard with special reference to crossing by the use of Bartlet's and Seckles and others all through the orchard, but still we had no pears to speak of.

MR. PURRINGTON. The gentleman's observations seem to have covered that point pretty closely. I am only an amateur naturalist, but I am sure that the bees will leave everything else for fruit blossoms. They will leave the dandelion, they will leave the honey locust, which is very attractive to them, and go to the fruit blossoms, so that I should say that in almost every case they would take the fruit blossom rather than anything else. They will leave honey exposed in the field, or syrup, and go to the fruit blossom in preference.

PROF. SEARS. You will have to get a pear with a yellow blossom. (Laughter.)

PROF. CHENOWETH. I may be able to add a little to this. The pear blossom has a little offensive odor, and when the apples come into blossom bees will leave the pear and go to the apples. The possibilities are that this rape appealed more to them than the pears did.

MR. NORMAN. I had gone away from the place during the pear blossoming period and I had no personal observation of it, but the men said the bees were thick in the rape when we supposed they would be thick on the pears.

MR. PURRINGTON. Then the rape spoiled the pears.

PROF. BROOKS. I would like to add a word which bears on this subject. Bees know their business thoroughly, and they never fail to work on what gives the most product for a given amount of exertion. They don't hesitate to change at once. Now, red clover contains much more nectar than does alsike. Ordinarily, as one of the speakers has said, the bees cannot reach it, but in those days which make humanity "wish it could take off its flesh and sit in its bones," when the air is full of humidity, when there is no wind and the weather is hot day and night, and the red clover is in bloom, then the nectar rises up high in these

tubes, because the air is too wet to let it evaporate, and the ordinary honey bees can get the nectar out of the red clover. I have watched certain hives, and they have stopped working on the alsike and devoted their attention wholly to the red clover. But when the wind changed and went into the west, and the sun came out, that nectar fell somewhat and they went back again into the alsike. I suspect that in this particular case the bees could get more honey for a given amount of horse power, or "bee-power," from the rape than they could from the pears, so they stuck to the rape.

MR. STAPLES OF CONNECTICUT. What is the effect on bees of spraying for the codling moth, just as the petals are falling? Is it dangerous?

PROF. CHENOWETH. I think it is conceded that there is no danger when the petals have fallen, but there is considerable danger there when they are falling and a considerable portion of the petals are still on.

MR. E. M. IVES OF CONNECTICUT. Do those bulletins you have referred to from Oregon relate to cherries, also?

PROF. CHENOWETH. Yes.

MR. PERRY. I would like to state that in a raspberry patch I believe bees are essential. I would like to find out if possible how many hives I would best put on an acre. There aren't enough bees in the patch to thoroughly pollinate and get a full crop.

MR. PURRINGTON. I am growing raspberries, too, in a small way, and I know something of what the problem would be. The raspberry bloom comes at a time when the weather is fair and consequently they have a good opportunity to visit its bloom. I should say that three colonies to an acre would be abundant.

MR. PERRY. Then on gooseberries, too. There is a great deal of pollen to them.

MR. PURRINGTON. Well, gooseberries come earlier. I should say the same bees would cover them, as well.

MR. PERRY. But it is very apt to be colder.

MR. PURRINGTON. Yes, that is so.

MR. PERRY. Then, on the strawberry patch, what about that?

MR. PURRINGTON. My notion is that you would want

more for strawberries. They come earlier; and it is more essential, isn't it, that you should have thorough pollination?

PROF. CHENOWETH. Particularly if they are imperfectly flowered.

MR. IVES. You spoke about one colony to 50 trees, a while ago. You didn't state how large those trees would be, but did you mean trees 20 feet high and 20 feet broad, or 5 feet high? Will you give some definite or average age or size, or "bee capacity?"

PROF. CHENOWETH. Trees of, say, 20 or 25 years of age.

MR. COPELAND. I am from Colrain, and we all know that we raise some apples in Colrain, but I don't know of five colonies of bees within many miles. You folks know something about Apple Valley, (this whole section produces more apples than the state of Oregon), and they say they haven't many bees, and we want to know how we get the apples without the bees. We spray and don't have any more insects than the rest.

PROF. CHENOWETH. Well, I don't doubt but you have a great many wild bees.

MR. COPELAND. Well, I don't know where they are.

PROF. CHENOWETH. Well, you just get out into your orchard in blossom time.

MR. COPELAND. I haven't seen but one swarm of bees within 10 years, and that was found right in the very village itself.

PROF. CHENOWETH. When I spoke of wild bees, I didn't mean such as you find in trees, but the Sweet and other members of the bee family.

PROF. SEARS. You go out into your apple orchard when the apple trees are in blossom, and I'll guarantee you will hear a good, big humming.

PROF. CHENOWETH. I think it has been demonstrated that in the case of Baldwins, they are a self fertilizing variety and a great many are grown, but there isn't any question in my mind that if you had good cross-pollination, Apple Valley would be even more celebrated for its fine apples, for experiments show in every case that as to size and form of fruit you would get better apples and larger

apples if you had adequate means of cross-pollination.

MR. COPELAND. I have been studying the Baldwin a little myself. I had one back pasture there where I cut all the apple trees down but one, which I left just for the fun of the thing, and because some of the neighbors wanted that I should, just to see what it would do. It is on a hill, and there are no other apples trees nearby, and that tree bears every other year; full of nice apples. I am satisfied that it is self-fertilizing.

PROF. CHENOWETH. All demonstrations have shown that it is, yes.

PROF. SEARS. The trouble with Mr. Copeland is that he is getting all the apples he wants already, and this notion that he could increase his crop by 50 or 100 per cent doesn't appeal to him. (Laughter).

MR. NORMAN. I am about 10 miles south of Mr. Copeland, and we have the same experience. Last spring we had mighty few bees, saw hardly any, and yet we had trees bearing 8 or 10 barrels to the tree.

PROF. SEARS. And probably would have had 20 if you had bees!

MR. NORMAN. Well, I didn't want that. That raises another question: If you have too many bees, how much thinning have you got to do?

MR. TORREY. I would like to say for the benefit of these gentlemen, that in my spare time I hunt bees, and I believe that all these New England hills are just covered with swarms of wild bees, and they have a hard time to live. I had 7 swarms that I found in 1911, and in the spring of 1912 every one was dead. The hills of western Massachusetts are just alive with swarms of bees.

PROF. CHENOWETH. That explains why Mr. Copeland gets fruit without bees.

QUESTION. I would like to ask what a good colony of bees should weigh, say, the first of September.

MR. PURRINGTON. I should say they would weigh 50 pounds.

QUESTION. Without the honey?

MR. PURRINGTON. Oh, you mean the bees themselves? Doctor Gates ought to be here. I suppose there are 40,000 to 50,000 bees, and they will weigh 5 or 10 pounds with any hive.

QUESTION. I would like to inquire if bees would have any tendency to keep away injurious insects by working in the trees.

PROF. SEARS. You mean, the codling moth, for instance?

QUESTION. Yes.

PROF. CHENOWETH. I don't believe they would.

PROF. SEARS. I think they would require some training before they would do that.

MRS. BROOKS. How can you arrange to spray so as not to interfere with the bees, so that they will be safe? The blossoms of the different trees fall at different times, and you can't hang around with the spraying apparatus at the different places.

PROF. CHENOWETH. You would have to take the time when the maximum number of trees are shedding their petals, and do it then. You would probably kill a few bees, but not enough to do serious damage.

MRS. BROOKS. I started keeping bees with one hive, and I wouldn't allow the men to spray the trees until the blossoms had all fallen, consequently the spraying didn't do any good.

PROF. CHENOWETH. You waited too long.

MRS. BROOKS. Some of the blossoms fell early.

PROF. CHENOWETH. I should say that if you began to spray when two-thirds or three-fourths of the blossoms had fallen, there wouldn't be any great amount of damage.

MRS. BROOKS. Do they work on the apple blossoms until the very last?

PROF. CHENOWETH. Until the petals begin to fall, and then, of course, the pollen is dried up and the nectar has ceased to secrete, and then of course the bees have nothing further to induce them to visit the tree.

MR. PURRINGTON. How late can you spray for the codling moth, when the apple is standing up with the blow end open, before it closes, which is usually considered to be about a week, possibly sometimes stretching out to eight or nine days after the petals have fallen?

PROF. SEARS. I think that depends a good deal on the weather. If you have cold weather, you can stretch

out the time, but if they are growing very rapidly, a much shorter time.

MR. PURRINGTON. Is it true that the proper time to spray is when the little bit of apple is standing straight up and the calyx is standing open?

PROF. CHENOWETH. The proper time to spray for codling moth is when the calyx is open, yes sir, and before it closes up, so as to close the material in there. The codling moth usually takes his first meal down in the calyx cup, and if you get that full of poison, you get your codling moth where you want him.

PROF. SEARS. If there is no further discussion, I presume we had better close this session. I hope you will all be out at this evening's meeting. There are some preliminary exercises in the way of a welcome from the City, and then the meeting is to be in connection with the deer nuisance, and I hope you all appreciate the importance of that. The question of spraying for the codling moth is a mere incidental matter with us, for if we could get rid of the deer, the codling moth and other small things like that wouldn't bother us.

(An adjournment was taken to 7.30 p. m.)

EVENING SESSION

Thursday, January 15th, 1914.

Professor F. C. Sears, Presiding

The meeting was called to order at 8.05 p. m. by Vice President F. C. Sears of Amherst.

PROF. SEARS. The hour has long since passed for calling this meeting to order, so we won't delay any longer. The first thing on the program is to be music by the Y. M. C. A. Training School Quartette.

(Music by Quartette.)

PROF. SEARS. The next number on the program is "Springfield's Welcome." We have already experienced her welcome in a great many ways, among others in these splendid quarters that have been provided for our meetings. We are to have, however, the official welcome tonight. As his Honor the Mayor is unable to be present, we are very glad indeed to have the Honorable Scott Adams, City Solicitor of Springfield, here to represent him, and I take pleasure in presenting to you Mr. Adams at this time. (Applause).

SPRINGFIELD'S WELCOME

Scott Adams, Esq., City Solicitor.

Mr. Chairman, Ladies and Gentlemen of the Massachusetts Fruit Growers' Association: I am sure that you regret with me the fact that brings me before you to perform this function. Personally, I regret it not at all, for to me it is a privilege and a pleasure to deliver to you the welcome of the City of Springfield, but from your standpoint I can assure you that the Mayor should have been here.

He has asked me to welcome you; he has asked me to say to you that he and Springfield are glad that you are

here; he has asked me to say to you that Springfield hopes you will come again.

The topic assigned to me by Mr. Jenks for thirty-seconds' speaking is "Superior Springfield's Welcome." It would be presumptuous of me to talk of Superior Springfield. What Springfield is, what Springfield offers, what Springfield means, is not for Springfield to say, but for you, who view Springfield from the proper perspective, to determine. I would be content myself, for the Mayor and for Springfield, if I could paraphrase that subject, and deliver to you Springfield's Superior Welcome, a welcome which you would recognize as being sincere, as coming from the heart of Springfield as a city and as a civic community, a welcome that meant something, and a welcome that, more than all, would mean your presence with us again. I thank you. (Applause)

PROF. SEARS. I am sure that we already feel that we are welcome here, but our welcome is to be made a little broader by receiving a welcome from Western Massachusetts, which is to be delivered by Mr. F. J. Hillman, Director of the Board of Trade, instead of Mr. J. L. Brooks, their President, who was to deliver it. We are very glad indeed to have Mr. Hillman with us. (Applause)

WESTERN MASSACHUSETTS' WELCOME

Mr. F. J. Hillman, Director of the Board of Trade.

Mr. Chairman, Ladies and Gentlemen of the Massachusetts Fruit Growers' Association: I had supposed that I was asked to speak to you upon this occasion, and to bring to you the welcome of the business men of Western Massachusetts, because of my absolute lack of knowledge of anything pertaining to the fruit growers' industry or of horticulture in any of its branches, but as I have been sitting here this evening awaiting my turn, my attention has been drawn to this exhibit of fruit upon the table, and it reminds me that I was born and raised upon a farm in Western Massachusetts, and that the one thing that I do remember having been taught in my youth was the necessity of perserving

carefully apples of this kind (indicating some good fruit) to pack at either end of the barrel, and I judge, by some remarks that I have heard, that that is a custom that hasn't been entirely outgrown yet.

I feel that it is a peculiar privilege to come before the members of horticultural organization and to bring to you the welcome of the business men of Western Massachusetts. There is peculiar significance in the fact that today, more than at any period during the history of this community, the business man of the community is interested in your subject and in the subject of agriculture. There is no topic which one can introduce into the conversation of any gathering of business and professional men, and particularly in this section of the country which has been referred to as "The Effete East", which will bring such an immediate hearing and response, as the subject of agriculture or horticulture.

Even in that great and select club, the University Club in New York City, I have discovered that there is within the organization a "Farmers' Club", a club made up for the most part of millionaires who have taken up farming for an avocation, and who meet and discourse learnedly upon the quality of fertilizer, upon the methods of fruit growing and marketing, upon the question of seed and of soil, and it is a very select wheel within a wheel.

Now, is that a fad? No. It is business. Your modern business man is a man of broader intellectual attainment; he is a man with a growing appreciation of the underlying principles that govern the progress of business, and he knows that, economically speaking, the importance and the balance of power of a nation, a commonwealth, a community, depend upon and are in direct ratio to its productivity; and hence, following that process of reasoning, that ultimately, productivity used in that sense, the productivity which is the foundation of his business, means the productivity of the soil. It is a business proposition.

I glanced in the newspapers as I came down, and I observe that you have decided to hold your conventions in Springfield, in Boston and in Worcester. We feel that you have done us an honor, and a proper honor, in coming to us upon this occasion. We think that you have shown excel-

lent judgment in selecting the three cities of Massachusetts that you have selected for your convention places. We recognize Boston as the foundation, the feet, so to speak, of the Commonwealth; Worcester, as everybody knows, is the heart of the Commonwealth—and Springfield is the head! (Laughter and Applause)

Springfield, seriously, is the metropolis of Western Massachusetts. In that respect she occupies a position comparable with Boston in Eastern Massachusetts, and our citizens are proud of the fact. But greater significance lies in the realization by the men of Springfield of the burden which is upon them and the responsibility which is upon their shoulders, and our business men are meeting that responsibility and they are endeavoring to reach out and offer their best protection and cooperation, and particularly are they doing that with respect to those who are pursuing agriculture and fruit growing and kindred lines.

Now, you ask, "What is the attitude of the something more than one thousand practical business men who comprise the membership of the Springfield Board of Trade?" Almost exactly a year ago this month a small number of rich men met in this city and organized the Hampden County Improvement League for the promotion of just that sort of industry which you are interested in and which you stand for. In that League are to be found some of our very best, biggest, brainiest and busiest business men, men who have put their shoulder to the wheel and who are giving freely of their time, of their money and of their knowledge, and at personal sacrifice are taking up this matter of progress in the rural community, the development of scientific agriculture and scientific horticulture. With such men as they have back of that organization, there can be no failure, and it is going to do, and is doing, one of the greatest works in that line, probably, that has ever been done in any community.

Now, we would not for a moment rob the Hampden County Improvement League of any of the credit or any of the glory which rightly belongs to it—and it is much—but nevertheless it is true that but for the Springfield Board of Trade there would have been no Hampden County Improve-

ment League, probably. It is the Board of Trade that made it possible; it is the active men in the Board of Trade who are, in large measure, the active men in the League. I cite that to show you the interest that the business men of Western Massachusetts have in your work.

I assure you that you are welcome; that the business men of Western Massachusetts receive you with open arms. No prodigal was ever received with a more sincere and cordial welcome than that which I am permitted to extend to you tonight, and we expect much from your organization and others like it. We are depending upon you to bring about the time when the rugged hills of Western Massachusetts will be painted with the soft colors and tints of the foliage and the sun-kissed fruit of prolific orchards. More than that, we are depending upon you to bring to us the time when we can hold out to the world the noblest fruit that the Creator has given to mankind—a perfect Massachusetts apple.

You are indeed welcome. You have done us an honor in coming here, and we hope that you will stay as long as possible, and when and if you must go, be assured of the sincerity of our invitation to return soon. I thank you. (Applause)

PROF. SEARS. I am going to call on our good Secretary, Mr. F. Howard Brown of Marlboro, to answer these welcoming addresses. (Applause)

ADDRESS OF MR. F. HOWARD BROWN.

Secretary of the Association.

Mr. President, Representatives of the City Government and the Board of Trade of Springfield: We certainly appreciate the words of welcome and the acts of welcome that we have received, not only since we have been here at this time, but at previous times.

The first appearance we made here in looking up this meeting was along in October, I think, when the President of the Association and I came to the city and happened to strike the meeting of the Hampden County Improvement League at the luncheon at the Cooley House. Nobody from

the eastern part of the state who had never attended a meeting of that sort would have any conception of what enthusiasm you have up here. Although it is being developed around New England, it is something that has not been disseminated at least in the eastern part of the state.

I had the privilege of being in Lewiston not long ago, and saw the same tendency in Maine. The Lewiston Chamber of Commerce were entertaining the Maine State Pomological Society, and there the business men and the farmers were getting together.

Now, that is something that ten years ago was absolutely impossible. It was not the fault of either the business men or the farmers alone. Perhaps we were too independent. We New England farmers are altogether too independent, to my notion. We are always, you might say, looking for trouble, or at least have been in the past, and perhaps when any organization of business men would invite an organization of farmers to cooperate with it, why, the farmers began to look for the nigger in the wood pile, and the business men would think that they had nothing in common with the farmers.

That day, without the slightest doubt, has passed. The business men are sometimes taking up their old homesteads not alone as summer places but are producing and sending that product to market, and they find that the farmer has got a straight up-and-down problem to deal with. He isn't making the money that perhaps some folks think he is. He has got a good hard row to hoe in the help line alone, and in the financial line, also. The business man is realizing that the farmer can help him, and the farmer is reciprocating.

I was asked to say a few words in regard to the Massachusetts Fruit Growers' Association. Recently, in going over the books, only as far back as 1908, the receipts for the year were under \$100, while the receipts when the books were balanced in March 1913 were over \$1000. Of course, that is not an entirely fair comparison, because we had the Worcester meeting in March and there was also the January meeting in Boston, which were included between the two balancings of the books; but it gives an idea in general as to

the progress the Association has made within the last few years, merely between 1908 and 1913.

Perhaps I had better explain that ordinarily the Secretary has something to do with making out the program. The program this evening was made out by the local committee here and the Secretary saw it for the first time practically after it was in the printer's hands, so that the Secretary had no chance to get after it in the first place. If he had, you may be very sure that his name would not have appeared on the program. The Secretary has always considered that the proper place for him was down behind the scenes, working, rather than appearing in public, and I trust that the representatives of the City and Western Massachusetts will excuse me if I do not come up to the expectations they might have in responding to their welcome.

I am sure that the Association very heartily appreciates it, not only the words, but the acts. Some times an organization may be invited to hold a session, and then the invitation may be forgotten and nothing futher done officially, but from the very first the invitation which we have had has been sincere and the welcome has been continual and still continues, and we have had help from all the organizations, not only from the City and the Board of Trade and the Hampden County Improvement League, but everybody in this part of the state, and I am very sure that, so far as the organization is concerned, we will be very glad to come again. I thank you. (Applause)

PROF. SEARS. Speaking merely as a resident of the western end of the state, I am glad that our Secretary is being educated as to the possibilities and general conditions out here in the west.

We are next to have another musical number.

(Music by Quartette)

PROF. SEARS. We are rather accustomed to feel, I think, that most of the big stories, the stories that have to be taken with a grain of salt, come from the West. I found it very interesting, in visiting the West recently, to discover that we could tell some stories from our end of the line that they found difficult to swallow, and the story that even I,

with my reputation for veracity, found it difficult to make them believe, was that the deer cause us trouble here in Massachusetts. If I had told them some stories a good deal further from the truth, I presume they would have believed them. I really think that we have a most interesting situation here, to the fellow that has no trees to be damaged by deer. To think that the powers that be spend thousands and millions of dollars to develop an industry, and then turn around and protect, or practically protect, the very worst pest to that industry, certainly makes a unique situation, and I am very glad indeed that the Hampden County Improvement League and other people are becoming interested in the situation.

We are to have for the rest of the evening a Round Table on this subject, the deer problem, and the session is to be in charge of Mr. Scheuerle, the General Secretary of the League and I take pleasure in presenting him to you now. (Applause)

Mr. Scheuerle outlined the history of the League, its purposes and aims and the manner in which its operations are conducted.

The damage which deer do to fruit trees was discussed by Mr. R. H. Race of Egremont, taking the place of Professor Waugh, who was unable to be present. Mr. Race stated that he had seen and experienced a great deal of damage caused by deer; stated it was a very serious problem to fruit growers and farmers. Mr. Race said that 15 years ago he saw only one deer in his locality, that 5 years ago he saw 16 at once, and that he has been told of 150 being in one locality; that he has been told of deer destroying 91 out of 100 trees which were set out a year ago; that it costs the farmer \$40 for each deer raised; that unless the deer nuisance is stamped out it will be impossible to raise fruit in Massachusetts in the near future; that the deer meat is tuberculous.

A speaker corroborated Mr. Race, following which many others made the same statements in effect.

Mr. C. W. Carpenter of Monson, gave his experiences with the damage done to grass and field crops by deer; stated that the deer are very fond of grasses and legumes; that he had had alfalfa and clover destroyed by them without its being given opportunity to grow, being browsed even

closer than cutting with a lawnmower; that he used to protect deer, but now would destroy them if he could; that the farmers are raising deer for the sportsmen to shoot; that they are very destructive.

This was corroborated by many speakers.

Mr. F. T. Jorey spoke in favor of the deer, as did one other speaker, saying that they were beautiful creatures and that he did not believe they did as much damage as many thought. This was disputed on every side; suggestions were made that the less deer there were, the less cruelty could be practised in the killing of them.

Mr. H. K. Herrick of Blandford, stated that deer herd where they can be protected from winter weather and can feed upon the young sprouts of trees, of maple, oak, chestnut, willow and black birch, but won't eat the gray birch, which everybody wishes they would; that they simply nibble off the tops of young trees and spoil them; that seedling trees nibbled by deer are killed; that this is having a very serious effect on the raising of lumber; that the legislature is inconsistent in reforesting, and protecting deer at the same time to help destroy them.

A speaker stated that he had been sceptical as to damage done by deer, but had seen the damage and become converted to the idea that they destroy much lumber; that he had planted a cover crop, and had an eight-foot fence around his orchard, but it was impossible to keep the deer out; that in improving land, one is simply inviting the ravages of the deer.

Mr. Jorey again stated that he had not seen much damage caused by deer.

Many speakers disagreed strenuously with Mr. Jorey.

Mr. Archer N. Tuttle of Warren, read a paper on the damage done by deer to garden crops.

Mr. Jorey stated that the deer had damaged him only to the extent of \$1.50. He was again strenuously opposed by a great number of speakers.

Mr. Edward S. Butterfield of Brimfield, gave a talk on adequate reimbursement, and stated that it is impossible to get anywhere near the amount of damage done by deer from the State, in spite of the law which is supposed to reimburse

the farmer; gave instances of getting very small reimbursement for large damage.

Various speakers corroborated Mr. Butterfield.

Ex-Representative W. J. Sessions, of Hampden, gave his reasons for thinking the deer laws unsatisfactory; compared them with the laws protecting gulls and game birds; stated that when the laws were made there was no thought, probably, that they would develop into a nuisance and source of damage to farmers; that the same protection should be given against deer as against domestic animals doing damage; that a farmer should have the same right to protect himself from deer that he has from human trespassers; that by the present law many men are made lawbreakers; that the hunting of so many deer is placing human lives in danger, many times; that he hoped it would be brought before the House of Representatives.

In answer to a question, Mr. Sessions stated that doe with young should not be killed, but they could all be killed as soon as the young were old enough to take care of themselves.

A speaker advocated the use of round slugs instead of the shot now used, since shot will spread too much and some times only wounds the deer slightly, causing him to go off and suffer and die in pain.

Mr. Herrick stated that at a meeting of the State Board of Agriculture, the Governor had stated that he would do all he could to help the farmers in this regard.

Mr. A. R. Jenks of Springfield stated that something must be done to lessen the number of deer in the state; stated that many men who were working for a close season were not farmers; that the Hampden County Improvement League had appointed a committee of eleven to take up the subject; that they had advocated an open season the year around except during the three months when the deer are breeding; that the legislature must at least be asked for a longer open season; that they had modified the requested law to call for a six-weeks open season, from, say, the middle of November to the end of December; that the bird hunters, fox hunters, and the automobile people are with them; that it would be well for all who are interested to get in touch with their Representatives and Senators and push the bill.

Mr. Harold Frost, President of the Fruit Growers' Association, stated that they wished to get the bill through this year; suggested that everyone write his Representative or Senator giving the amount of damage he has known of; that each man speak to his neighbors to the same effect; that the President and Secretary of the Association, on receipt of such letters, will see that they go before the Committee at the hearings at which he would be present; that the presence of those who had been damaged would count for more than anything else.

Secretary Wilfrid Wheeler of the State Board of Agriculture expressed the opinion that there would be strong opposition to the bill carrying a six-weeks open season all over the state; suggested restrictions on private deer reservations, stating that deer are often found coming out of them and doing damage; that a farmer should be allowed to shoot a deer that has damaged his property, even if the deer were not on his own property; that it might be well, on account of the strong opposition which would be encountered from the eastern part of the state, to limit the six-weeks open season to the western part of the state. Mr. Wheeler emphasized the opposition which this bill was sure to encounter.

(Adjourned to Friday, January 16, at 10 a. m.)

SECOND DAY

Friday, January 16, 1914

The convention was called to order at 10.30 a. m. by President Harold L. Frost. President Frost again called attention to the poor apples which were on the table, and to the three differently packed barrels of apples on the platform.

THE PRESIDENT. This morning we have with us a man who is a practical fruit grower, who has made a great success in his line. I understand that this is the first time that he has ever addressed an audience. Now, we all like to hear from a man who has done things. Mr. Margeson is sending the best currants and some other small fruits, that go into the Boston market, and I have known of him getting several cents a quart more than the market price. I also think that he is getting more per acre than any other fruit grower in the state, and possibly in New England. We had to work hard to get him to come and speak to us, and I am sure that you will appreciate his efforts as much as your officers do. I now take great pleasure in presenting to you Mr. Ingram I. Margeson, of Westwood, Mass., who will give you his personal experience on a fruit farm. (Applause).

PERSONAL EXPERIENCES ON A FRUIT FARM

Mr. I. I. Margeson, Westwood, Mass.

Mr. Chairman, Ladies and Gentlemen, Brother Fruit Growers, Members of the Massachusetts Fruit Growers' Association and Prospective Members:—

I feel sure that after attending this grand meeting all of you prospective members will become real members of this association by each depositing one dollar with our Secretary and Treasurer, Mr. Brown. If you are in the least interested in fruit-growing it will be your best possible investment, returning you many and many 100% dividends.

I am going to give you a little talk this morning on the subject of "What CAN be and what HAS been done on a five acre plot of old Bay State soil," or "Personal experiences on a fruit farm." These personal experiences of mine I trust will be of benefit to those who are contemplating fruit growing as well as to those who are already engaged in that line of work.

In January, 1904 I purchased a farm at Westwood, Massachusetts. The five-acre field which is the subject of my discussion this morning was in sod and full of stone. Located on, or near the boundary line of the field was an orchard of forty-five old apple trees, all very much in need of renovation, covered with moss, filled with dead wood and bearing a very small amount of fruit.

During the year of 1904 I pruned and scraped the apple trees, cut about five tons of hay, blasted and dug out the stones, carted them off and cleaned up the field.

In 1905, the second year, I planted about one third of the field to vegetables, principally corn and potatoes. I selected these crops because the corn shades the ground well and the potatoes necessitate stirring up the ground deeply. The land was thoroughly cultivated and witch grass and weeds found it a difficult job to exist. In the fall, stable manure, about seven cords to the acre, was ploughed in. I was forced to buy my manure but I would strongly advise, if one has land enough, the carrying of enough stock to raise one's own manure.

In 1906, the third year, I thoroughly cultivated the three acres in the early spring and planted them to fruit trees and bushes as follows:
follows:

About 1 $\frac{3}{4}$ acres to apple trees. 100 trees, 30 feet apart.
About $\frac{1}{2}$ acre to peach trees 100 trees, 15 feet apart.
About $\frac{1}{4}$ acre to pear trees 50 trees, 15 feet apart.
About $\frac{1}{2}$ acre to cherry trees 100 trees, 15 feet apart.

For fillers in the apple orchard I used 100 plum trees, in the pear orchard, dwarf apple trees. I realized that at some future time either the plums or the apples would have to come up. At present I am undecided which. By next year I feel that I shall know positively. Among the large apple trees and the cherry trees I planted 4000 currant

bushes—two rows of bushes between each row of trees and three bushes between each tree in the row. In the adjoining field of $\frac{1}{4}$ acre I set out about 800 of these currant bushes in order to compare their growth and production with those among the trees. All the planting was done in the early spring.

In planting, holes were dug 3 feet in diameter by $2\frac{1}{2}$ feet deep. The surface soil was well packed about the roots of the trees, no manure being put in the hole. The poorer grade of soil was placed about the tree nearer the surface and on the surface was applied a good mulch of stable manure. Continuous cultivation was given the soil until August 1. After that all weeds were removed by hand or by hoe.

In 1907, the fourth year, I gave a thorough cultivation to the three acres already planted and planted another acre. On this new acre which I planted as a standard apple orchard, I tried the experiment of using peach trees and dwarf apple trees as fillers. As peach trees demand more space than plum, I set out my standard apple trees 35 feet apart each way. Between these in the rows, I planted peach trees each $17\frac{1}{2}$ feet from the apple trees. Between the rows I set out a row of dwarf apple trees, 10 feet apart. Then between each standard apple and peach tree I planted 4 currant bushes; between the dwarf apple trees, two currant bushes. In the fall the currant bushes were pruned lightly and all the trees and bushes were given a liberal amount of stable dressing.

In 1908, the fifth year, three years after planting, especially good care was given the trees and bushes, all being sprayed and pruned. That year I gathered my first real fruit. In the fall I again manured the land.

In 1909, the sixth year, I gave the first three acres clean cultivation, eliminating all garden truck and cover crops, finding that in the fourth year the trees, with my intense fruit culture, required from the soil all the food it contained. Generally good care was given the trees and I was rewarded with a good crop of fruit most excellent in quality.

In 1910, the seventh year, I sprayed, pruned and fed the trees giving careful attention to each detail. The fifth acre was then planted with standard apple trees the same as the

preceeding acre except that cherry trees were used in place of dwarf apples—partly because I had not had time to see just what the latter would do and partly because I wanted to learn by experiment, just what the cherry trees would come to. In the fall I harvested another good crop of fruit.

In 1911, the eighth year, I continued giving the closest attention to all the fruit planted. On the 4th and 5th acres vegetables and garden truck were raised between the trees. Two thousand more currant bushes were planted, filling in the peach and pear orchards first planted. A large crop of fruit was gathered although it was somewhat affected by hail from the storm of June 20th.

In 1912, the ninth year, I did not cultivate the three acres first planted. I believe in it, but I could not use a horse between the rows. Some day, not far distant, I hope, there will be put on the market a new machine, motor-driven, which will work in 3-foot rows and will neither smash the limbs of the trees nor destroy fruit like a horse. Although I did not cultivate these acres I kept all weeds out and mulched heavily with manure and green rye straw. I gathered a good crop of fruit, the currants harvesting the largest crop to date.

In 1913, the tenth year, the eighth after planting the first three acres, seventh after planting the fourth acre and the third after planting the fifth acre has proved the banner year in general fruit production.

PLANTING

April, I have found to be the best month for planting, for all stock planted thus early has a chance to start its root connections with the soil before the summer drouths arrive. Thorough planting is very necessary. Work the soil into the roots; press it in all around the root system and tramp firmly into the hole. Use the top soil for this. Do not use soil dug from the bottom of holes except on the extreme top. Do not tramp this in.

CULTIVATION

Cultivation is very important in the early life of trees and plants. I begin cultivating as soon as the trees and bushes are planted and continue twice weekly until August 1. I stop cultivating then in order to eliminate further

growth and to give the wood a chance to mature sufficiently to withstand the rigors of a New England winter. This early spring and continued cultivation, I have found, forms a dust mulch which retains the water in the soil and so proves of the greatest value to trees and bushes during the periods of summer drouth.

PRUNING

I prune my currants either late in the fall or early in the spring with hand clippers, removing about one-third of the bush, all weak new wood and a large portion of the 3-year-old wood. My apple, pear and cherry trees I prune in March and April. My young apple trees I head back from 6 inches to 1 foot. My pear and cherry trees I prune lightly, cutting out the chafing and interlocking branches. In pruning the latter trees always remember to leave room for the sun to get at the cherries if you would harvest the finest fruit.

Plum trees should be pruned in April. Some varieties should be headed in severely, cutting back as much as 2 feet. Others, especially the Burbanks, should be encouraged to grow upright, by leaving the lateral bud on top of the limb where the cut has been made.

Peach trees should be pruned during the latter part of April, at the time of their blossoming. This affords an opportunity to cut out the unfruitful and the weaker branches. I have found that vigorous pruning gives the best results.

SPRAYING

Dormant spraying I have found to be the best. Absolutely ALL fruit trees and bushes should be sprayed, and THOROUGHLY. I use lime-sulfur and find that it will keep in check all kinds of scale if applied to ALL parts of the tree or bush. Spraying 90% of a tree is very unsatisfactory. My trees run in rows North and South. In spraying I go over each tree twice, once with an East wind, once again with a West wind or vice versa. If no wind is blowing at the time, I spray both sides of the tree.

FEEDING AND MULCHING

In the late fall, after the foliage has fallen I use stable manure to the extent of 6 or 8 cords to the acre, placing it

around each tree and plant with a fork. Early in April I apply to each acre 1000 pounds of basic slag, 250 pounds of sulphate of potash and 250 pounds of bone meal.

IRRIGATION

I feel confident that if water can be properly applied to orchards at certain times during drouths that the crops can be greatly assisted. In fact I have saved an entire peach and cherry crop by irrigating, carrying water to the trees by pipes and digging trenches about the trees five or six inches deep. For young trees I have made the trenches six feet in diameter. I fill and refill the trenches several times according as the water is absorbed by the dry earth around the trees.

MARKETING

In marketing, ALWAYS put your fruit up honestly and give good measure. Sell only as A No. 1 fruit, that fruit which is A No. 1. Do not try to work off seconds as firsts. This takes more time and care, but the time and care are both well spent. If practicable, sell direct to the family trade as this is generally the most profitable way to dispose of fruit. The commission merchant, if his firm is reliable, is well worthy of patronage and will many times return you net as much as you would have received from the family trade, time and general expense being considered. I have very little use for fruit "hawkers" as I find that they usually try to get your product at low figures and make all kinds of complaints about it, no matter how good it may be.

DIFFICULTIES

I have found many difficulties in fruit-growing but have generally been able to cope with them. Some of them are San Jose scale, leopard moth, aphid, borers, currant worm, gypsy and brown-tail moths, breakage of heavily-laden branches by wind-storms, peach leaf curl, drouths, hail-storms and lack of competent help. I have also been troubled in getting my fruit picked and marketed promptly.

I have found that close attention to spraying, dormant and later, locating and digging out the leopard moth, early bracing with props of heavily-laden branches and thorough dormant spraying of peach trees with lime-sulfur for leaf

curl have proved very successful. The help question, one of my greatest difficulties is still unsolved.

STATISTICS

Apples and peaches have returned the largest net income to me. Currants used as filler crop have been very profitable, yielding good dividends.

Largest crop of currants in one year

From 6000 bushes—18,000 quarts.

Largest crop of peaches in one year

From 125 trees—1200 14 qt. baskets.

Largest crop of cherries in one year

From 100 trees—4700 pounds.

Largest crop of apples in one year

From 45 old trees—700 bushels, as against 100 bushels the first year.

Largest crop of plums in one year

From 90 trees—5200 qts.

VARIETIES

I have been most successful with the following varieties of fruit.

Apples—Baldwins, Rhode Island Greenings, Roxbury Russets, Bellflower, Yellow Transparent, Bismark.

Peaches—Elberta, Stump, Greensboro, Lady Kneeland, Champion, Ray.

Plums—Burbank, Abundance, Shippers Pride, Bradshaw.

Cherries—Large Montmorency, Early Richmond, Bay State, Bing, Windsor, Governor Wood.

Currants—Wilder, Perfection, Red Cross, Cherry, Fay's Prolific, Prince Albert, Black Champion, White Grape.

Pears—Bartlett, Bosc.

Let me say one word in conclusion before I answer your questions. I have found fruit-growing a most pleasant occupation. Everyone here knows the delight of watching a tree or bush slowly develop, day by day, knows the delight of caring, tending and administering to it; knows the delight and pride when the full, ripe fruit—perfect in shape and luscious to the taste—comes to the table.

Such pleasure alone can only be enjoyed by our wealthy neighbor who raises fruit for fun. We here, who are in

the business for a livelihood need another pleasure—that of a well-earned profit. And I can safely say that I have enjoyed that pleasure.

So can each one of us here, but only at a cost of much hard labor, incessant care and deep thought. This labor and care and thought must be applied every day. We must labor in our thorough and clean cultivation; we must take care in our daily inspection and in our thorough spraying; we must think deeply on every change and on every turn that our trees and bushes may take. And no detail of the entire work can be held as too trivial for our notice.

A man who puts all this into his orchard, even if it is an old worn-out one, will have his double reward. He will enjoy the healthy growth of his trees and the beauty of their fruitage with his wealthy neighbor. And he will enjoy, what perhaps his neighbor cannot, the pleasure of a fair profit on his investment and on his labor.

THE PRESIDENT. Now, you have here a man “with the goods.” Ask questions and get the information that he can give. We want to make this meeting a very informal one and we don’t want to have anyone fear to ask questions, because we are all ignorant on some things.

MR. FORBES. I would like to inquire as to what is the very best variety of currants.

MR. MARGESON. That is a hard question to answer. Several varieties are doing well. Perfection is the most productive, but I believe it needs to be grown in the shade instead of in the open. If you grow it in the open it is liable to be afflicted with sun scald. I should put the Wilder second.

MR. WILFRID WHEELER. I would like to ask Mr. Margeson if he doesn’t consider Perfection too light in color for a good seller.

MR. MARGESON. I haven’t had any complaint, and have found it goes very satisfactorily. I don’t pick it quite as soon as some might, but I think that if you let it hang, it will get more color. I have got a larger yield from Perfection than any other. I have kept account of the yield, and have taken as high as eight quarts to the bush, which I can’t get from any other variety I have.

MR. MacRAE. I would like to ask if you will give us in rough numbers the returns from five acres as intensely cultivated as are yours—the net returns.

MR. MARGESON. Well, do you mean at the present time?

MR. MacRAE. Any one year; say, last year.

MR. MARGESON. Last year was more productive with me than were the earlier years, as the trees and bushes are getting up. I have taken a gross amount from those five acres of about \$5000 in 1913. Of course, you can figure it in different ways; you can make your net profit small or large, but I feel it netted me at least half of that amount.

PROFESSOR W. P. BROOKS. What is the speaker's judgement in reference to the profit on dwarf apple trees as compared with the standard apple trees?

MR. MARGESON. I would not advise planting dwarf apple trees as a commercial proposition, but I believe that when you are starting the orchard, if it is filled in with dwarf trees, there will be a profit in them. I have got fruit from dwarf apple trees after two year's planting and at three years I have got nearly a bushel on some of the trees, but they must be very carefully handled.

MR. STAPLES. How about dwarf pears, and the profit from them?

MR. MARGESON. I think you will get very little profit from dwarf pears.

MR. WINSOR of Rhode Island. I don't want to ask a question, but I think the gentleman is worthy of congratulation on the results of his labors on five acres of land.

MR. MARGESON. Thank you.

MR CURTIS. How much do you prune the dwarf trees?

MR. MARGESON. Well, I prune them vigorously, try to keep them down.

MR CURTIS Is there danger in pruning the dwarf?

MR. MARGESON. I would fear that there might be with some varieties in so doing. but when you are growing trees as intensely as I am. you have got to prune to keep the limbs from getting into the limbs of the other trees, and I prune quite heavily.

MR BILLINGS. Do you find that fertilizing with

stable manure and the heavy pruning of peach trees gives you trouble by having winter-killing from stimulating new wood?

MR. MARGESON. You get plenty of new wood, but you cut it out, and I get better results than if I didn't feed them as well as I do.

MR. BILLINGS. But don't you have trouble with winter-killing from the new wood?

MR. MARGESON. I have very little trouble. In my earlier planting I was very careful, and about the first of September I cut back the new wood, and it seemed to harden up the wood and they stood the winter all right.

MR. NORRIS. Is the Ray peach a good variety with you?

MR. MARGESON. Yes, very good.

MR. NORRIS. How does it compare with the Carman?

MR. MARGESON. I am not growing Carman, but I think it is a better peach. It gets off the tree very quickly if you have much wind, but it seems to keep well and has a very fine flavor. It seems to grow fast and large and heavy, but it presses itself off the stem and we have difficulty in keeping it on the tree.

MR. BUTTERFIELD. I would like to ask if you have trouble in interplanting peach and apple trees, by increase of borers.

MR. MARGESON. I haven't found that, but I wouldn't altogether recommend planting peach trees as fillers in an apple orchard. You see, you lose the shape of the apple tree which you desire. The peach tree is the quicker grower and takes more of the sun, and the apple tree has to shoot up and make itself a higher tree in order to get its share.

MR. STAPLES. Have you found any remedy for borers, except the knife and wire?

MR. MARGESON. I have followed an experiment that I think was helpful. I have taken crude fish oil and applied it to the trunk of the tree with a brush, for probably a distance of about six or eight inches, digging away the soil for about two inches and then going up four or five inches above the ground.

MR. STAPLES. For both peaches and apples?

MR. MARGESON. Yes, I have used it on peaches and apples.

THE PRESIDENT. I would like to state that Mr. Margeson and some of the rest of us in our locality were troubled with the leopard moth, which is the most serious borer we have in the eastern part of the state.

MR. WILFRID WHEELER. If you want to get rid of the leopard moth, put up plenty of good nesting boxes for the woodpeckers. They will take care of them, and will find them more quickly than you can.

MR. MARGESON. I have found more of them recently than for some time, in the young apple trees, at the beginning of the branches, three or four feet from the ground, and all I would notice was just a little sawdust effect coming out, but on digging it out, I would sometimes find the cavity of one or two inches. I think we will have to keep looking over our trees for that pest.

MR. CARPENTER. I would like to ask how you fertilize your currants.

MR. MARGESON. I use stable manure. The fruit is so intensely planted that the manure has to be conveyed in by wheelbarrows. I put on slag and potash and bone meal, sowed broadcast in the spring.

MR. CARPENTER. About how much to the acre do you put on?

MR. MARGESON. As I stated in my paper, about eight cords of manure per acre. That takes care of the trees and the currant bushes. I use about 1000 pounds of basic slag, 250 pounds of sulphate or muriate of potash, and 250 pounds of bone meal.

MR. GEER. How low down do you head your trees?

MR. MARGESON. Well, I have tried different experiments, but now I head them 'way down, getting the trees to branch from six to ten inches from the ground. I have had some that were two or three feet, but the low-headed tree interests me the most.

MR. A. J. NORMAN. Have you ever had any experience with the low-headed trees having their lower branches cut off just as though done by a knife? I had some low-headed trees in my orchard, and found the branches had

been take off low down. I found 15 trees that way, and since then I have been willing to have a high head.

MR. MARGESON. I wouldn't be surprised if the leopard moth should attack your tree in that way. They will cut your branches pretty clean, and they will drop off.

MR. WILFRID WHEELER. I would like to ask Mr. Margeson what experience he has had with sweet cherries.

MR. MARGESON. My experience has been poor, generally speaking. I don't believe they are profitable to grow.

MR. WHEELER. What kinds have you that you recommend?

MR. MARGESON. Montmorency has been the largest money getter.

MR. WHEELER. I mean, in the sweet cherries.

MR. MARGESON. Bay State is a fairly sweet cherry, and if you can get a crop, it is a very fine fruit, but they don't fruit very heavily. Windsor is another.

MR. WHEELER. Have you tried Black Tartarian?

MR. MARGESON. I have tried it, but I haven't had much success with it.

THE PRESIDENT. If there are no further questions, we will give up this subject. We want very much to hold a field meeting with Mr. Margeson, when he will let us see just what he is doing. I have always been astonished at the amount that can be done on a small area, and whenever I have seen a place like Mr. Margeson's I have felt that most of us are making a mistake in trying to do too much and only half doing it. I wish that this address might go to many of the city people who anticipate buying farms and making a living on them. I don't believe that many of them can make the success that Mr. Margeson has, but if more people could only see what he has done, I believe it would save a great many failures in this respect in the future.

Now, we also have with us this morning Doctor E. Porter Felt, State Entomologist, of Albany, New York. We have called on Doctor Felt for many years. He is a Massachusetts man and a graduate of our Agricultural College, and he has always been much interested in both the College

and in the Fruit Growers' Association. He is one of the men that the Commonwealth can feel proud of. We have sent out many entomologists who are making a name for this state, and I consider that Doctor Felt is the leader of those men who have gone out to help the other states solve their problems.

I now take pleasure in presenting Doctor Felt, who is the only speaker on spraying that we will have during this convention, and we will give you ample time to ask questions, even if we have to carry it over into the afternoon session. (Applause).

SPRAYING FOR INSECT PESTS

Dr. E. Porter Felt, State Entomologist, Albany, N. Y.

Primarily and fundamentally we are dealing with a business proposition. Spraying is protective not curative; it is a species of insurance, not reimbursement; it differs from both life and fire insurance, in that returns are not conditional upon demise or destruction but upon production. The profits are proportionate to the activity of insect pests and the development of fungous diseases, and yet the assurance of comparative crop safety is worth something.

It is evident that the remedy must not be worse than the disease, though the speaker knows of cases where spraying was conducted in good faith and the latter condition of the orchard was worse than the first. A man dependent for a living upon his trees may advantageously keep clear of experimental work, especially of the kind which may jeopardize the existence of his orchards. Trees are living organisms and the mere fact that they have successfully withstood a given treatment one season, gives no assurance that the same will be true another year, though it may go far to establish a probable freedom from injury. The great trouble with a man unaccustomed to experimental work is that he jumps at conclusions and soon is taking greater chances than are justified by the available facts. If I could say but one thing, it would be this: Cultivate such a conservative and prudent habit that it will be impossible to adopt on a large scale, any method or procedure which is not thoroughly justified by competent authority.

Does spraying pay? The mere fact that most commercial orchardists and a large number of farmers spray one or more crops, would indicate that this is a paying operation.

The cost of spraying six apple trees in 1911 was 48 cents or less than 12 cents for each barrel of fruit kept from being thrown into the second class or cider apples because of injury by the apple worm or codling moth. These six trees were representative of conditions obtaining throughout a large orchard and clearly indicate that the thorough spraying was profitable. In another orchard six trees sprayed at a cost of about 10 cents each, produced eight barrels more of sound fruit, the cost of spraying amounting to $7\frac{1}{2}$ cents per each barrel, which would otherwise have been wormy. The check or unsprayed trees in this orchard produced over 32 barrels to the hundred of wormy fruit, while the trees treated as mentioned above, yielded less than two barrels per hundred of wormy fruit. These are only two illustrations of the profits resulting from spraying, and by no means represent the maximum returns, since the orchards were not badly infested. Many similar instances may be cited.

Steps may be taken when planning an orchard and selecting a location which will materially increase the efficiency of spraying later. The trees should have ample room and every one be readily accessible from all sides. Crowded trees on uneven hillsides are never thoroughly sprayed. Planting varieties in blocks assists since it is much easier to meet varietal peculiarities when a number are grown together than when they are scattered. In the case of the codling moth there are reasons for believing that it is more difficult to secure a high percentage of worm-free apples in orchards where the varieties are mixed. Some attention should be given to the surroundings of the proposed orchard, not only for the present but for the future. If a little selection is possible and will make the work of the future easier, by all means attend to this phase of the problem.

The first essentials in spraying are: The recognition of the need, the appreciation of the possibilities, and some knowledge of the insects or fungi causing the trouble. The two first are necessary to supply the incentive, and the last must exist or there can be no intelligent direction of energies. Spraying for San Jose scale is practically of no value for the control of the codling moth, while the poison used for the destruction of this insect has no effect upon the

developing plantlice: In other words, sprays must be adapted to local needs, and the farmer and fruit grower should first of all know something about the more injurious insects affecting his crops, otherwise the results from spraying are apt to be extremely unsatisfactory.

The spraying next on the calendar is that for the control of the San Jose scale. This may be done at any time conditions permit between now and the starting of the buds in the spring. Personally we are inclined to favor late spring applications because they seem equally efficient and, theoretically, should be more so,—and if the work be delayed until the buds actually start, we also have in this treatment a specific against the blister mite, and if tobacco and poison be added, a very efficient check for early appearing plantlice and the early leaf feeders, such as the apple tent caterpillar, the bud moth and the case-bearers. Some of our Hudson valley growers do not give this spraying until the buds have started well, sometimes waiting till even the pink shows in the blossom, and thus obtain very satisfactory results against the scab. This late spraying, especially when tobacco is added, may be of much importance in orchards where red bugs have become numerous. Last year about one-third of a large crop of Greenings in one orchard in the Hudson valley were practically blasted by these pests.

The best spray material which can be used against San Jose scale is one of the standard lime-sulfur washes, commercial or home-made, testing about 4.5 degrees Baume after dilution. The general excellence of this material is shown by the fact that it constitutes probably 90 per cent. of the spray used for scale insects in the important orchard sections of New York State. Individuals and manufacturers are still endeavoring to improve this wash and various brands and modifications have appeared or are likely to be put upon the market in the future. Prof. Parrott of the Agricultural Experiment Station at Geneva has been making a test of various sulfur compounds. For the purpose of standardizing these comparisons and thus obtaining definite results, he adopted for the experimental work a solution containing $4\frac{1}{2}$ ounces of sulfur per gallon for the winter spray and 1 ounce of sulfur per gallon for the summer spray. Sulfur compounds used for spraying may contain lime (calcium)

barium, sodium and potassium. Certain results of tests conducted by Prof. Parrott with these various compounds are given below.

Efficiency and Cost of Sulfur Compounds

	Per cent. living scale	Cost per gallon of spray
Calcium (lime)	1.4	1.7c
Barium	1.6	3.8c
Sodium	2.3	3.9c
Potassium	9.3	22. c

Only a glance at the figures is necessary to show that the old reliable lime-sulfur wash is a little more efficient and decidedly cheaper than the other compounds. It was found in these experiments that sodium and barium compounds lacked uniformity, while the sodium and potassium preparations were apt to burn the foliage very badly when applied as summer sprays. The Federal insecticide law compels all insecticides entering Interstate commerce to bear on each and every package, a label giving the percentage of the essential ingredients, and it is therefore very easy to judge correctly as to the value of the sulfur compounds, if comparison is made with the above table. By all means purchase insecticides on the basis of the efficient content. Mere pounds count for nothing unless you have the real thing in the package. With this table, so far as sulfur compounds are concerned, one can easily judge as to which is the best for average orchard spraying. The Baumè or specific gravity test is the most reliable indication of the relative value of lime-sulfur washes. A high grade concentrated lime-sulfur wash, commercial or home-made, should contain practically no sediment.

A miscible oil is sometimes used in the place of a lime-sulfur wash for the control of San Jose scale and blister mite. This, either home-made or commercial, is not entirely safe, owing to the fact that under certain climatic conditions or the physiological state of the tree, serious injury may result. Such a preparation appeals to many, however, because it spreads more readily than a lime-sulfur wash.

In view of the great abundance of San Jose scale parasites, the question may arise as to the probable need of spraying in sections where these insects are numerous. There

is no question but what the parasites in many instances rendered material aid in checking the scale last summer. We found on a part of a twig an inch long and 5-16 inch in diameter, 184 exit holes, each of these meaning one scale insect destroyed. Although encouraging, it should be remembered that in many cases the parasites had become numerous only after the trees have been severely injured, and in not a few instances, killed. This is the first occurrence of the kind we have seen in a period of fifteen years, and these insects may not render material service again for a decade or more. It does no harm to know about the parasites, the entomologists have known of them for decades, although the time has not come when we can safely rely upon these little friends. The Good Book tells us to "pray without ceasing." The horticulturist should spray without ceasing.

The most important insect the orchardist must control is the apple worm or codling moth, a pest which may reduce the crop of sound fruit by one-fourth to nearly three-fourths. This is such a serious loss that we may well spend a few minutes studying the insect, in an effort to ascertain the most efficient method of checking its ravages. This insect winters, as most know, in a tough, silken cocoon usually located in an oval cell under the rough bark of trees. With the appearance of warm weather in the spring, usually late April and early May, the caterpillars change to apparently lifeless pupae, and a week or ten days after the blossoms fall, the moths commence to emerge and continue to appear throughout the greater part of June. The minute, whitish eggs are deposited largely upon the leaves, though a number may be found on the young fruit. They hatch in about a week and, as a consequence, the young apple worms of the first brood may be entering the small fruit from early in June, approximately three weeks after the blossoms fall, to nearly the end of the month or even later. These caterpillars require about four weeks to complete their growth, at which time they desert the fruit, wander to a sheltered place and spin a cocoon. They transform once more to pupae and in about two weeks, namely the last of July or in August another brood of moths may appear. These in turn deposit eggs which hatch in due time and the young caterpillars

usually enter the side of the fruit, producing the familiar side-wormy apples. Two broods appear to be the rule in the northern fruit growing section of the United States.

With the above summary of the habits of this insect in mind, it is easy to see that there are three well defined periods when applications of poisons may be more or less effectual.

The first comprises the week or ten days after the dropping of the white petals or bloom, and during which the much smaller green calyx lobes remain open and the young apples upright in such a condition that the calyx cavity can be more or less filled with poison.

The second period is about three weeks after blossoming and is the time when the young codling moth larvae or apple worms hatch, begin feeding and enter the fruit.

The third period is the latter part of July or early August and is of especial importance because the small caterpillars of the second brood, the young apple worms are then hatching and feeding on the leaves or entering the fruit.

We were desirous of obtaining some information as to the actual value of poisoned sprays applied during these different periods, and also wished to ascertain how many were necessary to control the apple worm under average conditions. Experiments were begun in 1909 and continued through 1912. The work was planned along practical lines, so far as possible, and special pains taken to secure only fairly representative trees in orchards kept in good horticultural condition. Invariably the spraying outfit and the men on the place were employed, the entomologist contenting himself simply with explaining his methods and insisting upon reasonable thoroughness in treatment. It only required, for example, one minute and three gallons of spray material to treat a tree 15 feet high with a power outfit equipped with two lines of hose. The experiments were conducted in four well separated localities, while the trees selected were of the standard varieties, being Baldwins, Greenings, Northern Spy and Ben Davis. The diversity of season, location, equipment and men and the different varieties used for the tests, prevent these experiments being classed as local or exceptional. The spraying was invariably given as soon as possible after the dropping of the petals,

special pains being taken to throw the poison down upon the upturned ends of the young apples. The results we propose to discuss for a few moments should be compared in every instance with the yield from check or unsprayed trees, which, during the four years period under discussion, produced 32 per cent. or practically one-third wormy fruit.

Spraying during the first period, namely the week or ten days after the blossoms drop and preferably as soon as possible thereafter, depends for efficiency upon poisoning the floral organs and the calyx cup or the calyx cavity, the small depression at the blossom end of the young apple. This application, as mentioned above, is given some two to three weeks before the small apple worms begin feeding, and finds its justification in the fact that two-thirds to three-fourths of the wormy apples on unsprayed trees are what are known as end wormy; in other words, about three-fourths of the young caterpillars seek to enter the fruit at the blossom end. There are those who insist upon the necessity of using a high power and a coarse, driving spray in order to secure the maximum benefits, though experiments in earlier years, under Hudson valley conditions, have shown so little difference between the two methods that we are unwilling to insist upon this point. In fact the weight of evidence, which is not strong one way or the other, is somewhat in favor of the fine, well distributed spray. The method of application has invariably been to adjust the nozzles so that the poison (2 to 3 lbs., 15 per cent. arsenic oxide, arsenate of lead to 50 gals. of water) would be thrown down into the upturned blossom ends and an effort made to cover all portions of the tree rapidly and uniformly. Most of this spraying was done from the ground with ordinary nozzle extensions and disk nozzles set at an angle of 45 degrees, though in one orchard the owner preferred to use bamboo poles to which the hose was tied and nozzles adjusted so that they would discharge in the desired direction. One thorough spraying given as outlined above and during this period, gave an average for the entire series of experiments, of 97.56 per cent. of worm free apples, less than $2\frac{1}{2}$ per cent. being wormy; or, stated differently, out of a yield of 423 barrels, one spraying gave over 55 additional barrels of sound fruit when compared with the product from unsprayed trees. These returns are

based on practically every apple the tree produced, including the drops, and every fruit grower knows that such figures would mean over 99 per cent. of sound fruit upon the trees at picking time. Obviously, with such results from one spraying, a second and a third application could not add greatly to the returns.

Theoretically, spraying during the second period, namely about three weeks after the blossoms fall, should be more efficient than applications at any other time, since it is then that the young caterpillars are just beginning to feed and enter the fruit. We tested the efficiency of this one spraying during two seasons and found that it was by itself, about one-half or one-third as effective as the treatment given during the first period, in each instance making comparisons with the unsprayed trees as a standard. A spraying during the second period, when given in addition to the first spraying, produced only a very slight additional gain in the four year period, namely but .09 of 1 per cent; surely no very material advantage.

The application in the third period, the latter part of July or in early August, is designed to check the second brood and is applied at about the time the young caterpillars of the new generation are beginning their feeding. These latter are the ones responsible in large measure for the side wormy apples of the late summer. In our experimental work this third treatment, in addition to the first and second, gave an average of 99.22 per cent. of worm free fruit, a gain for the third treatment, of practically $1\frac{1}{2}$ per cent. (1.57 per cent).

There are one series of figures which are particularly significant, namely the percentage of end wormy apples. That for the unsprayed or check trees was a little over one-fifth of the total yield (21.73 per cent.) The trees sprayed only once and during the second period, gave one-eighth of the total yield (12.26 per cent.) of end wormy apples; those sprayed once and during the first period, practically one-third of 1 per cent. (.353 per cent.) of end wormy apples; those sprayed twice (namely once during the first and once during the second period) yielded less than one-third of 1 per cent. (.308 per cent.) end wormy apples, while the trees receiving the three applications bore less than one-fifth of 1

per cent. (.185 per cent.) of end wormy apples. It will be seen at once that the one spraying during the first period is by far the most effective in reducing the number of end wormy apples and this, taken in connection with the fact that two-thirds to three-fourths of all the wormy apples on unsprayed trees are entered at the blossom end, shows why the early spraying (the application within a week or ten days after the blossoms fall) is the one which produces the results. It is obvious that if the first spraying for the codling moth is by far the most efficient, this is the one upon which special stress should be laid. One thorough spraying at that time is fully twice as effective as an application given a little too late to secure the best results. In our experience we are satisfied that more penetration is secured if the work is done just after the blossoms fall and before the stamens have dried and twisted so as to present a more or less effective bar to the entrance of the poisonous fluids into the calyx cavity, the point where most of the young apple worms should meet their fate.

If the fruit grower can fully realize the importance of the first spraying for the control of the codling moth, there is little probability of his suffering much from later broods. Paradoxical though it may appear, the way to control the second brood is to spray thoroughly for the first.

A study of the data collected during a series of years, justifies the conclusion, for the Hudson valley at least, that in normal seasons when the crop is abundant or fairly abundant, one thorough early spraying within a week or ten days after the blossoms fall and preferably early during that period, should result in the production of 95 to 98 per cent. of sound fruit. A slight gain will accrue from a second treatment about three weeks after blossoming, and additional returns may be secured from a third spraying the latter part of July. The benefit from the latter two is comparatively small, so far as the codling moth is concerned, though ample to meet the cost of the poison and, in many instances, probably the expense of the treatment. A small crop almost invariably means a larger percentage of wormy fruit, and if the prospects are even fair for good prices, the third spraying (the latter part of July) would justify itself because of

the additional protection from possibly severe injury by the second brood. The treatment three weeks after the blossoms fall may be advisable, especially if the first application is not thorough for some reason or other, though as stated a moment ago, we much prefer to emphasize the importance of thorough work during this first period.

It may be contended by some that the results from a single spraying, given above, are better than the average fruit grower can obtain by himself. The best answer we can make to this is that during the past two seasons we have, without previous warning, gone into the orchards where experimental work was conducted in earlier years, and found that the owners had obtained practically the same returns without the benefit of any supervision or suggestions from the entomologist, aside from that gained while the experimental work was in progress. Last summer one of our fruit growers became somewhat worried about the possibility of injury by a second brood and, to satisfy himself in regard to the matter, sprayed two rows in an orchard in early August, all having been thoroughly treated during the first period as described above. An examination of the yield at picking time showed that the trees sprayed but once bore about 95 per cent. of worm free apples, while the second application in August resulted in a gain of approximately 2 per cent of sound fruit. Practically this made little difference, since the infested apples produced by the trees sprayed but once, were mostly on the ground and therefore very few, in any event, could be run in as first-class fruit.

Spraying for the codling moth, so far as we are concerned, has not resulted in making an enthusiastic supporter of any one system. It has, however, shown us the possibilities, and if conditions are such that one spraying will not do the work, by all means give more. Before concluding that the latter is necessary, be sure you know what thorough work means, because it is much more economical to spray a tree satisfactorily in one treatment than to make two trips—the second, if unnecessary, simply means wasted effort. We are well satisfied that under Hudson valley conditions, and they are not very different from those of Massachusetts, orchards in what we term a good horticultural condition will give surprisingly satisfactory returns with one thorough

spraying as outlined above. This treatment should ordinarily prevent serious injury by early leaf feeders, such as the apple tent caterpillar, canker worms, bud moth and case-bearers, and if tobacco has been added at the rate of $\frac{3}{4}$ of a pint of 40 per cent. nicotine to 100 gals., it will destroy many plantlice and possibly obviate the need of later applications for these pests. A fungicide, either Bordeaux or lime-sulfur wash (not a soda sulfur wash) should also be added to the spray because of the protection thus afforded against fungous diseases.

A word as to plantlice may be timely. It is exceedingly difficult to forecast probabilities with these insects, though as a rule, a cool, backward spring is favorable to their development. Precautions are justified under such conditions which could hardly be advised if the skies were bright and the temperature rising, because the latter conditions are favorable to the rapid development of efficient natural enemies, such as the black spiny grubs of the ladybeetles, the varicolored maggots of the flower flies and the small four-winged parasites which live within the bodies of the plantlice.

The pear grower has special problems. He may find it very desirable to delay the lime-sulfur treatment for San Jose scale until the buds begin to start and the pear *Psylla* has deposited its yellowish eggs. Spraying at that time takes care of both the scale and the *Psylla* if the work is thorough. It is advisable to supplement this by keeping the trunks of the older trees smooth and thus diminish the shelters and eliminate, in some measure, the number of flies which survive. In cases of unusually serious infestation it may be advisable to spray during warm days in late fall or early winter for the purpose of destroying the *Psyllas* as they emerge temporarily from their winter retreats.

Blasted pear blossoms, the mysterious blossom blight, has resolved itself in the Hudson valley into injury by pear thrips. The slender, dark brown insects are about 1-20 of an inch long and have very delicate, narrow, fringed wings. They appear on the trees as the buds start and quickly shelter themselves among the expanding flower buds and later between unrolling leaves. The bloom is literally blasted, presenting a brown, seared appearance, there is an

unusual drop of bud scales and the small leaves have a characteristic spoon-shaped deformity. Sticky honeydew is abundant on the infested trees. Here again, are conditions where late treatment with a lime-sulfur wash, to which a tobacco extract such as black leaf 40 has been added in the proportion of 1 to 800, is justified. This will destroy many of the early appearing thrips, and if the insect is numerous, another spraying may be advisable just as soon as the young pears have separated sufficiently so the insects at the base of the stems are exposed. It may even be necessary to give another spraying after the blossoms fall. This insect works so rapidly and seeks shelter so persistently, that promptness in treatment is a prime essential to successful work.

The false tarnished plant bug is capable of producing on pears, a condition similar to that caused by the red bug on apples, namely an irregular, gnarly development, the depressions being marked by pithy cores which may extend some distance into the fruit. The young begin to appear when the trees are coming into blossom, and the pest can be most successfully controlled by spraying with a tobacco preparation such as black leaf 40, using $\frac{3}{4}$ of a pint to 100 gals. of water to which is added 3 lbs. of soap. Some growers have been satisfied to delay the regular lime-sulfur spraying for San Jose scale, adding thereto the requisite amount of the tobacco extract.

Specific directions might be given for the control of other insects and this paper continued to an almost indefinite length. The main thing is to appreciate the fact that, as a rule, most insects can be controlled if one understands the method of attack. Complaints of unsuccessful work invariably lead us to ascertain the cause. We should remember that a chain is not stronger than its weakest link and any defect in our method of spraying, be it lack of thoroughness, untimeliness, a poor or unsuitable material, is bound to have disastrous results. We would urge upon all progressive fruit growers, the desirability of adopting a system of spraying which may be profitably followed year after year, because in this manner alone, can the best results be obtained, especially in controlling such a pest as the codling moth. Trees producing a large crop one year, like the Baldwin,

need protection from insect enemies and fungous diseases the following year, in order to store sufficient energy to produce a large crop the next season. The early leaf feeders, such as the bud moth, the two case-bearers and canker worms should be kept in check by annual sprayings. Unfruitfulness, in a measure, may be due to unsuspected injuries by any one of these insects. The production of large crops of high quality fruit necessitates vigorous trees practically free from insect pests and fungous diseases, a condition which can be brought about only by thorough and systematic spraying.

THE PRESIDENT. We will now welcome all the questions you wish to ask.

MR. E. M. IVES OF CONNECTICUT. The Doctor has alluded to Black Leaf 40, which perhaps some of us are not using. There has been trouble in combining Black Leaf 40 with arsenate of lead, and also in using Bordeaux mixture, if you should use it in that first spraying before the petals open. What suggestions has the Doctor on any experiments that he has made along the line of using another combination with Black Leaf 40 as an insect spray, and also as a fungicide? In other words, a combination of sulphide of iron and zinc arsenate with Black Leaf 40. Have you made any experiments with those combinations? This combination spraying is something we have got to get right, and we have evidently got to hit all these different things with the one spraying, and this problem of summer spraying is a pretty serious one; and just where to hit, and hit right and combine right, is a very intricate problem.

DR. FELT. I don't know that I can answer you very definitely, except to say that so far as Black Leaf 40 was concerned, I understood that it could be used safely with a lime-sulfur wash not with Bordeaux mixture, and that some other tobacco preparations have given trouble. I do not wish to be misconstrued as trying to defend one product more than another, but I have alluded to this one because it seemed to be a moderately standardized material, and the great difficulty in the past in recommending a tobacco product has been to get hold of something which you could refer to definitely as containing so much of the actual insecticide.

We have not made any experiments with sulphate of zinc. We have a number of growers who have been using the Black Leaf 40 and lime-sulfur combination with a great deal of satisfaction.

MR. IVES. And arsenate of lead combined?

DR. FELT. Yes.

MR. IVES. Well, there are Station Reports that show injury where they used either arsenate of lead or combined it with Bordeaux mixture.

DR. FELT. I was at the New York State Fruit Growers' meeting the week before last, and there the statement was repeatedly made that this tobacco preparation could be used on apple with the lime-sulfur wash and also with the arsenate of lead.

MR. IVES. But under New York conditions.

DR. FELT. Yes. Of course, there may be a difference in the conditions between here and over in the Hudson Valley, but I would not expect anything very marked. I am willing to admit that these combinations are new and perhaps present some new features. A heavy spraying with a lime-sulfur wash, at summer strength, to which poison is added may of itself produce burning. The spraying must be carefully done and pains taken to secure good distribution. Here is one question: Was this a lime-sulfur, or a sodium sulphide?

MR. IVES. I don't know that I have anything in regard to lime-sulfur combination, but I am speaking more of the arsenate of lead and copper as a compound.

Dr. FELT. I can't answer that quite so definitely as in relation to lime-sulfur.

PROFESSOR BROOKS. I want to say only that at the Experiment Station last summer we combined Black Leaf 40 with Pyrox, with extremely satisfactory results. We had a great deal of trouble with red bug for one or two years, and we had very nearly perfect fruit last season, almost wholly free from red bug. This combination spray was made just after the petals fell.

MR. STAPLES. What protection would you suggest for browntail moth? They have been troubling us in our vicinity for several years. They come on in May or about the first of June, and strip the trees.

DR. FELT. You mean under orchard conditions, or woodland?

MR. STAPLES. Orchard conditions.

DR. FELT. With the trees sprayed?

MR. STAPLES. Certainly. We sprayed five times last season, and yet they persisted somewhat, in fact, quite largely, with their work. We picked the nests in the winter and thought we had pretty well got rid of them, and yet we had an abundance of browntails in the spring, and then we sprayed again in August, and a good many persisted through that and lived and ate the leaves. They would not die with arsenate of lead.

DR. FELT. I think Mr. Frost would be better qualified to answer that, because he knows about it. We are not spraying for the browntail in New York, because we haven't got it yet. Mr. Frost is in the business, and he might tell you.

MR. BRONSON. I would like to ask about sweet spray for the control of the cherry fruit fly and the apple maggot, and whether the use of such sprays would interfere with the bees.

DR. FELT. I can't tell you about the bees, but Professor Herrick of Cornell conducted some experiments in 1913 near Lake Cayuga, in which he obtained very satisfactory results by spraying a small amount of sweetened arsenical poison on the foliage of the cherry for the control of the cherry fruit flies. In regard to the fruit fly on apples—railroad worm—there seems to be some advantage, but there seems to be comparatively little injury from that insect in orchards which are systematically sprayed for codling moth. I have yet to learn of any definite experiments showing that this insect is equally well controlled by the use of these sweetened sprays, though I would rather expect that such might be the case. We have been trying for seven or eight years to find a condition where we could thoroughly test out the sweet spray, and as yet have not been able to do it. We find a few in some orchards, but these were mostly sprayed, and the flies never became abundant enough so that we could get any decisive data.

MR. MANN. I want to ask the Doctor what he can tell us of the use of soluble sulfur in killing the San Jose scale.

DR. FELT. I have not tested that out carefully, but it has been tested by the Agricultural Experiment Station at Geneva, and so far as they have got at it at present, it works very nearly as well as the lime-sulfur wash. There is a variation of less than 1 per cent, in the case of San Jose scale. This is necessarily based on only a few season's work. I don't want to say too much about soluble sulfur. It is a material which can hardly have been tested out thoroughly, and I am a little curious to know what the results will be when the application is followed shortly by heavy rains.

MR. MANN OF ESSEX COUNTY. I notice you recommend the combination of lime-sulfur and arsenate of lead in spraying for codling moth. I think that is a very dangerous doctrine. It may be safe in New York, where you haven't the browntail and gypsy moth, but not in eastern Massachusetts. Here in Massachusetts 3 pounds of arsenate of lead to 50 gallons of water just gives the browntail and gypsy moth enough to get fat on, and don't do any good at all, and I don't think that less than 5 pounds of arsenate of lead to 50 gallons of water is any use. That gives them enough so that they stop business right away.

As for the combined lime-sulfur and arsenate of lead, I haven't used that combination, but I have repeatedly been in orchards the first of the summer, where you could see the foliage burned in some places quite badly, and I would ask the man if he didn't use the lime-sulfur with the arsenate of lead, and he would say, "Well, yes, we did use it on this part of the orchard, but on most of it, we didn't," and in most every place where I would see the foliage burned and the fruit hard, it would be where they had used that mixture. It may have been a climatic condition or perhaps it wasn't put on right, perhaps they didn't use the right amount, but at the same time, there was the damage and we ought to know how to protect ourselves against it. In some places where they used the highest priced poison of the lot, which I suppose really is arsenate of lead and lime or Bordeaux mixture, I noticed they had used it on their McIntosh and Gravensteins, and when they were ripe they didn't have a fancy apple in the lot;—all blasted on one side where they got that spray. We ought to know how to do these things right.

I don't know much about the use of soluble sulfur. It is nice stuff to handle and you don't have to pay a lot of freight, but I have used the combination of soluble sulfur and arsenate of lead and I damaged two or three orchards very seriously. Whether it was a climatic condition or not, I don't know. Perhaps I used more of the arsenate of lead than I should have, but I don't believe it is safe to combine the two in my section of the state, from what I have observed. I think it did more damage than it prevented. I want to get rid of the scale, of course. I have followed the teaching of the scientific men and the Docor and everybody else, to the best of my ability, and still there is scale. Last fall I made a heavy application of oil, and again in the spring I dosed them heavily with the soluble sulfur. On some trees there was no scale at all, and I don't know whether it was the oil in the fall or the soluble sulfur in the spring.

MR. STAPLES Is it safe to put on 5 or 6 pounds of arsenate of lead with water?

MR. MANN. I think it would be safe to put on 20 as far as injury to foliage is concerned.

DR. FELT. If I understood the speaker correctly, it is possible that he and perhaps somebody else has misapprehended my remarks. I have recommended, and still recommend, the use of a fungicide with an insecticide,—that is, either Bordeaux mixture or a lime-sulfur wash with arsenate of lead, and over in New York State a great many of our fruit growers are drifting into the use of a lime-sulfur wash rather than Bordeaux mixture, and unless the application is quite heavy, they get very good results. Here, where you have browntail and gypsy moths and use a larger amount of arsenate of lead and presumably make a heavier application. I would not be at all surprised if you should have some foliage injury.

Another thing I want to make clear is this: the gentleman asked in regard to soluble sulfur for the San Jose scale. I gave you the data in regard to it in my paper. He refers to serious injury following the combination of a soluble sulfur and arsenate. We have had just that experience in New York State, and at present consider the combination unsafe. I saw trees last summer with three-fourths of the leaves taken off, and the men who made the applications

told me that they had followed the manufacturer's directions.

MR. MANN. I ought to make clear one point in deciding whether it is that combination. I didn't want to condemn the soluble sulfur because the combination had done the damage, and I proved to my mind that it wasn't the sulfur, but was the combination that hurt the trees. One day a little later on, when the trees were in full foliage, I thought I would give the hen-house a good soaking, and I had the soluble sulfur handier than lime, and I made a strong solution, twice or three times as strong as I would put it on for a winter application, and I soaked the hen-house thoroughly, and then I turned the hose on to an apple tree that was right handy, and it didn't hurt that any, so that it seemed to me that it was the mixture, it was the combination, that did the damage. It would be valuable for me, I think, if I could learn to do these things right the first time.

THE PRESIDENT. For the benefit of the audience I would like to give the opinion of Dr. Boker, the chemist of Brown University. He is very much interested in fruit growing and fruit spraying. He states that, knowing what he does of the chemical elements of arsenate of lead and sulfur, he would not use the arsenate and sulfur compounds on foliage. He says that sulfur has a great affinity for the arsenate and will react on any arsenic compound if it is in sufficient quantity. That is simply the chemical end of that combination, and I think you should use your own judgment. Many people are using a combination of lime-sulfur with arsenate of lead with safety, and manufacturers are sending out some letters showing where soluble sulfur and arsenate of lead are used in safety, but I shouldn't advise any of you to use those combinations unless you are pretty sure of them, And bear in mind the opinion of this chemist of Brown University, who stands very high in his profession.

MR. FOSTER. Until last year I have always used self-boiled lime-sulfur preparation with arsenate of lead, but last year I tried some of the soluble sulfur. I had never been told by anyone but what I could use arsenate of lead with it just the same as I had the other preparations, and I immediately got into trouble, and by the time I had burned enough of my apple trees, I found others had been doing the same,

and I got frightened and would not use any more of the soluble sulfur, and I have it on hand now. I am told it was a splendid thing to use alone and use the arsenate of lead in a separate spray, so I would like to ask if that would be a safe plan, to spray with the soluble sulfur and let it dry on the tree, and then spray with arsenate of lead, at two different times? They would be mixed on the tree, and I was wondering if anyone has had any experience. I would like to use up the rest of the soluble sulfur in some way, and I don't know what to do.

DR. FELT. If I were in that fix, I would certainly try to use my soluble sulfur as a San Jose scale spray. I don't know just what the result would be, and I am not sure that any living man could tell you. I think a good deal would depend on conditions following your application. If you put soluble sulfur on first and there was considerable rain, there might be enough of that washed off so that you could make an application of arsenate of lead and there wouldn't be any reaction. If, on the other hand, there was no rain to wash it off, or wash off either one or the other—and the rain wouldn't wash off much arsenate of lead, anyway—and you got both on, and even though there was subsequent drying, I wouldn't want to be responsible for the result with the recurrence of moist conditions. In New York State trees sprayed with a combination of soluble sulfur and arsenate of lead showed progressive burning, which extended over a considerable period. Some of the leaves which received a heavy coating, came off early, and the others dropped off at intervals of even three or four weeks, showing that there was more or less chemical activity going on for some time. With that in mind, it would be a little hazardous to permit a possible combination of that character.

MR. IVES. It seems as if the western fruit growers have met with all the troubles that we are going to be up against, in these combined sprays, and I incidentally mentioned this zinc arsenate and sulphite of iron as a combination they are working on. I don't know whether the Doctor has taken it up or not. If you use a Bordeaux mixture for the first spray, on the bud we will say, and cease to use Bordeaux then and use it just for one spray for that period, for a fungicide with arsenate, if you want to, and

then for the next spray cease that and take up this sulfur and arsenate, you will have trouble: I have. I wouldn't want to use that strong Bordeaux after the petals drop, but I have for rust, etc., and found the other trouble of completely stripping the set of fruit, as well as some leaf injury. I wanted to get a combination that wouldn't produce injury or be affected by the weather, that would hit all these bugs and fungus diseases, but I haven't got it yet. I have had trouble, as this chemist from Rhode Island says, and they probably have had the same thing in the west. They are mighty careful of their fruit; they want that fruit just as fine and near perfection as they can get it, and they have trouble with combined spraying.

THE PRESIDENT. I would like to say, the West is still having trouble. I have here some Hood River apples I picked up in one of the Boston stores, which are covered with scale, and also have flaws in them, the first western apple I ever saw that had scale.

MR. PUTNAM. Yesterday a scientist told us that we must plant our apples in mixed plantations in order to secure the great benefit of cross-fertilization, and Dr. Felt tells us that we must plant in blocks in order to aid in controlling the codling moth. If we plant in small blocks, will those be large enough blocks to be of use in controlling the codling moth?

DR. FELT. It is a little difficult to answer that question, because I doubt if there is any exact data. I made the suggestion for the reason that in some orchards I have seen alternate setting in the rows, and some of my friends have had a good deal of difficulty in controlling the codling moth under those conditions, I couldn't attribute it to any other feature than that mixture of varieties. I didn't mean to make that recommendation in opposition to the advice of a competent horticulturist, but I did mention it as one of the factors which might make spraying a little easier for the control of insects, from the entomologist's standpoint. It is up to the fruit grower to judge which is best for himself—mixed or in blocks. Planting varieties in alternate groups of two or four rows would probably harmonize this difficulty.

MR. STAPLES. Is there any advantage in Bordeaux mixture as a fungicide, for instance for the scab, over the

lime-sulfur, for the early spray, say, when the bud is pink?

DR. FELT. I don't care to take a position on that one way or the other, it not being an entomological question.

MR. STAPLES. It is claimed in good authorities that the lime-sulfur is entirely equal to that work, and I wanted to ascertain if it is, that's all.

THE PRESIDENT. I will ask for an expression of opinion from the audience.

MR. IVES. I probably haven't got percentages in comparing these things, but it is generally recognized that Bordeaux has been the better and stronger. The only trouble is that it is too strong at certain periods and does the work too well, sometimes causing rusting and injury to foliage. I have never had that trouble, but on certain varieties you will have more than on others. I doubt if the Spy will be affected by any spray; certainly not by Bordeaux or sulfur.

MR. MARGESON. I would like to ask if we can use arsenate of lead and tobacco together as a dormant spray for bud moths?

DR. FELT. They are being used in New York State. They are making an application of lime-sulfur, and leaving the spraying for the San Jose scale until the leaves get out a distance of a quarter of an inch and sometimes even until the pink shows in the blossom, putting on a lime-sulfur wash and Black Leaf 40, and arsenate of lead, and are not getting material injury. They are using it in the central fruit growing section of the state, and there has been an insistent demand in that section for an opportunity of putting on the poison in connection with the San Jose Scale spraying. The only advantage I can see from that is that when you delay treatment until you have something green to put your poison on, you can get some of those early leaf feeders, and in that section we have one or two which may possibly be very serious, namely, the leaf roller, which has destroyed fruit in several orchards in recent years, and which begins feeding and works right down into the buds and ordinarily escapes the usual poison spray. The only way to get at it in time is by putting on the poison just as soon as the first green shows, and then you have a decided advantage. I

might say in regard to this leaf roller that experiments in the West, and some conducted by Professor Herrick of Cornell, would indicate that the spraying in the spring or during the dormant season with a miscible oil or petroleum emulsion is perhaps the most effective method of checking them when abundant in an orchard.

MR. MILLER. I am pretty firmly convinced that the simpler we keep our spraying mixture and the more effective we are in the use of them, the better results we will get. The average fruit grower is apt, when he gets into the realm of various spraying mixtures which we have today, to become confused. I feel that with a good thorough application of the lime-sulfur compounds for the dormant spray we can control most of the scale insects and the fungus troubles, and then when we get into the summer season where we are liable to get the codling moth and the chewing insects, at that time, if we have thoroughly worked with the lime-sulfur, I believe we can thoroughly control the chewing insects with the arsenate of lead. Now, I hope that every fruit grower here today, whatever else he may get from this discussion, will go home with the idea that if he uses these two spraying mixtures thoroughly, he can practically control the entire situation as relating to the production of perfect fruit. I would suggest with relation to the lime-sulfur that the mixture may be made a little stronger than is ordinarily recommended; I believe about 6 gallons to 44 gallons of water is the ordinary formula, but my rule has been about 8 gallons and I have observed, as to practical results, that the stronger the mixture up to that point, the better the results are. I likewise believe that a little stronger mixture of arsenate of lead than is ordinarily advised produces better results, and I likewise believe that this spraying problem should never be disassociated with the other factors and the other essentials that are necessary in order to produce fruit. In other words, I believe that better cultural treatment, more attention to pruning, is an important factor, together with the thorough spraying, in order to grow the fine fruit which we are trying to produce today.

MR. IVES. I would like to ask Mr. Miller how he is going to fight the pink and green lice. There is a scourge of it here.

MR. MILLER. When you have trouble like that, use something especially suited to that trouble. We who have used Black Leaf 40 understand that it is a preventive, that it will control the Green Aphis. If you have browntail or gypsy moth, then you have got to use arsenate of lead. stronger than you would ordinarily use it to control the codling moth, say. My point primarily is to give the insect the proper treatment, and not try to make a combination of mixtures in the hope that one spray will control the entire situation.

MR. IVES. One point to be considered is that if you follow one treatment by another, you are going to get into trouble. You have got to follow up one fellow pretty soon after you chase the first, and the overlapping of those sprays is going to make trouble, and you will find it so if you try it out; if you don't look out, you will have trouble with your Black Leaf when you put on something else.

MR. ROGERS. Is there any danger in using Black Leaf 40 with arsenate of lead for spraying for codling moth?

DR. FELT. I don't think so.

MR. ROGERS. Years ago, in spraying in the dormant season on apple trees, we used to use Bordeaux mixture 4-4-50 and didn't have but very little trouble for a good many years from injury, and now, just before the petals open we use the 4-4-40 Bordeaux for the fungus diseases and immediately after they open we use arsenate of lead and sulfur combined and have had no injury all through some seasons and then the next season we would get injury. Why should we get that under practically the same conditions?

DR. FELT. You may get an appreciable difference in the amount of application. If you spray very freely with arsenate of lead and lime-sulfur in a combination, you are apt to have more or less of it collect in depression in the leaf and some injury, and you have therefore got to make that application pretty uniform and stop before you apply too much or there will be injury.

MR. BILLINGS. To come back to the codling moth again, I understood the Doctor to say there was no difference in the pressure used in the first spraying, that high or low pressure made practically no difference. I have had five years' experience in the Northwest, and they used high

pressure for the first spraying, so as to drive the spray through the trees and into the calyx. Since I have been East I have seen people just spitting the spray at the trees; as you might say, without pressure enough to get at the top, and then saying it didn't do any good to spray. It seems to me that the pressure question in spraying is something that the people here haven't got on to yet.

DR. FELT. My position in regard to the pressure is this: the higher the pressure, the more rapidly you can do thorough work, but with a pressure of 80 pounds or thereabouts, if you are willing to take the necessary amount of care and can get it all over the tree, I fail to see why you can't secure almost as good results as though the pressure ran up to 200 or 300 pounds. Of course, it takes more time with a pressure of only 80 pounds. In our initial experiments we ran a pressure test on six plots, three by spraying with a high pressure of approximately 150 pounds and using a coarse spray with a Bordeaux nozzle adjusted so as to get something that would drive; and in the other three using a disc nozzle which gives a more uniform spray. We were insistent upon having thorough work especially with the driving spray, because we wanted to give it a good, fair test, and it took longer, so long, in fact, that the man who owned the orchard almost lost patience because we took so much time. With the other spray we went over it rapidly. So far as distributing the spray, the covering was pretty nearly uniform in both series, though I think if we had kept close watch we would have found more used per tree where we employed the heavy pressure, than in the others. On checking up at the end of the season I think there was less than one-half of one per cent difference. If you can get 98 or 99 per cent with a fine spray, why say anything about the absolute necessity of using a coarse spray and high pressure?

MR. BILLINGS. Take it on a high tree, how would you get at the high limbs?

DR. FELT. That is just the point. You have got to have your pole or equipment of the proper dimensions. You have got to have proper distribution. My ideal of spraying for codling moth is not to stand under a tree and shoot up the spray and let it fall down. You must have a nozzle

extension and the nozzle should be set at an angle of 45 degrees or 90 degrees so that you can give a thorough spray downward, then if the trees are away up high, you can spray to the best advantage. You may have to use high pressure to throw it up, but I am not willing to state that you are going to get 95 or 98 per cent sound fruit. If your land will permit, you ought to use a tower and a good long extension so that, even in the case of high trees, you can reach up; then, so long as you have pressure which will give a fairly good distribution at the end of your nozzle, you are all right. We have found on moderate size trees that 80 pounds was plenty. As you go up, you must increase your pressure, of course, in order to get fairly good distribution from the nozzle; you have got to put your spray, in other words, where you want it. So far as driving it down into the the calyx cavity is concerned, our experience doesn't show that that is necessary.

MR. SESSIONS. If you had a young orchard that you were pretty sure wasn't affected, then what about spraying? Would you need to?

DR. FELT. That would depend a little on conditions. I will get around that by saying this: in most orchards it is probable that your secondary benefits resulting from lime-sulfur application would pay for the treatment, and if you wanted to be sure, spray; but if I was moderately sure and didn't want to spray and was willing to keep a close watch on the orchard, I would see no particular hazard in taking a chance.

MR. SESSIONS. Well, knowing what the San Jose scale was, and after you concluded that you didn't have scale enough to necessitate spraying, what then? This is on three-year old trees.

DR. FELT. Your practical orchardist should not find it necessary to go through his orchard with a microscope. He ought to be keen enough to distinguish between the normal, healthy bark and one that had scale. If he had any experience with the San Jose scale he ought to be able to detect it on young trees with the unaided eye before it became very injurious.

MR. SESSIONS. I have been through that experience; I didn't know what it was. But I am not speaking so much of

myself as perhaps some of the others, who might wonder if it wouldn't be safe for them to let the spraying go, with the idea that possibly there might not be any scale.

DR. FELT. You see, a good deal depends on what familiarity a man has with the scale and his ability to recognize it. I had an experience with a man who had read up on everything he could find in regard to scale, he and his two sons, and they read very thoroughly, and yet when they got through they found some of their trees literally covered. They didn't know what to look for. A man may lose a lot of trees because he doesn't know what to look for or doesn't look right. In sections where the scale is abundant you would be taking more or less of a hazard unless you knew what it is and how to control it, but in New York many could spot it before the trees were badly injured.

MR. SESSIONS. What would you do if you found a young tree in the orchard that was thoroughly covered with it? Would you try to save it by spraying, or pull it out?

DR. FELT. That would depend on the tree. Generally speaking, I wouldn't pull it out, because I have been repeatedly astonished at the recuperative ability of trees badly infested by San Jose scale. In my earlier years my impulse would have been to tear it out and start over again, but I am inclined to say that if the tree wasn't too badly deformed and the limbs not actually killed, I should give it a chance.

MR. ROGERS. The Professor has given the idea that if he had a small orchard that didn't have scale, that he wouldn't spray apple trees. If I have judged right I differ from him. I certainly think it would pay as well for the young orchard, and I believe it is one of the most essential things, to spray the trees every year.

DR. FELT. Personally, on my own trees. I would spray, but I do not feel like urging a man to spray a young orchard unless he feels it is well worth while, himself. I certainly believe it is the safest and soundest policy. This gentleman asked if it was absolutely necessary when the young trees were not infested and a man was watching them and was familiar with the scale, or at least, that was the basis on which I gave my answer. Necessity is one thing, and desirability another.

MR. SESSIONS. Where I live, we are trying to get the

young men to start in and raise fruit, even where they have got limited capital and the dollars count. We are looking for individuals to get out of this state what they ought to, and they haven't always got enough to do it with. If a man has got a big bank account, he can go ahead and spray, but if he has got to go and borrow money or dig it out by raising corn or something of that kind, the question that he wants answered is whether it is absolutely necessary to pay out his hard dollars and cents that he got out of the soil. in spraying, if he don't see any scale, or whether he can let it go. If they can let it go, every dollar that he can keep in his pocket means something to him.

DR. FELT. That is a question that every man has got to pass upon personally. I wouldn't want to say to any man, "It is absolutely necessary for you to go in and spray your orchard for San Jose scale." I can take you over into the Hudson Valley and show you trees that have never been sprayed and have been infested by San Jose scale for a decade or more, and they are still alive, but not producing fruit that you gentlemen, perhaps, would like to grow. There are so many factors that come in that, in my opinion, one can't lay down any hard and fast rule. I believe in spraying and if a man wants to be absolutely safe with a young orchard in a locality where San Jose scale exists, he should spray, because I believe he would get his money back in good, hard dollars, if you please. But if his means are restricted and he knows what San Jose scale is, there is no call to spray it until it is necessary, and if he is inclined to save down to the last dollar and will watch closely, he might get by. I could watch an orchard and not get caught, and I think others could.

MR. IVES. What nozzle do you like. There is the driving mist spray, you know, not the Bordeaux type, but a modernized type, driving a mist spray, and then there is one that throws a more restricted spray, but a little more area, but not so far ahead. Have you worked out those types? Which do you prefer?

DR. FELT. I would prefer to have a driving, moderately well distributed, fine spray.

MR. IVES. In a large tree, for instance?

DR. FELT. Yes. For codling moth spray I like to get

thorough distribution and yet enough power back of it so you can direct it, because you have got not only to take care of your blossoms on the outside, but should be able to throw the spray down in and get at the inside blossoms, and if your spray is so fine that it simply drifts' it is beyond control; you don't get enough into the blossoms that are away in, so I would say a moderate drive and a good distribution. I use one if the disc nozzles, but I don't care to designate. The Friend is good. Personally. I prefer to have a moderately large hole, because you get a little coarser spray which you can place more nearly where you want it.

MR. MURPHY. Mr. Sessions spoke of a young man starting out to spray young trees. Now, he would probably have some other trees on his place which would need it. What would be the extra expense of spraying the young trees over the others.

DR. FELT. Not very much.

MR. MURPHY. Then why run the risk?

THE PRESIDENT. I will state to the gentlemen present that the officers of the Association anticipated just these things, and that is why we got Mr. Margeson here to tell his experiences. Mr. Margeson is producing more from five acres than a lot of men in New England are who have planted 50 acres. They haven't got a bank account nor have they got a good orchard, and Mr. Margeson has got both! We have discussed this subject, and we feel that one of the duties of the Association is to try to teach the beginner not to plant more than he can take care of thoroughly. My personal experience is that nearly all of us plant more than we can take care of well, and lose in the end. and in planting in the future I shall not plant any more than I can spray at all times from one year up as they require it.

MR. PARMELEE. I would like to ask if birds or bats or anything of that sort would help eat up insects and bugs that grow on trees. enough so to encourage their growth.

DR. FELT. Birds are very important friends of the farmer, generally speaking. I have been interested in looking up that phase, more particularly in connection with an outbreak of leaf eaters in the forests, because there much depends on a natural check. Back in 1899 there was estimated to be a decrease of approximately 45 per cent in the

number of our native birds, and I have noticed in recent years a large number of outbreaks by leaf eating caterpillars in the forests of New York and to a certain extent, in New England. I believe in protecting the birds. The experience of Professor Forbush, who was in charge of the gypsy moths in 1891, is interesting. He had an orchard in a badly infested section where there was about everything in the way of an insect that could be found, and he simply attracted the birds, and, according to his own statement, obtained very desirable returns as a result. Now, for the fruit grower. I do not know that I would advocate relying upon the birds. I would recognize their value, but I would do my part in the fight and try to encourage and protect them, not so much on account of the returns in the orchard, but on account of the protection to forest and shade trees which under many conditions we cannot spray at present.

THE PRESIDENT. Before we adjourn, I would like to state that I have here a lot of peach twigs brought in yesterday by the vice-president of the Connecticut Pomological Society. Mr. Barnes has examined them and reports that from 75 to 90 per cent of the buds are alive, so if that is correct it looks as though they had come through the cold spell very well.

(An adjournment was taken to 2.00 p. m.)

AFTERNOON SESSION

Friday, January 16, 1914.

The meeting was called to order by the President at 2.30 p. m.

THE PRESIDENT. While we are waiting for the audience to come in. I am going to give you just a few statistics. We are asked constantly if we don't fear an over-production of apples. Some of us have tried to figure out the percentage of trees that are being planted now, that are going to produce first class fruit. and we have agreed that 10 per cent of the trees being planted now will be taken care of in the future and will produce first class fruit.

At the present time you know what the market is for good eastern apples. I was talking with one of the big grocers in a suburb of Boston, and he wanted to know what was getting to be the matter with people here. He said, "I can't sell western apples." That shows that we are educating the easterners up to demanding a good eastern apple.

I have got some statistics from the census which show that in 1910 there were about 480,000 less apple trees in Massachusetts than there were in 1900. I will let you account for that in any way you want to! That includes 355,868 trees that are not bearing. The totals were, for Massachusetts, 1,852,046 apple trees in 1900: in 1910, 1,367,379. Now, the production of apples was 3,023,436 bushels in 1899 and 2,550,259 in 1909. being about 500,000 bushels less in 1909 than in 1899. You may be interested to know about Hampden County, which ought to be one of our big apple-producing counties; but I am sorry to say that it comes very low. Hampden County had in 1900, 129,818 trees, and in 1910 had 115,264 trees, so you see there was a

reduction. In 1899 she produced 293,302 bushels. and in 1909 produced 183,012 bushels. Now, Hampden County comes fifth in the counties of Massachusetts in the production of apples, and one reason for the meeting here is to see if we can't help her get ahead.

(It was moved, and voted, to have a committee of five appointed to bring in names of officers to be elected at the annual meeting at Worcester in March, the committee to be chosen by the President.) Messrs. Hittinger, Cook, Morse, Copeland and Jenks were appointed.

(It was moved, and voted, that the Secretary be instructed to write a vigorous protest to the members of the committee in Washington having in charge the bill providing the keeping of all food products in artificial storage shall be limited to 90 days, asking that the fruits such as the Association is interested in be exempt from the provisions of that bill.)

(The Secretary was instructed to embody in said letter, the number of fruit growers that are in the Association).

(It was moved, and voted, that the Association accept the invitation to meet with the Worcester Horticultural Society in Worcester in January of 1915.)

THE PRESIDENT. I have received a letter with a last year's program enclosed of an apple show and convention of the International Apple Fruit Shippers' Association. This association offers a very valuable cup for fruit to be exhibited in August in Boston. This is the first time, I think, that they have met in Boston, and one of their officers who is a Boston man is very anxious to have our Massachusetts growers show the western states that we can raise good apples. They do not expect ripe apples, and I want to ask everyone present, if you possibly can, to send to your officers for a prize list and to show some apples next August. They expect green apples, but they will have apples from the western, central and southern states, and Massachusetts has hardly ever taken any interest in this convention and show. If you wish any other information in regard to this later on, write to our Secretary.

I want to ask you today to visit the exhibitors after the address. Our attendance has been small, and the exhibitors have done a good deal for us at this convention, and we will

be able to close early enough today to visit them and we also ought to give them some time tomorrow morning. We also wish you would stay over and meet the commission men. They are coming here from Boston and Worcester, and then there are the Springfield men, and they want to get together with the fruit growers and see if we can't come to some better understanding in regard to selling and marketing our fruit.

We have an invitation from the H. P. Stone Company and the H. J. Perkins Company, both very large commission men here in Springfield. to visit their plants, and they will show us every courtesy. and I wish we all might to do that. Both of these gentlemen have been very generous. H. P. Stone furnished this fruit and the samples of packing, and Mr. Perkins is paying for the large advertising banner across Main Street, and has also put in quite an exhibit in our exhibition hall. It has been suggested that we meet here at nine o'clock tomorrow morning. and then we will make a circuit of the plants of the commission men.

Now, for this afternoon's session we are going to have an address on "Experiments on Cultural Methods, Cover-crops and Fertilization in Apple Orchards", by Dr. J. P. Stewart, Experimental Pomologist of the Pennsylvania State College. Dr. Stewart has spent a good deal of time on this subject and has a great deal to say and he has condensed it so that we should get much information which will be of great value. Dr. Stewart gives the results of a number of experiments covering a period of several years in widely separated localities, and without doubt is the best informed of anyone on this subject, in the country. I now take pleasure in presenting Dr. J. P. Stewart of Pennsylvania. (Applause.)

**EXPERIMENTS ON CULTURAL METHODS, COVER-
CROPS, AND FERTILIZATION IN
APPLE ORCHARDS.**

**Dr. John P. Stewart, Experimental Pomologist,
State College, Pa.**

To develop and maintain an apple orchard in its highest state of efficiency involves many decisions. Even among the principal operations, there are generally at least two available courses, between which it is often difficult to decide. In such cases the ideal procedure whenever possible is to ask the trees. With the individual orchardist, however, this is frequently out of the question, especially when immediate action is required or when only a few trees of a single variety are available. The comprehensive orchard experiments, and the careful determination of the general effects of the leading operations, should therefore be cared for by the various state and national agencies already provided. The net results of such experiments then become available to the grower as a basis for immediate action, and the latter can be further adjusted to the exact local needs by means of suitable tests wherever the operations are sufficiently extensive.

Experiments of this general character have now been in operation under the writer's direction, in the leading orchard sections of Pennsylvania since 1907. Altogether these experiments include ten different soil types and about 3700 trees, some 2200 of which are in various stages of bearing. The latter have produced over 42,000 bushels of fruit under the various treatments during the last 6 years. The wide extent of the work largely eliminates the variations of individual trees and localities, and incidentally makes this much the largest and most comprehensive series of experi-

ments on apple production so far reported. The details of the Pennsylvania experiments are given elsewhere, so that the present discussion is confined merely to the more striking and practical phases of the results. Of these the first that we shall consider is the matter of cultural methods or soil management in young orchards.

CULTURAL METHODS IN YOUNG ORCHARDS.

How should the soil be managed in a young orchard so as to give the best growth and the earliest fruiting of the trees? Should it be thoroughly tilled, both before and after planting, or may equal or superior results be secured in other ways? Does it pay to fertilize young apple trees, and if so, how? Do covercrops pay? Can intercrops, or crops for profit be grown between the rows without material injury to the trees? These and similar questions must be answered in some way by everyone who expects to earn his living by means of apple production. Fortunately, data now available from three of the Pennsylvania experiments, covering the first six years of the life of the trees, will assist materially in answering them.

The first of these experiments is on Volusia silt loam, in the western end of the state and about midway between Pittsburg and Erie. The experiment was started with the planting of the orchard in the spring of 1908. The field had been in sod, of a rather light and poor growth, and it was plowed and prepared about as for corn before the trees were set, in all plats except the last, No. 14. In it the sod was left undisturbed, the trees were planted with a spade and were mulched at once with about 100 pounds each of straw or similar vegetation and were also protected from mice. Since then the mulch has been maintained by means of the intergrowth and by further additions of outside materials as needed to prevent any appreciable growth of vegetation immediately over the majority of the tree roots. All the other plats have been tilled annually in the usual manner, and in addition they have received the various treatments indicated in Table I. The first 10 plats contain 18 trees each, of three varieties,—Baldwin, Northern Spy, and Rome Beauty. The last four contain 45 trees each, of the same varieties, and all are set at the rate of 27 to the acre.

TABLE I.

Influence of Fertilization and Cultural Methods on Growth.

(Average Increases in Trunk-girth, 1908-'13, the first 6 years.
Expt. 337)

Plat	Treatment	Average	Gain over
		Increase	Normal Growth
		inches	per cent.
(a) Fertilization			
1	Check (Unfertilized)	4.85	—
2	Nitrogen and Acid Phos.	5.43	10.1
3	Nitrogen and Potash	5.07	1.2
4	Check	5.09	—
5	Phosphate and Potash	5.79	6.2
6	Complete Fertilizer	6.45	11.2
7	Check	6.19	—
8	Manure	6.63	11.4
9	Lime (and Ftlzr. 1912-)	6.21	7.8
10	Check*	5.54	—
(b) Cultural Methods			Gain over lowest.
			per cent.
11	Tillage and Covercrop	5.41	5.67
12	Tillage and Intercrop	5.12	—
13	Tillage alone	5.34	4.30
14	Mulch	6.00	17.20

*The average check equals 5.417 inches of increase.

In connection with the average increases shown here, it should be stated that plats 6 to 10 are situated slightly lower than the others, and apparently more favorably. Hence their actual gains are not so valuable for comparison throughout the experiment as their percentages of gain over the normal growth for the situation. On the latter basis, it will be noted that certain forms of fertilization,—particularly those containing nitrogen and phosphorus—are beginning to show considerable influence. This is doubtless connected with the fact that this particular soil type is often unusually low in these elements, as young apple trees frequently fail to respond appreciably to any application involving plant food alone.

This soil is also usually well supplied with moisture,—so much so in fact that drainage is generally its first need. Even at that, however, it will be noted that the mulched trees of plat 14,—a treatment especially fitted to conserve

moisture—have made the largest per cent of increase of any trees in the experiment. The excellent showing of the trees receiving manure is also doubtless partially due to its mulching effect.

In the other cultural plats, all those involving tillage without any definite fertilization have fallen much below the mulched trees in rate of growth. The intercrop here has apparently been a slight detriment, but the reduction in tree growth is less than 6 per cent and judging from other results this is probably due more to a slightly unfavorable location, recently corrected by drainage, than to any necessary influence of the intercrops used. All cereals, excepting corn, have been excluded here and elsewhere in our experiments and none but tilled annuals have been used. The addition of an annual covercrop in Plat II shows a slight gain over its absence in No. 13, but the benefit as yet is much too small to pay for itself.

Results on Young Trees at the College.—Most of the results in the above experiment are brought out more clearly and are extended considerably in two of the experiments located near the College in the central part of the state. The treatments and results in one of these experiments are shown in Table II.

The soil in this case is of limestone origin, technically known as Hagerstown silt and clay loam, and it was badly run down in fertility before the trees were planted. This field also was in a rather poor sod, which was left undisturbed in plats 7 to 9, and the trees were merely planted with a spade and mulched, or mulched and manured, as indicated in the table. The other plats were plowed in the fall and thoroughly prepared as for corn before planting in the spring of 1908. Plats 1, 4 and 7 contain 45 trees each and the others 27, of three varieties,—York Imperial, Stayman Winesap and Baldwin. The other details of treatment are as already indicated in connection with Table I, or as shown in the present table.

TABLE II.

Influence of Cultural Methods on Tree Growth and Soil Moisture.

(Average Increases in Trunk-girth 1908-1913, the first 6 yrs. Expt. 331.)

Plat	Treatment	Average Increase in.	Gain over Tillage alone per ct.	Av. Moisture Sept. 1913 per ct.	Rel. to optimum per ct.
1	Tillage alone	5.19	—	10.6	53.0
2	Tillage covercrop				
	& intercrop	5.42	4.43	5.5	27.6
4	Tillage & covercrop	5.21	.39	8.5	42.7
5	Tillage, covercrop				
	& manure	6.62	27.55	9.2	45.9
6	Tillage, covercrop				
	& com. ftlzlz.	5.92	14.07	9.4	47.2
7	Mulch	6.32	21.77	17.1	85.6
8	Mulch & manure	6.81	31.21	18.2	90.8
9	Mulch & com. ftlzlz.	6.89	32.26	18.1	90.4
4	Tillage & covercrop	5.31	.39	8.5	42.7

In this case again the untilled, mulched and spade-planted trees have shown decidedly the best average growth. They also have developed by far the most blossoms and they would doubtless have borne a fair amount of fruit during the past season had it not been killed by the unusually late and serious frosts. The addition of a mulch alone has given a gain in tree growth of more than 21 per cent over the trees receiving annual tillage alone. On the same basis, the further addition of manure or a "complete" fertilizer shows an additional gain of about 10 per cent more than the mulch alone.

In this case, therefore, it appears that moisture conservation, which is the chief accomplishment of the mulch, is about twice as important in trees of this age as the application of plant food. Fully half the benefit shown in plat 5 is also doubtless a result of the mulching effect of the manure, though this does not appear in the present moisture column chiefly because in 1913 the mulching effect was purposely eliminated so far as possible by removing the accumulations from around the trees and working them into the soil.

While the mulched trees are doing so well, those receiving annual tillage alone are making the least growth of all, and the addition of a covercrop has improved it by less

than a half of one per cent. Incidentally, the moisture content is noticeably less under the covercrop, and this reduction has evidently practically offset the plantfood additions that should have come from the annual leguminous covers. The further addition of an intercrop here has thus far actually improved the trees by a trifle more than 4 per cent, although the moisture content of this plat was lowest of all at the time taken. This result is probably due partly to the presence of a fertilizer in connection with the intercrop and also to the later seeding of the covercrop on this plat. The addition of a complete fertilizer in plat 6 is now showing a somewhat larger benefit than might be expected, but this has just begun to appear in the last couple of years, and its moisture situation is slightly favorable,—a fact which shows up in the last two columns.

The striking correlation between moisture supply and the growth of young trees is evident here in the first two and last two columns. The only important exception appears in the manure effects in plat 5 and this has already been at least partly explained. In general therefore, on the average soil and with average moisture conditions the best growth of young trees will naturally be secured by the method that is most efficient in conserving moisture.

In this connection we may state that the samples for the present moisture determinations were taken on September 6, after a six-week period of unusual drought, which enabled us to test quite fully the moisture-conserving qualities of the various cultural methods. Only 1.27 inches of rain had fallen in the 43 days immediately preceding the test, or only about 22.6 per cent of the normal for the period, which is about 5.6 inches. The moisture was determined both in the first and second 6 inches of soil, at a distance of about $4\frac{1}{2}$ feet from the trees, and the figures given in the third column show the average moisture present in the surface foot. The figures in the last column are calculated from those in the third, on the basis that a moisture content of 20 per cent is about the optimum or best possible content for the soil involved.

In both the third and fourth columns, the remarkable efficiency of the definite mulches in conserving moisture is evident. Next to them, but decidedly lower, comes the plat

that had received tillage alone, while those receiving covercrops and especially the one with an intercrop had been reduced practically to an air-dry condition, from which little or no more moisture could be extracted by the trees. This comparison may be hardly fair to tillage, since the tests were made long after the regular tillage season was over. But they do show exactly what is likely to occur in the latter part of any season, with the result that the growth is frequently curtailed, under the drier conditions. And even the most active tillage has never yet proved equal in moisture conserving to a definite vegetative mulch, so far as the writer is aware. From this and other data now available, we would say that orchard tillage is simply to be regarded as preferable to sod or to the presence of other untilled intercrops, but it is not equal to a definite mulch either in moisture conservation or in promoting the growth of young trees.

Results from Covercrops alone.—The other experiment at the College referred to above is concerned with tillage and covercrops alone. This is because some form of annual tillage and covercrops was generally considered best at the time these experiments were started. Along with the 12 annual covers, however, we have one permanent cover, viz., alfalfa in plat 13. It was sowed the first year, along with the usual liming, manuring and inoculation necessary for its proper growth, and was turned under and immediately reseeded the following spring owing to a poor stand. Since then it has remained as a permanent cover and has been cut two or three times per season and placed around the trees as a mulch so far as needed. It thus has developed and maintained a very satisfactory mulch for five years without the addition of any outside materials. The other crops are seeded annually at the usual times and plowed under the following spring. The results thus far are shown in Table III.

TABLE III.

Influence of Covercrops on Tree Growth

(Average Increases in Trunk-girth, 1908-13, the first 6 yrs. Expt. 333)

Plat	Treatment	Average	Gain over	Rank
		increase	original size	
		in.	per cent.	
1	Medium Red Clover	5.70	274.0	12
2	Mammoth Red Clover	5.40	278.3	11
3	Alsike	5.53	298.9	9
4	Crimson Clover	6.00	339.0	6
5	Hairy Vetch	6.50	401.2	2
6	Cowpeas	5.75	273.8	13
7	Soy Beans	6.03	291.8	10
8	Oats and Peas	6.12	336.3	7
9	Rye	5.76	331.0	8
10	Millet	6.52	360.2	4
11	Rape and turnips	6.07	344.9	5
12	Buckwheat	6.65	363.4	3
13	Alfalfa	7.12	442.2	1

Here again the mulched and untilled trees of the alfalfa plat are distinctly in the lead. In fact their actual increases are the greatest of any trees in the entire experimental orchard of 33 acres. And this is accomplished without the addition of any outside materials whatever and by means of a plant that has been widely stated to be injurious to apple trees. The latter might possibly be the case where the roots are allowed to compete too freely, but where this is prevented as in the present case, the results are all that could be desired.

Among the annual covers the vetch has given the best per cent of gain. It is a leguminous plant, of very low moisture draft owing to its hairy or woolly covering, and of a spreading and matted habit of growth which largely prevents direct evaporation from the soil. It is therefore not surprising that its trees should show an exceptional growth. Incidentally this plant is likely to be one of the best for a permanent cover and as a basis for a mulch where it does not winterkill too badly. Although naturally an annual, it is being kept satisfactorily without re-sowing by means of a thorough discing along in August or whenever a sufficient amount of its own seeds have formed. This plan is now working very well both in Virginia and in Southern Pennsylvania, and it is well worth trying farther north, especially on the lighter or sandier soils.

The other leguminous annuals have not fared so well. This is especially true of the cowpeas and soy beans which are practically at the bottom of the list. The unusually low rank of the medium red and mammoth clovers is probably due more to some unfavorable condition of the soil in their plats than to any direct action of the clovers themselves, because it has been difficult to get even them to grow satisfactorily. From the general characters of these plants we would expect them to rank about with crimson clover, which itself has unexpectedly dropped from third to sixth position during the past year. In the case of the cowpeas and beans the difficulty appears to be largely due to the fact that they have to be seeded too early,—about the 25th to the 30th of June, which materially shortens the tillage season, and the crops themselves soon begin growing vigorously and thus apparently do more harm through competition for moisture than good through the addition or release of plant food.

The high rank of the millet, buckwheat, rape, and cow-horn turnips is worthy of note, and it is also rather hard to explain, though in the case of buckwheat it may be partly due to location. Our results with this class of crops, however, are not materially different from those of Emerson at the Nebraska Station, published in 1903 and 1906 in their Bulletins 79 and 92, and the same is true of our results with intercrops. Our results with mulches are also practically duplicated by the experiment at the Ohio Station, which is reported in their Bulletin 171.

This particular group of crops is composed of frost-killed annuals which make no demand for moisture in the spring and this is apparently much to their credit. The millet is much the best of the lot as a winter cover, and the rape and turnips are the poorest. For the average orchard, however, the writer is still inclined to prefer vetch and at least some of the clovers. But from the present indications and especially in view of the low cost of their seed, these plants are undoubtedly worthy of attention and they are very likely to come more nearly paying for themselves in many cases than many of the plants now frequently sown for orchard covers.

CULTURAL METHODS IN ORCHARDS OF EARLY BEARING AGE.

The data from our experiments in orchards ranging from 6 to 20 years of age are too extensive and somewhat too complicated for definite presentation here. In general however their results are not materially different in trend from those already given. The mulched trees have usually been first in both yields and growth, and they have been followed in most cases by those receiving tillage alone. The tillage and covercrop treatment has fallen slightly behind tillage alone in the majority of cases, while the sod treatment has practically uniformly resulted in the least growth, and it is now also last in yields in about two-thirds of the comparisons. The mulched fruit also has usually averaged largest in size, and generally second to sod in color. The sod fruit on the other hand has practically always been highest in color, but lowest or next to the lowest in size in most cases.

The addition of a mulch alone in these orchards, at the rate of about 3 tons per acre of outside materials, has given an average increase of about 25 bushels per acre annually, and a maximum average gain of 36 bushels. The mulch therefore must evidently be confined to relatively cheap materials in order to show an immediate and regular profit in trees of this age.

In two cases out of nine the addition of covercrops has given an average increase of about 25 bushels per acre annually over the use of tillage alone. In one other case there has been a slight gain from the covercrops, but in all the remaining comparisons they have fallen behind tillage alone, and in one instance they now show a deficit of over 40 bushels per acre. In growth the covercrops have shown a slight advantage in five cases out of nine, but the benefit has been too slight to justify clearly their use. In view of these and other results already presented, it now seems inadvisable for any orchardist to make an extensive use of annual covercrops without first testing them fairly thoroughly and determining whether or not they are of any material value in his particular location.

CULTURAL METHODS IN MATURE ORCHARDS.

When we come to mature orchards, we find some reversals of previous form, especially in regard to growth. Data on this will be found in Table IV. This experiment is located on a sandy loam of alluvial origin in Wyoming County, north of Wilkes-Barre and Scranton. The trees are Baldwin and Spy and they were 36 years old at the start of the experiment in 1907. The usual orchard tillage has been used, along with annual leguminous covers composed of vetch and clover. The mulch has been made with annual applications of swamp hay at the rate of about 3 tons per acre, in addition to the intergrowth, which has been rather light. The manure has been added annually at the rate of 12 tons per acre, and the fertilizer at the rate of 30 pounds of nitrogen, 60 pounds of P_2O_5 and 100 pounds of K_2O per acre. At present, however, we are recommending only 8 tons of manure or the fertilizer indicated later.

TABLE IV.

Influence of Cultural Methods on Yield and Growth, Expt. 221.
(Annual yields per acre, 1909-13, and the average increase in trunk-girth 1907-12)

Treatments	Average Yields, Last 5 Years.		Average Growth, 6 Years	
	Tillage & Covercrop bu.	Sod Mulch bu.	Tillage & Covercrop in.	Sod Mulch in.
Without fertilization	381.7	363.8	5.39	3.19
Gain over mulch	7.9	—	2.20	—
Relative gain	4.9 %	—	69.0 %	—
Rank	1	2	1	2
With manure	436.8	561.4	6.72	4.26
Gain over lowest	—	124.6	2.46	—
Relative gain	—	28.5 %	57.7 %	—
Rank	2	1	1	2
With fertilizer	463.4	489.7	6.06	4.16
Gain over lowest	—	26.3	1.90	—
Relative gain	—	5.7 %	45.6 %	—
Rank	2	1	1	2

In this experiment, where the mulch alone has been compared with the tillage and covercrops alone, the latter have excelled in yield by about 18 bushels per acre annually. In this case therefore the covercrops are evidently furnish-

ing something that cannot be fully equalled by the mulch. Their plant-food value may be coming more to the front in this soil and with trees of this age, where the cropping strain has been fully developed and plant food has also been withdrawn for many years in the annual wood production.

In the other treatments, however, where definite amounts of plant food have been added to both cultural methods, the superiority in yields is still with the mulched trees. The advantage in one case amounts to more than 26 bushels per acre annually and in the other to nearly 125 bushels. This evidently makes it possible to continue orchards under the mulch treatment without loss of efficiency even after full maturity is reached, provided sufficient materials are available and a proper fertilizer is used.

As indicated in the table, the tree growth in this experiment has been rather decidedly greater throughout, under the tillage and covercrop treatment. In fact, it is quite possible that too much growth is being made by these trees in some cases. In any event, a large growth is generally objectionable in mature trees, and it is the growth that is associated with the highest average yields that counts.

Relation of Cultural Methods and Fertilization to Steadiness of Yields.—It is not sufficient to have a good crop merely once in a while. It is the steady crop every year that counts and enables one to develop and maintain his reputation on the market. In this same experiment we have a rather striking case of steady and uniform crops being produced right alongside of the typical bi-ennial sort. This appears in Table V, which shows the annual yields under the various treatments during the past 7 years.

As shown in the table, in all the tilled plats there has been a well-defined biennial bearing habit, while in the adjacent plats receiving a mulch and fertilization, the yields have not only been steady but they have shown an almost continuous increase. The real cause of this difference is not yet fully determined, but it is apparently connected with three facts,—the presence of sufficient plant food, the absence of excessive yields in any one year, and undisturbed root-systems on the mulched trees. Judging from our other similar data, none of these three conditions can be omitted

without breaking up the series and destroying the steadiness and regularity of the fruiting.

TABLE V.

Influence of Cultural Methods, with and without Fertilization, on Steadiness of Yield.

(Yields in bushels per acre annually, for 7 yrs., in Expt. 221.)

Treatment	1907	1908	1909	1910	1911	1912	1913*	Average
	bu.	bu.	bu.	bu.	bu.	bu.	bu.	last 5 yrs.
1 Covercrop								
alone	23	467	195	505	202	481	525	381.7
2 Mulch alone	29	221	215	391	246	439	527	363.8
3 Covercrop								
& Manure	117	145	493	216	612	188	654	436.8
4 Mulch &								
manure	84	215	493	526	621	413	753	561.4
5 Covercrop &								
Ftlzr.	129	122	639	118	573	161	826	463.4
6 Mulch&Ftlzr.	38	199	409	560	370	416	693	489.7

*The 1913 yields are based on the Spy alone, since the Baldwin were seriously and irregularly affected by frost.

These and other results apparently demonstrate the feasibility of obtaining practically annual crops from such supposedly refractory biennial bearers as the Baldwin, York Imperial, Spy and Tompkins King, provided the conditions are made right. They also indicate that where annual tillage is followed, it should be done with double-action discs or cutaways, or their equivalent, in preference to the regular plows, wherever the soil conditions will permit.

RELATIVE INFLUENCE OF CULTURAL METHODS
AND FERTILIZATION ON YIELD.

As apple trees become older, and their yields are increased, the need and influence of proper fertilization usually become greater. In most cases, this results sooner or later in the fertilization influence surpassing that of cultural methods.

Data on this are available in another of our experiments on Volusia silt loam, in Lawrence County north of Pittsburgh. This is in the famous Johnston orchard in which we have obtained such remarkable results from fertilization. The variety is Baldwin, now 25 years of age, and planted at the rate of 48 trees to the acre. The mulching and tillage have

been the same as above, with the exception that all the cultural-method plats received a uniform application of fertilizer in 1911. This fertilizer was made up on a 6-10-5 basis and applied at the rate of about 600 pounds to the acre. The frost also injured the crop quite severely on most of the fertilized portion of this experiment in 1913, while that on the cultural-method plats was scarcely touched. Whatever experimental advantages have arisen therefore have been distinctly on the side of the cultural methods rather than otherwise. The results up to date are given in Table VI.

TABLE VI.

Relative Influence of Cultural Methods and Fertilization on Yield.
(Annual yields per acre, during five years, 1909-'13, in Expt. 338)

Treatment	An. Yields per acre	An. gain over sod	An. gains 3 yrs. before fertiliz'n of Cult Methods
(a) Cultural Methds. bu.		bu.	bu.
Sod	204.9	—	—
Sod Mulch	293.2	88.3	22.0
Tillage and covercrop	356.0	151.1	100.0
(b) Fertilization			
Sod plus phosphate and potash	251.0	46.1	123.0
Sod plus nitrogen and phosphate	519.2	314.3	451.0
Sod plus manure	541.3	336.4	390.0

The results here are self-explanatory. Through a 5-year period, the addition of a mulch alone has increased the annual yields by 88 bushels per acre over sod, and the substitution of tillage and covercrops have increased this gain to as much as 151 bushels. These are both important gains and they are the maximum thus far shown by either treatment in any of our experiments.

When we add certain kinds of fertilization to this same sod, however, still more important increases are secured. These have not been obtained by the orchard fertilizer commonly recommended, viz., phosphorus and potash. This combination has here given an increase of only 46 bushels per acre, and that incidentally is a fairly characteristic showing for this particular application. But when nitrogen and phosphorus are added, either in commercial form or in manure, the annual gains are more than twice as great as

the maximum shown by the best of the cultural methods. And these results have been obtained merely by spreading the proper fertilization over the surface of the ground, above the majority of the tree roots, and letting the rains carry it down,—and we also have other quite similar gains from this same combination elsewhere.

A GENERAL FERTILIZER FOR APPLES.

In view of the evident importance of proper fertilization in many orchards, we have derived from our present experimental results a general fertilizer that should meet the needs in most cases until the particular requirements of the given orchard can be ascertained. This general fertilizer is one carrying about 30 pounds of actual nitrogen, 50 pounds of actual phosphoric acid (P_2O_5) and 25 to 50 pounds of actual potash (K_2O). Where potash is not known to be lacking the smaller amount should be used, or after a little testing it may even be omitted entirely. With the smaller amount of potash, the essentials of this combination are carried in 500 pounds of a 6-10-5 fertilizer or its equivalent, and this is the amount recommended for an acre of bearing trees where most of the ground is to be covered. For younger trees these amounts should be reduced approximately in proportion to the reduction in area covered.

In our work about half of the nitrogen is carried in nitrate of soda and the other half in dried blood. This combination gives a quick action and also one that is prolonged well through the season. There is also no objection to stable manure or to leguminous covers for a part or all of the nitrogen, where they are available and have been shown to pay. With the other elements any of the ordinary carriers should be satisfactory and hence those that are actually least expensive or most convenient should be chosen.

If nitrates are used, the applications should not be made too early. From present indications, the best results with nitrates can probably be secured from applications made some time between the setting of the fruit and the first of July. An incidental advantage of this delay appears in the opportunity that it offers to vary the rate of application

somewhat in accord with the amount of fruit set. In other words, one can reduce the applications when the crop is light, because enough fruit buds are naturally formed under such conditions, and they may then be increased when the crop is large, so as to avoid a complete failure in the following year. The mineral fertilizers can be applied any time and hence we apply them along with the nitrates. Manure also may be applied almost any time, excepting possibly late summer and fall, without danger of appreciable loss or ill effects.

As to method of application, we have simply scattered the fertilizer broadcast around the trees, applying it heaviest under the outer two-thirds of the spread of the branches and grading it off more lightly for several feet beyond. It may then either be left on the surface to be washed in by the rains or it may be harrowed or lightly plowed into the soil. With this done, the results must not be expected until the following year at the earliest, and it may be even later before important results appear.

ADJUSTING THE FERTILIZER TO PARTICULAR ORCHARDS.

Not all orchards will respond to fertilization, and those that do will not always respond to the same elements. If one desires to find out just which of the ingredients of our general formula is most important in his own orchard, and which if any may well be reduced or omitted, he can do so by following the local testing plan given in Table VII. This plan is especially adapted to the needs of commercial orchardists and to "community" tests among the smaller growers. A test of this kind naturally requires some work, but as yet it is the only way that one can become really acquainted with the exact needs of his orchard, and where the income from it is important, the time thus spent should be most profitable.

TABLE VII.

Plan for Local Orchard-Fertilizer Test.
(Pounds for a Mature Tree in Bearing)

1	Check (Unfertilized).
2	Nitrate, 2½ lb.; Dried blood, 3½ lb.; Acid Phosphate, 10 lb.
3	Nitrate, 2½ lb.; Dried blood, 3½ lb.; Potash 2 lb.
4	Acid phosphate 10 lb.; Potash 2 lb.
5	Check
6	Nitrate, 2½ lb.; Dried blood, 3½ lb.; Acid phosphate, 10 lb.; Potash 2 lb.
7	Same as No. 6, plus lime, 12 to 25 lb.
8	Manure, 400 lb.
9	Check

This test should be located in a typical part of the orchard, and should include not less than 5 average trees of the same variety and age, in each plat. All the trees should be labeled and carefully measured at a fixed point on the trunk, and definite records of their growth and yields should be kept for at least 3 years. Frequently, good indications of the orchard's needs may be obtained in less time than this, but at least this period should be allowed and more should be used when necessary.

The same time and methods of application should be followed as described above. The materials are indicated here in amounts per bearing tree instead of per acre as above, and the same proportionate reductions should be made for younger trees. In other words, if only a third of the ground is to be covered, then only about a third of these amounts should be used, if the rate of application is to be kept within proper bounds.

on the trunk, and definite records of their growth and yields kept within proper bounds. This test or its equivalent properly carried out, will give one a more exact knowledge of the real fertility needs of his orchard than can be secured in any other way now known.

QUESTION. Were these trees in sod?

DR. STEWART. The fertilized trees were.

MR. BARNES. I would like to ask the Doctor what the character of the foundation of the soil was in different cases.

DR. STEWART. Well, as I have said, we have got about ten different soil types, so that they vary all the way

from a light, sandy loam down to a heavy, limestone clay loam.

QUESTION. Has the soil made any difference in the result? Wouldn't that have to be taken into consideration?

DR. STEWART. The soil, and especially the previous treatment of the soil, I believe does make considerable difference, but it is rather surprising to me that in many instances the soil influence is much less than I might have expected it would be. I am almost coming to the opinion that the age of the tree and the amount of fruit it has borne.—the business that that tree has done, and the previous treatment of the soil are likely to cut a much greater figure in the chances of benefit from the application of plant food, than does the original type. Peculiarly enough, one of our lightest soils is not responding much to fertilization, and, on the other hand, one of our heaviest soils is, which is again quite contrary to the customary opinion.

DR. BROOKS. I wanted to ask a question in regard to the different colors; are the results based upon one soil?

DR. STEWART. No. These two here (indicating) are based upon two totally different soils in different parts of the state, and in addition to that, we have similar comparisons from four other soil types that I simply referred to.

PROF. BROOKS. I noticed that the plots which ranked highest in the cover crop experiment were near one side of the field, that is, numbered consecutively. Do you suppose that shows that there is a natural superiority in the soil on that side of the field?

DR. STEWART. We have a fertilizer experiment right next to that one and it gives us a check on the soil conditions throughout, and, with the exception that the buckwheat plat is a little more favorably situated with regard to moisture—and perhaps the same is true of one end of the alfalfa plat—I wouldn't say that there is any appreciable advantage in one end or side over the other.

PROF. BROOKS. I asked because I noticed the buckwheat ranked high, and I was surprised that it outranked the soy bean.

DR. STEWART. It certainly was a surprise to all of us and is probably due, partly at least, to the rather slight

advantage that it may have in regard to moisture.

PROF. BROOKS. I must say that from my own experience where I find that there are natural differences in productive capacity which I can't account for, I am still a little bit inclined to wonder whether that side of the field is not naturally a little better than the rest. You also spoke of thorough preparation of the alfalfa plot by the addition of lime, and, I think you said, some manure. Were the other plots treated in the same way?

DR. STEWART. They were so far as lime was concerned, but not in regard to manure, because there wasn't a very large application of the manure and it was put in between the trees rather than around them.

PROF. BROOKS. I should think that might have some effect. considerable effect. What is your experience on that?

DR. STEWART. We are testing out the manure thoroughly with annual application and much heavier in another part of the same field, and my belief is that the comparatively light manure application that was put on the alfalfa has very little to do with the present superiority of its trees.

MR. DERBY. I want to ask how you control the mice in your mulched trees.

DR. STEWART. We control them by means of galvanized wire screens, about 18 inches square, made with Number 20 wire, and 3 meshes to the inch. You can get those screens in 36 inch widths, in rolls, and when you split it right down through the middle you get the 18-inch width with selvage on one side which is enough. (Dr. Stewart illustrates with a strip of paper how it is fastened). It costs about 7 cents per tree and in the long run is the cheapest method I know of. Where borers are bad, most any kind of coating that you care to put on your trees will do, and it will keep mice and rabbits away, providing you can get a satisfactory coating. I have been at it for six years and am not yet in a position to recommend what I would call a satisfactory coating, but I believe we are making a little progress. I believe that as soon as we can get a satisfactory coating to cover the bases of our trees and which will keep the borers out, instead of poking

around in there to get them after they are in, that we will very largely eliminate a great deal of this so-called collar rot and crown rot and King disease and all that sort of thing. I can give you what I consider the characteristics of a coat that should be used on the base. In the first place, it should be safe; in the second place, it should be easily applied; third, it should be cheap; fourth, it should be somewhat elastic so that it will increase in size without cracking as the tree grows; and fifth, it should be preferably light-colored so as to reflect the sun's rays instead of absorbing them and increasing the danger of sun scald or winter injury. Now, as I have followed them through, the lime-sulfur concentrate, more or less mixed with sediment, plus a sticker, comes as near having all those characteristics as any one single coating that I know of, but that sticker is the "sticker," when we come down to getting the right one. We have been able to hold it on the tree all right by the addition of a little iron sulphate, but that changes the color to dark instead of light, and I don't know how much of an objection that is going to be. I believe as soon as we can get a little better sticker, that that is a very good start. There are a few other kinds: we have used white lead and oil on the base of the tree, mixed with pure linseed oil, without turpentine or any other dryer in it, and it has never given us any material damage. It has the proper color, but it does roughen the bark and is not elastic enough, in my opinion.

QUESTION. - How near do you put the mulch?

DR. STEWART. We always try to keep it at least six inches away from the base of the tree. That is one of the important points in the work against the mice.

MR. FRASER OF NEW YORK. (Mr. Fraser illustrates the putting up of a wire guard around the tree).

MR. GRAY. You told us when you used nitrate of soda, but you didn't say when you apply the other materials.

DR. STEWART. We put them all on as a complete mixture at the same time we apply the nitrates, because, so far as I have been able to determine either from our own results or those of anybody else, the time of application of the other materials is of little importance, so that you might

just as well put them on along with the nitrate of soda as at any other time. It saves labor.

MR. DAVIS. Carrying out that experiment, what should be the average good yield increase per tree?

DR. STEWART. Well, an average of anywhere from three to five bushels. That would be a very satisfactory increase, I should think. We have some of them that show an average increase of 10 bushels per tree for a five-year period.

MR. BUTTERFIELD. When you recommend the use of muriate of potash instead of sulphate, have you found any difference in the quality of the fruit when muriate is used? Does it make poorer quality, as on potatoes?

DR. STEWART. We have not been able to distinguish closely in the eating or dessert quality of the fruit, but there was no outstanding difference that we could see, or could measure, and I have been keeping this matter in mind. Our work is partly on the quality, but thus far I have been unable to get anything that I could use as a real measure of the slight differences that exist in the dessert quality of the fruit. In some instances we have been able to get differences in the amount of this punky pitting, and that sort of thing which is an evident difference, but outside of that, outside of things like that, we have not seen much difference. We have kept records of the average size and amount of color in all cases, but I don't believe there has been an appreciable advantage for the muriate over the sulphate, or vice versa.

THE PRESIDENT. Do you consider it worth while to protect mulched trees against fire?

DR. STEWART. It might be. We have had no damage from it, but that nevertheless is a possible danger that is associated with the mulching treatment. I don't know just what protection would be needed, except the use of ordinary judgment.

MR. BUTTERFIELD. How about keeping it away from the trunk of the tree several feet?

DR. STEWART. That is all right after the tree gets to some size.

MR. STAPLES. I would like to ask as to the amount

of manure used with the mulch per acre.

DR. STEWART. We have adopted the 12-ton per acre unit for the manure applications throughout our experiments, but, as I have said my present recommendation would not be more than eight.

MR. STAPLES. And on the complete fertilizer?

DR. STEWART. There again I would recommend 500 pounds of the 6-10-5 combination. We have used somewhat more than that in our experiments, but that is what I would recommend.

MR. IVES. You spoke of using three tons of mulching material. What source do you obtain the mulching material from and about what does it cost year after year? In other words, what was available to you at a reasonable cost?

DR. STEWART. We have used in these experiments anything from swamp hay or buckwheat straw—hay available merely for the cutting and hauling—or the buckwheat straw which is available for the hauling. in that instance—up to baled straw costing us \$8 and \$10 a ton. We had to have it, because we were running experiments, and had to get it there regardless of cost. When mulching material gets up to eight and ten dollars a ton, however it is out of the question as a mulch, unless the conditions are very usual. You have got to be able to get cheap material, cheaper than that, to get a steady profit. The best return in apple values we have had for our mulching was about 88 bushels per acre of apples with three tons of mulch. That means that you have got to stay down among the relatively cheap materials. On young trees we are getting good increases in growth from it, and they will probably show up later, but for immediate profit you need relatively cheaper materials.

MR. IVES. What price are you getting for the 88-bushel yield?

DR. STEWART. The fruit is handled by the grower, and he is getting all the way from 75 cents to \$1.25 a bushel. I would say that it has been averaging pretty close to a dollar a bushel, but you can't always guarantee an 88-bushel gain. As a matter of fact, in our intermediate orchards,—those just developing the bearing habit,—our gain from mulch has run around 25 bushels per acre, and

that means it must run still lower in the price of material, to get a steady benefit from the mulch. At the same time, our mulch results do not show that the mulch is extremely efficient in the securing of growth on young trees, because it conserves a most important thing for young trees, which seems to be moisture. They can usually ferret out their own needs in plant food if you will give them moisture and keep it there. In the second place, we have shown the great possibilities of using permanent covers plus the mulch around trees in all situations that are in any way subject to erosion or in which tillage is objectionable for any reason. In addition to that we have shown that in mature orchards, after the trees themselves get out and begin shading the soil, the moisture requirements seem to go down in their relative importance, so far as plant food is concerned, and it looks as if results had shown in those situations that you could gradually reduce the quantity of your mulch and adjust the proper fertilizer to it and go ahead.

DR. GILSON. What depth do you call the best for mulch?

DR. STEWART. Any depth that is sufficient to keep the growth of vegetation down. We use six to twelve inches of a mulch, which is depth enough to keep most of the vegetation down.

PRES. BARNES OF THE CONNECTICUT POMOLOGICAL SOCIETY. I would like to say that the first week in February the Connecticut Pomological Society have their annual meeting, and among other things that are scheduled is an address by Doctor Jenkins of New Haven, bearing on experiments with a peach orchard for a term of years. I think possibly many of us in Connecticut and Massachusetts who are possibly members of this Association are peach growers, and I feel quite sure that address will be of interest to all of them, and I hope as many as can will be present at that meeting and hear what the Doctor has to say about those experiments.

THE PRESIDENT. You will have opportunity, I think, to ask Dr. Stewart some questions as individuals. We have some other business to come up, and I am very sorry to have to ask that the discussion now come to a close. Mr.

Scheuerle wants to speak a few moments on some matters he wishes to bring before you.

(It was voted that the Massachusetts Fruit Growers' Association heartily endorse the petition of the Hampden County Improvement League presented to the Legislature of Massachusetts and the bill submitted with the petition,—the act providing county and state aid for corporations organized to promote agriculture and country life,—and that the Massachusetts Fruit Growers' Association herewith instruct its President, H. L. Frost, to do all within his power and according to his judgment to assist in securing such county and state aid for such corporations as provided in the act providing county and state aid for corporations organized to promote agriculture and improve country life.)

(Adjourned till 9 A. M. Saturday).

THE BANQUET

Friday evening the first banquet ever held by the Association was given at the Cooley House at 6 P. M. and from the thirty who expected to be present, the final attendance was nearly 100 more than that. The caterer took care of this increase exceptionally well and a fine dinner was enjoyed by all at nominal expense.

Pres. H. L. Frost introduced Prof. F. A. Waugh of Massachusetts Agricultural College as toastmaster and he kept things going in his inimitable way. H. E. Montague of New York represented the trades exhibitors and noted that the package business increased twenty-five per cent last year. Hon. Charles A. Gleason of Springfield, a trustee of Massachusetts Agricultural College, made his initial acquaintance with the Association and praised the success of the Convention. Pres. J. Norris Barnes of the Connecticut Pomological Society spoke of his state as a source of supply to Massachusetts both for nursery stock and for fruit and referred to the deer problem in Connecticut. Director W. D. Hurd of the Massachusetts Agricultural College Extension Service said that no state was making such strides in apple growing as Massachusetts and that more apples are

produced in the northwestern section of the state than in the whole state of Oregon. General Secretary John A. Scheuerle of the Hampden County Improvement League spoke of the work of the League in co-operation with the Association, referring to the ideas and ideals held in common. Mr. T. K. Winsor of Rhode Island who won so many prizes at the recent New England Fruit Show also spoke on Rhode Island conditions.

SATURDAY, JANUARY 17, 1914.

VISITING SPRINGFIELD

The extreme cold had moderated and when the party assembled at the Municipal Group for the trip over the various plants, an ideal day was promised. The first place inspected was that of the H. P. Stone Co., wholesale and commission house. Mr. Stone and his assistants took the growers through all the different departments of the business and here we discovered the "fruit growers' cigar," for although we were all offered the real thing by our host not one quarter availed ourselves of the privilege. But later when inspecting the banana rooms and the "freedom of the place" was ours there was not a man but what accepted THIS "cigar."

We next walked around the corner to the new establishment of the Frank Perkins Co. located in Market Square, Here we found conditions which might well make firms in much larger cities envious. In planning the new building all previous experience was made use of and everything was laid out with efficiency and economy uppermost. After inspecting the refrigerating plant and artesian well the party, which had been increasing in size as time passed, visited the various storage rooms and then the peanut roasting room where the automatic roasters were at work and where a large box was filled with freshly roasted nuts and the instructions were for everybody to fill their pockets and the trail of shells from then on testified that all obeyed. On the way to the upper floors both elevators were loaded at

once, and there was a race which was won by the "light weights" arriving first. More storage rooms were inspected and a mountain of peach baskets was noticed overhead. More "fruit growers' cigars" were indulged in and on passing out to the waiting autos every one helped himself to an orange and received as a parting souvenir a silver spoon showing the Municipal Group.

President Oakley of the Bay State Storage Co. whisked us away to his fine fire proof plant where again efficiency had first call. Everything under the sun can be stored here at a minimum of handling, etc.,—from a box of needles to the largest machinery. There were individual rooms for household furniture, a specially warmed room for pianos, auto storage, carriages and floor after floor of farm machinery and parts for repairs—each in its special bin and instantly available when a rush order comes in. Separate storage each for flour, fertilizer, oil and immense elevators making each floor a "street" floor. A spur track runs right into the building and a trolley siding adds its share there. The very large new concrete stable and garage was another model in efficiency and completeness and showed careful study of every detail in planning it. It is self evident that Mr. Oakley is an expert on transportation and knows the fine points which obviate all possible jarring during transit.

AT THE HALL

We were whisked back to the Auditorium and as many were obliged to leave soon after noon the President immediately called the gathering to order in the Mahogany Room and introduced Mr. Alfred W. Otis of the commission house of that name in Boston. Mr. Otis said that the fraud in packing was so common in years past that such a thing as absolute confidence between grower and commission man was almost unknown. Some growers even gathered the idea that the commission men winked at the practice. Mr. Otis said he wanted to clear up that delusion at once and most emphatically. What the commission men do advise is that packers choose the most highly colored fruit for the facing layers, but every other apple in the barrel should be

exactly the same quality. The establishment of confidence between shippers and buyers is THE one thing which the fruit traffic needs and the over facing of the barrels did more to destroy that than anything else. Many of the ideas expressed by Mr. Otis were applauded during his talk.

The President then introduced Mr. Orcutt of Boston who explained a chart which he had prepared showing graphically the points he wished to bring out in his talk.

SELLING APPLES

**Mr. John C. Orcutt, Secretary Committee on Agriculture,
Boston Chamber of Commerce**

For years the grower has been studying and working to improve his methods and his product. Lectures, discussions, books and bulletins have dealt with nearly every phase of the problem but "Selling the Product." "Selling Apples" has always been of great importance to the grower, but until recently it has not been given very much thought, study or attention. The speaker does not come here as an authority on the selling of apples, as he realizes that he knows very little about the subject as a whole, but to give you the conclusions he has reached from some little experience, study and observation.

CLASSES OF GROWERS

Growers may be divided into three classes:

1. The grower whose fruit is his main crop and income, who takes care of his orchards and packs his fruit in a systematic manner.

2. The grower whose fruit is a side issue, who takes care of his orchards and packs his fruit in the best manner he knows how.

3. The grower whose fruit is a side issue, who takes no care of his orchards and packs in no systematic way.

Large and small growers of all these classes are found in nearly every section of New England. Because of these facts and while it is the desire of all growers to sell their product for as much as possible, it is evident that all the

product of any one section cannot be sold in the same way or sent to the same market and have the results satisfactory to all.

AVAILABLE MARKETS

There are two principal markets for apples. The local market and the outside market. **The local market** is the growers' immediate vicinity. There are generally four ways in each of these local markets to sell your product. First, direct to the consumer; second, to the small retailer who sells in that vicinity; third, to the local buyer who buys for himself or some wholesale firm and fourth, the traveling buyer of wholesale houses.

The outside market is in the large towns and small cities, outside of the growers' immediate vicinity, and the large cities that are distributing points for local and foreign demands. This outside market affords three principal ways of marketing. First, selling direct to retailer; second, to general commission men; and third, to large wholesale commission men.

All of these markets are open to the growers of apples in New England, and it is up to the grower to decide which one he will take advantage of. The growers have been putting much energy into producing their product and have for the most part paid little attention to finding a market for their product but have expected the market to come to them. The buyers and commission men have found the market and come to the grower. Mr. E. C. Simmonds, President of the Simmonds Hardware Company of St. Louis, the manufacturers of the Keen Kutter line of goods, says that he built up the annual business of \$20,000,000 by nine parts of salesmanship and one part of general management. The fruit grower and also the farmer have been taught for many years that it was a great thing to make two blades of grass grow where one grew before, and to this end they have been putting in nine parts of their time and energy, and only one part into selling. All are agreed that it is a great thing to make two blades grow where one grew before, but some think that it is quite a stunt to sell the one that already grows for a fair profit.

PRINCIPLES GROWERS SHOULD OBSERVE

The fundamental principles in the selling of apples are:

1st. Planning ahead.

2nd. Understanding the ways of marketing, who the buyers are in these markets, and what these buyers want.

3rd. Having a knowledge of salesmanship and finance to handle the product.

Planning ahead. Each grower if he wants to get the most money out of his product must be planning ahead. This does not mean just for next season's crop, but you have got to work and plan, every week, for fifty-two weeks in the year and every year. It is the net results that count. The grower should all the time be looking up and learning all about the buyers, markets and their conditions, become acquainted with as many as possible, and plan out how he can make conditions so that he can put up some good arguments why his fruit should be sold for a good price.

Understanding the ways of marketing. The grower should thoroughly understand the various ways of marketing,—first in his local market, how many consumers are there who would buy direct, to whom he can easily deliver and how much will they buy, who are the retailers and how much will they buy, who are the local buyers and how many buyers from outside commission firms are likely to be in the vicinity. Inquire from other growers how they sell and to whom they sell. Second, in the outside market, make the same study of who and where the large retail and wholesale buyers are, and how they handle apples, the varieties, the package, commission and storage rates.

Having a knowledge of salesmanship and finance to handle your product. To successfully plan ahead, look up markets and hold apples in cold storage, takes money, and time, which is just the same as money,—so does the studying up of selling plans and the getting out of literature to advertise your product. Each individual grower must decide according to the importance of his crop as to how much planning, time and money he can put into this work.

HOW TO GET IN TOUCH WITH THE MARKETS AND THE BUYERS

Each grower in his local section can get in touch with

the buyers by expending some time and a little energy. The outside market is a little more difficult to get in touch with, but I am sure the Boston Chamber of Commerce and your own State Board of Agriculture will be only too glad to furnish you with a list of buyers in the large markets. There are some growers who have gotten in touch with large retailers in Boston, and working together the growers are marketing part of their fruit. This is a good way but can only be used to a limited extent, as the majority of retailers do not want to buy of the grower because they do not know the growers, his brands or reputation. These retailers want to buy from day to day from a wholesaler who will furnish them just what they want when they want it, adjust any claims for poor and damaged fruit and at times extend them credit. There are a large number of general commission men who handle more or less apples, some buy outright of the owner and others handle on consignment only. The growers have found a great deal of fault in this way of doing business, claiming the commission men do not give them a square deal, for they read in the paper that apples were quoted \$4.00 per bbl. and in going through Quincy Market, a dealer told them he asked \$5.00 a bbl. and they had only received \$2.50 return from the commission man they had shipped to a week previous. So the grower immediately concludes the commission man charged him an enormous profit. The grower did not understand that his shipment was a small one, the commission man did not know in advance the kind or quantity of the apples, or that he was to receive any at all, so he had no time to work up a market, but as the grower wanted his money right off he had to sell at what he could get. Then on a small quantity the overhead charges are very high.

If the grower has small lots of apples to sell which he wishes to sell through a commission man, the best thing he can do is to go to the nearest large town or city, look up some commission man, become acquainted with this man, and work with him to dispose of his apples. This generally is very satisfactory. If not, find another man to deal with, but the grower must always remember that if he does not look out for his interests, nobody else will. The same method applies to the selling of apples to the wholesale commission

men, who handle the bulk of the apples. Know what you are going to have to sell, then get in touch with some wholesaler and work together in grading, advertising and marketing your fruit. You can easily obtain the names of large dealers. Every grower should keep a checking account in his nearest national bank or trust company. This will bring you to know the bank and the bank to know you. They can help you to look up any dealer you wish and will undoubtedly be glad to. After looking up your dealer, call upon him and go over the matter of handling your apples, and I do not believe but what you both can obtain satisfactory results.

It must be kept in mind that, if a buyer pays you cash for your apples it will necessarily be less than the present market price less regular commission rates of say 20 cents per bbl., because the man who takes the risk must make more than a regular commission profit. A quantity of apples can be handled cheaper than a few barrels. This is where cooperation comes in, if the growers of any one section can combine and decide to grade and sell their apples together. Get in touch with the local banker, some good wholesale commission house, and all pull together. In a few years a very profitable market can be worked up.

Right here in New England we have a good example of a cooperative society, which has been steadily at work for the last four or five years and have made a good success, the Oxford Bears Fruit Growers' Association of Buckfield, Maine. They have established a brand name and that with a good pack of fruit is the most important asset in selling.

I realize that on account of the various conditions which exist in the different sections, it is hard to do this. But you must realize that the more you go out to the market, the more net money you will receive, and as long as you let the market come to you the less money you can expect to receive. And lastly, we cannot get rich in one season, and we must have time, energy and patience to accomplish lasting results.

I believe one of the most fundamental things for the growers to do is to get in touch with the way apples are marketed in the large cities and the people who are handling them and the different grades and markings for apples.

This I think will be a help to all and eliminate much of the misunderstanding that now exists. I am sure the Committee on Agriculture of the Boston Chamber of Commerce will be very glad to help you to get in touch with these markets, buyers and conditions.

Final adjournment was then taken so that members could catch early trains.

ANNUAL MEETING, WORCESTER, MARCH 12, 1913

The morning session was called to order by Pres. Frost with some 200 present and Mr. Archer N. Tuttle of Warren spoke on "Personal Experiences on a Fruit Farm" and told of what he had accomplished in his orchard of 5000 trees which he had developed from almost nothing and through many discouraging experiences.

This was followed by Dr. H. J. Wheeler of Boston who spoke on "Fertilizing the Orchard with Special Reference to Lime." He stated that Acid Phosphate was immediately soluble while Slag must be thoroughly worked in. In fertilizing young orchards put some on out from the tree as roots run toward plant food. Use a fairly quick acting fertilizer to give early growth. An old orchard, not showing full amount of growth, needs more nitrogen but there should be the correct relation between the nitrogen and the other mineral elements or a poor keeping quality will result. Bearing apple orchards require more potash than young ones as the fruit contains much of it.

On heavy soil lime has a flocculating effect, making the small particles larger. Sandy soil may be overlimed even with ground lime-stone. Light soil should have light applications periodically but not too often. Destruction of nitrates takes place upon soil puddling. Liming a soil helps the natural development of nitrification. Clover needs lime moderately while vetch and alfalfa need much more. Lime liberates phosphoric acid when entangled with alumina and iron and has some influence on plant diseases as in potatoes and scab. Lime affects the wood growth on some fruit trees. Early Richmond and Black Tartarian cherries show benefit. Peach shows no influence. Bartlett pear also thrives on acid soil. Baldwins seem to be helped by liming. Quince showed marked increase. Blackberry

and black cap are indifferent. Cuthbert raspberry moderately benefitted. White currant not helped while cherry currant is decidedly helped, and the gooseberry even more so.

Both the speakers were questioned after their talks and it was a very profitable occasion. The Secretary regrets that both of these are not to be published in full.

BUSINESS SESSION 2 P. M.

The meeting was called to order at 2 o'clock by Pres. H. L. Frost and Chairman Dr. F. Earland Gilson of Groton reported for the committee on nominations (Dr. Gilson, Groton; Ethan Brooks, W. Springfield; E. R. Farrar, So. Lincoln; M. Morse, Medway; F. A. Russell, Methuen.)

It was voted that the Secretary cast one ballot for the list as read and the following were declared elected.

(For list of officers see front page).

President Frost referred to the local co-operative associations in Maine with a large association to come later and called on all to work for the continued growth of the Association and for quality in the fruit grown so prizes might be won at the New England Fruit Show at Boston.

Secretary's report was then read, accepted and placed on file.

SECRETARY'S REPORT

STATISTICS. Our by-laws require that a list of the members be kept each year and on going over this membership book recently the Secretary found that up to March 1910 only 72 pages had been required to enter these names, while since then 73 pages have been covered, or in other words, during the last three years the Secretary's Office has taken care of more than in the previous 15 years.

The Treasurer's report for 1910 showed an income from 137 membership. The next year showed \$285; this 100% increase being due largely to the publishing of the report for the years 1906-10. 1912 showed 553 paid membership still another 100% increase, while for 1913 we show an income of \$919 of which \$28 is for the sale of lists or 891 memberships.

Although our books show 891 memberships paid since the last annual meeting of course there are some who are recorded twice, i. e. those who joined at Worcester for 1912 and who have also since paid for 1913, and there are a few whose dues are as yet unpaid. Hence our total membership list March 1st is 940, of whom 468 are new members since the books were closed March 8, 1912. Exactly one half of these new ones were received at Boston in January. We may consider our Association in a broader aspect than a state affair, as we now have 75 members outside of our boundaries, mostly in New England. There are 35 ladies who are now members and the number is constantly increasing.

FIELD MEETINGS AND INSTITUTES. Owing to crop shortage only one peach field meeting was held but this was very successful. The fame of the splendid young peach orchards of Director Edmund Mortimer of Grafton with 2000 baskets of ripening Waddell brought members from all over the state and an auto party from Wilton, N. H., Aug. 1, 1912. Block after block of many ages and varieties of trees all in the pink of condition were visited and after a basket lunch under the pines, prominent visitors from outside the state as well as our local growers spoke on peach growing.

The visit to Hillside Orchards of E. Cyrus Miller of Haydenville, September 26, 1912, showed an orchard in action as the picking of his 3000 barrel crop of splendid Baldwins was then going on. His methods of harvesting were shown and his orchards planted where had been standing timber, were seen "before and after" as a new section of woodland was to be cleared this winter for new orcharding.

A successful institute was held in Marlboro February 26, 1913, when the reports of the Boston meeting were distributed to paid up members. Prof. F. C. Sears spoke on "Spraying" to the intense interest of all present at the morning session, while at the afternoon session Pres., John P. Bowditch of the Middlesex South Agricultural Society introduced Mr. F. A. Smith, of Ipswich who gave many practical points on Small Fruits. Two hundred and twenty-five were present and 12 new members obtained.

Farmers' week at the Massachusetts Agricultural College with our Rally Day on Thursday March 20 and a last institute at Colrain probably April 16th will close our winter meetings and we will have been the length of the state, Boston, Marlboro, Worcester, Amherst and Colrain.

FIRST MASSACHUSETTS FRUIT SHOW. From Nov. 7-10, 1912, Horticultural Hall, Boston, saw satisfied crowds flocking to our first State Fruit Show. Though held in conjunction with the Chrysanthemum Exhibition of the Horticultural Society, the officers of the latter say the attendance was many times larger than ever before for the Chrysanthemum Show alone. While the quantity of the fruit exhibited was not large the quality was of the finest and the influence of former New England Fruit Shows was seen to full advantage in the selection of specimens and the box packing. In the ten box and five box classes as well as the single, perfection seemed to be attained. The total product of single trees was not so well patronized as desired, but the new departure in attractive packages and the practical packages for retail trade brought out many ideas worth while and should aid greatly in helping the producer to get more of the consumer's dollars. The cordial feeling among the exhibitors showed that the judges had done their work well. The aid of the State Board of Agriculture made this Show possible.

THE BOSTON CONVENTION. Needs no reference here as it is thoroughly covered in 1913 report. The splendid attendance, the capable speakers, the instructive trade exhibit, all the new members and the enthusiasm everywhere in evidence will make this meeting go down in our history as a red letter event.

Horticultural Hall, Boston, January 10-11, 1913.

A life membership in the Association was voted at the Boston meeting to be \$20.00 and the invitation to hold the Convention of Jan. 1914 at Springfield was accepted.

EFFICIENCY. We find that a large number of members in the past have been confused by our receipts reading to March 15th or whatever the date of our annual meeting was. Many have thought they paid for the year in advance while in reality it was only for the year past. This has been

corrected by the new receipts reading to December 31st and with the calendar year one can readily tell whether he is entitled to the new report or not.

RECOMMENDATIONS. No. 1. That a committee of three be appointed by the chair to draft a new Constitution and By-laws to be presented at our next annual meeting for adoption. Important changes should be brought to the attention of the members that they may be familiar with them before the meeting for adoption. We have decidedly outgrown our old Constitution and Bylaws.

No. 2. That a vote be taken that it is the sense of this meeting, that reports be sent only to paid up members (as an inducement for prompt payment of dues) but all notices of meetings, etc., be continued as usual.

No. 3. That an inexpensive watch fob with the Association emblem be presented to all sending in three new members at any one time. We believe some recognition should be made of the work of members in this direction.

No. 4. The thanks of this Association are tendered the Massachusetts State Board of Agriculture; The Massachusetts Horticultural Society; the Worcester County Horticultural Society; the Massachusetts Agricultural College, and all those who have so ably and heartily assisted in making the year so successful for the Association.

As in the past let each member consider himself a special committee, to bring in one new member during the year for this is one way our numbers increase.

It is as much in the province of this Association to prevent the uninitiated from plunging on apple or fruit raising as it is to help the regularly established fruit grower to fight his insect enemies to the best advantage. Too highly colored reports are usually the cause coupled with a natural tendency to return to the soil. A moment's thought of the great surgeon and the average practitioner will immediately show one that the thousand dollar fee is the exception rather than the rule and so it is in the fruit growing line.

Respectfully submitted,

F. HOWARD BROWN,

Secretary.

Auditor's report was read and accepted.

Treasurer's report was read, accepted and ordered placed on file.

TREASURER'S REPORT

Mr. President and Members:—

The report of the Treasurer is as follows:

Balance in National Bank March 12, 1912.....	\$ 146.13
Membership dues at Worcester 1912	196.00
Membership dues at Boston Jan. 1913	395.00
Membership list 1911	3.00
Membership lists 1912	25.00
Membership dues through Sec'y's office to Mar. 1, 1913	300.00
	<hr/>
Total Receipts	\$1065.13

EXPENDITURES

Annual meeting, 1912	\$ 136.31
Printing Report 1912 meeting	163.90
Postage	119.82
Institutes and field meetings	32.87
Salary of Secretary-Treasurer	50.00
Miscellaneous	94.89
Annual meeting 1913	178.67
Printing Report 1913	250.00
Balance in National Bank, March 1, 1913	38.67
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Regarding the First Massachusetts Fruit Show—Fruit was sold for exhibitors amounting to \$34.44 which was deposited on the Fruit Growers' account and cancelled by Association checks.

The Trade Exhibition at Boston has brought in so far \$876.40 with bills paid amounting to \$714.28 leaving a balance of \$162.11 at present, with about \$200 still due.

Respectfully submitted,

F. HOWARD BROWN,

Treasurer.

Report of Committee on Memorials,

Abel F. Stevens, Chairman: H. Ward Moore and
H. O. Mead.

Report accepted and ordered printed.

Voted to continue Committee.

Regarding the recommendations in the Secretary's report. It was moved and so voted that a committee of three draft a new Constitution and By-laws to be presented at the next annual meeting for adoption.—(Committee consists of Pres., Vice Pres., and Sec'y.)

It was moved and so voted that it was the sense of the meeting that the annual reports be sent only to paid up members as an inducement for prompt payment of dues but all notices of meetings, etc., be continued as usual.

The recommendation that an inexpensive watch fob be presented to all sending in three new members at any one time was referred to the Secretary with power to act and unanimously carried.

Recommendation No. 4 was adopted as recommended.

Sec'y Wheeler of the New England Fruit Show recommended that a committee be appointed for the State Exhibit which would have the backing of the State Board of Agriculture. It was moved and so voted that the Officers serve as an Exhibit Committee.

Sec'y Wheeler also introduced the section of the By-laws of which the necessary previous notice of a change was given at the Boston meeting. The section now reads "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 (\$100) per year." Formerly this read "\$50 per year."

It was moved, seconded and so voted that the amendment as read be adopted.

It was the decided sentiment of the meeting that the Secretary should attend out-of-state conventions and it was moved and so voted that the question of defraying the Secretary's expenses to out-of-state be referred to the Executive Committee with power.

A letter read by Mr. Spalding of the New England Apple was read and referred to the Executive Committee.

Mr. Spalding recommended that all packages of apples, peaches, pears, quinces, grapes and other fruit grown in Massachusetts if offered for sale by any other person than the grower shall bear the name and address of the grower and if not packed by him shall also bear the name and address of the party responsible for the packing, and that a

committed be appointed to recommend and defend this before the proper legislative committee.

OTHER MEETINGS

The section on Fruit Growing during Farmers' Week at the Massachusetts Agricultural College had Thursday, March 20, 1913, as Massachusetts Fruit Growers' Association Day and the following program was given before an interested audience with Pres. H. L. Frost in the chair.

8.30 A. M. Box Packing, Mr. R. W. Rees, of M. A. C.

9.45 A. M. Picking and Handling Fruit,

Mr. Fred A. Smith, Turner Hill, Ipswich.

11.00 A. M. Peach Growing for Local Markets,

Mr. F. Howard Brown, Marlboro.

1.30 P. M. Small Fruits,

Mr. Wilfrid Wheeler, Concord.

Co-operation Among Fruit Growers,

Dr. A. E. Cance, M. A. C.

3.30 P. M. Can We Sell Our Apples,

Prof. F. A. Waugh, M. A. C.

The occasion was one of interest and instruction to all and might well become an established custom.

The institute at Colrain, Wednesday, April 16th, 1913 was the usual success which these meetings held here always are. It was a joint affair with the Franklin County Agricultural Society and the Women's Relief Corps of Colrain who served a fine dinner at noon.

In the morning H. H. Wilder, Bureau of Soils, Washington, D. C. spoke on "Apple Soils," and he was familiar with the soils in the immediate vicinity as he owned neighboring orchard land.

At the afternoon session Prof. F. C. Sears of M. A. C. spoke on "A Trip Through the Apple Country of the West"

Many membership dues and new members were paid in at each of these meetings.

FIELD MEETINGS

WILBRAHAM

Thursday, July 31, 1913 saw all roads leading to Wilbraham where the big peach field meeting was held with Director Lee W. Rice. This was a case of the third time never fails as it was the third year we had tried for a meet-

ing with Mr. Rice and it certainly was worth waiting for as every one attested.

The Hampden County Improvement League furnished auto transportation from North Wilbraham and co-operated in making the meeting a success. The speaker of the day was Mr. A. T. Henry of Wallingford, Conn. who congratulated Mr. Rice on his orchards saying that his cultivation was the best he had ever seen in this country. Mr. Henry took up peach raising from the time of preparing the land until the marketing of the fruit. Mr. Rice described his method and although he expected at this time to have a crop of only about 2500 baskets we were glad to learn later that 8000 baskets were harvested.

Mr. S. C. Sevey editor of the New England Homestead, spoke of the importance of arousing western Massachusetts to an appreciation of the importance of fruit growing.

General Secretary Scheuerle of the League emphasized the importance of organizing and getting together for business purposes.

Mr. Frank M. Kinney was the last speaker and told of conditions in the state of Washington where the growers had to organize and get together to meet eastern competition. He called attention to the fire blight which within a few weeks destroyed orchards costing \$1,000 or more an acre. This is just making its appearance in New England and should be nipped in the bud.

TURNER HILL

The field meeting at Turner Hill Farm, Ipswich on Saturday, August 16, 1913 was everything which could be desired at the largest and best developed orchards of apple, pear and small fruits of any farm of Massachusetts. Autos from New Hampshire were almost as plentiful as those of Massachusetts, and the members coming by train from Boston were more than the trains could seat in addition to regular traffic. Autos carried members between station and the farm.

After lunch in the grove with plenty of iced "ginger pop," Mr. Fred A. Smith of Hawthorne, formerly Superintendent of Turner Hill Farm, described the methods used in reclaiming the wild land and developing the fine young or-

chards, the first planting of which was begun in 1903. Much fall planting was used and very little winter kill resulted. For this gravelly soil ideal distance was found to be 20x20 with permanent trees to be 40x40. Seven and eight year filler trees were bearing full crops and needed thinning. Numerous varieties were planted. Desiring early bearing, little pruning was practiced except at planting and trees were headed low. A peculiarity of the location being so near the sea caused sooty fungus and allied species and lack of color as a sea turn would come in at 3 or 4 P. M. and last till sunrise or 11 A. M.

Secretary Wilfred Wheeler of the State Board of Agriculture advocated these outdoor meetings right in the midst of things which are being accomplished and said that what we saw proved that the wild Massachusetts land can grow fine fruit. Mr. Richard Hittinger of Belmont, speaking on the pear outlook, said that the California pears knocked out the market for local grown Bartletts but that the Bose has a place.

The members were then divided into groups under a competent guide and we saw what Mr. Smith had been telling us about. We tramped up hill and down dale, over rivers and through orchards galore and what we did not see was not worth seeing. Everybody had a mighty fine time and much praise was bestowed upon Mr. Rice and Supt. Sprague for the cordial hospitality everywhere in evidence.

BELMONT

Early Saturday morning, August 23, 1913 the Secretary was called up on the phone and asked if the weather would postpone the pear field meeting set for that day with Director Richard Hittinger. We all took a chance and when the weather saw it could not keep us back it behaved itself and we won out. Mr. Hittinger met us with his jovial smile and showed us around. We had a practical demonstration of intensive fruit culture for, besides range after range of greenhouses the Hittinger Fruit Co. has apples, pears, peaches, currants, gooseberries and other fruit with every foot of space utilized and all showing the expert's care. Many of us made our first acquaintance with the leopard moth as it is plenty in this section. A great many practical

points were brought out by Mr. Hittinger as we made the rounds. The people ate their lunch in the packing house and scattered about the grounds and again the "ginger pop" was popular. (We believe we have discovered the fruit growers' beverage and "cigar")

While Mr. Hittinger was conducting a party of late arrivals the others gathered under the big apple trees and Mr. John C. Oreutt, the new Secretary of the Committee on Agriculture of the Boston Chamber of Commerce was introduced and told of the plans of the committee in the study of marketing conditions. Mr. Charles W. Mann of Methuen spoke on the conditions of the peach market quoting 80 big California peaches for 60 cents and retailing at 15 cents a dozen. This was bound to affect the price of natives. His market method was to get the customer's eye. He raised 40,000 baskets of strawberries a year. Mr. George W. Smith of Wellesley gave his experience in home marketing strawberries and spoke on the single tax. Mr. George W. R. Harriman gave a talk on the marketing problem which he divided into three parts; the producing part, the transportation part and the marketing part. He took up the transportation end and explained the situation and the difficulties therein. When the time came for breaking up, all felt that a very profitable and pleasurable day had been spent.

GRANVILLE

The meeting with Mr. William C. Hansen on the Sodom Mountain Road, Granville, Wednesday, September 3, 1913, came earlier in the month than the Secretary had expected, and owing to a peach rush in ripening just at this time he missed the good time in Hampden County. The League again furnished transportation from trolley to farm and the visitors were shown through the splendid orchard with its heavily laden crop. The trees have all been renovated within the last three years, bearing a good crop last year and a better one this year. Mr. Hansen had some especially fine Gravensteins and Twenty Ounce, the latter having reached enormous size. The Baldwins bearing heavily two succeeding years tended to upset the biennial bearing theory. After the basket lunch, eaten under the trees Dr.

J. K. Shaw of the Agricultural Experiment Station at Amherst gave a very thorough talk on Orchard Management, giving special attention to spraying.

Mr. William C. Hansen followed and gave his methods of renovating, practicing clean cultivation with some varieties and alternating this with sod with others. He gave his experience in thinning Wealthy and hereafter he will follow the practice. More spraying will also be done in the future as he found it profitable. Mr. Hittinger of Belmont spoke on the necessity of getting together for the purpose of marketing the crop. Mr. G. Labouteley of Three Rivers spoke on the McIntosh Red and Mr. R. A. Ely of Holyoke took up the renovation of old orchards. Mr. L. B. Dickinson who has a demonstration orchard described his work and told of Wealthy trees set as yearlings two years ago producing specimen apples already. The bulk of his trees are Baldwins different fillers. Rev. K. C. Pratt spoke of the co-operative efforts of the League and the newly formed Granville Fruit Growers' Association.

A hearty vote of thanks was tendered each host for the cordial hospitality so evident on all sides and there is not the slightest doubt but what each field meeting has helped wonderfully in giving the members just what they want; a practical demonstration of the successful methods of the other fellow. Every one attending feels renewed impetus in tackling his own problems at home.

THE NEW ENGLAND FRUIT SHOW

The Third Bi-ennial New England Fruit Show was held at Horticultural Hall, Boston, Wednesday to Sunday inclusive, November 12 to 16, 1913. The tremendous advance in the box classes is realized when one appreciates that nearly one thousand boxes were on exhibition. The late spring frosts had cut the apple crops in many places so the barrel classes were not so largely entered as usual. In spite of the large pear crop the late rains following the drouths made for such poor keeping qualities that Massachusetts alone entered in Class E,—the boxed pear class. Class I.—for Massachusetts only—brought out some fine fruit and the competition in some of the sections was keen.

The state exhibits were non-competitive this year and only Connecticut and Massachusetts entered. The former had a magnificent exhibit as might be expected with a special appropriation of \$2000 for this feature by the state. All their fruit was packed by one expert and was from a comparatively few growers.

The Massachusetts state exhibit consisted of some one hundred and sixty-five boxes and occupied the whole end of the hall banked five tier high. The idea was to have every section of the state represented so far as possible and this scattering necessitated over half a dozen different packers. The scheme in placing on the racks was the deep colored varieties in the centre and then shading off to the lighter ones with enough dark color on the wings to emphasize the contrast. The whole made a very fine showing and the Secretary received many new memberships after the show as well as during it—from folks who saw the exhibit and took one of the membership applications, which were handy.

Among those contributing were:

Chas. W. Mann, Methuen	H. A. Moses, Woronoco
Turner Hill Farm, Ipswich	M. M. Browne, Marlboro
T. C. Thurlow, W. Newbury	Easterbrook Bros., Dudley
Russell B. Hall, Medway	Edw. A. Lunt, Newburyport
Herbert A. Thayer, Harvard	T. E. Proctor, Topsfield
Alden Derby, Leominster	Edw. Burt, E. Longmeadow
J. T. Geer, Three Rivers	C. R. Green, Pelchertown
L. F. Priest, Gleasondale	J. M. Handley, W. Acton
Goodwin Warner, Littleton	Wm. Hansen, Granville
B. Warherbarth, Granville	C. F. Libbie, W. Acton
E. R. Farrar, So. Lincoln	F. Howard Brown, Marlboro

Among the varieties included in the exhibit were Baldwin, R. I. Greening, Roxbury Russet, Northern Spy, King, Tolman Sweet, McIntosh, Rome Beauty, St. Lawrence, Ontario, Hubbardston, Wagner, Stark, Jonathan, and Pennock.

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LIST OF ANNUAL MEMBERS

of

MASSACHUSETTS FRUIT GROWERS' ASSOCIATION

January 1, 1914.

☞ Notify Secretary immediately of any change of address.

- Abbot, Miss Mary P., Harvard
Abbott, Charles S., Antrim, N. H.
Adams, Chapman Co., Boston
37 No. Market St.
Adams, Charles R., Medway
Adams, Edward E., Millis
Adams, Everett F., Leominster
Adams, Henry J., Fitchburg
Alderman, Edwin H., R. 2, Chester
Aldrich, Frank M., Mendon
Allen, Frederick W., Reading
Allen, G. Howard, Littleton
Allen, George L. L., Medfield
Allen, Harry F., Northboro
Allen, John W., Northboro
Allen, W. O., Box 150, Northboro
Almy, Frederick S., W. Wrentham
Ames, John S., No. Easton
Ames, Joseph W., Melrose
272 Grove St.
Angier, Neadon, Natick
63 Rockland St.
Amidon, Otis W., Grove, Vt.
Amsden, Nelson W.,
Newton Highlands
Anderson, Herbert W., Worcester
Andrews, Henry J., R. 1, Fitchburg
Appleton, Francis R., Jr.,
32 Liberty St., New York City
Arel, D. A., No. Andover
Arthur, M. Charles, Ipswich
Turner Hill
Atkins, Mr. and Mrs. Edwin F.,
Belmont
Atkins, W. H., So. Amherst
Austin, Charles S., R. D., Ward Hill
Babcock, P. H., Harvard
Bacon, Wm. H., Lexington
Bagg, Edw. O., W. Springfield
1067 Riverdale St.
Bailey, Harold E., Byfield
Bailey, J. E. F., Lancaster
Bailey, Thomas W., Kingston
Baillie, Mrs. Helen T., Boston
305 Columbus Ave.
Baker, James E., So. Lincoln
Baker, John M., Swampscott
Baker, W. W., Westwood
Ball, W. G., Hopedale
Baldwin, John D., Worcester
19 Cedar St.
Ballou, H. A., Worcester
143 Main St.
Bamburg, Robert, Jr., Wrentham
Box 185
Bannan, John F., No. Andover
59 Court Ct.
Barber, Eldridge C., Framingham
Barclay, John H., Cranbury, N. J.
Bardwell, William H., Shattuckville
Barker, Bowen, Groton
Barker, F. D., Concord
Barker, Harry, Littleton
Barker, John, No. Andover
Barnes, Jacob P., Wenham
Barnes, Charles, Marlboro
Barnes, Charles W., Box 58, Stow
Barnes, Chester G., Bedford
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
 Battelle, W. W., Dover
 Bauld, J. Gibson, Framingham
 Bausch & Lomb Optical Co.,
 Rochester, N. Y.
 Beadlee, Thomas, Northampton
 Smith Agricultural School
 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, James R., Maynard
 Benton, Elmer J., Griswoldville
 Berger, Hjalmar, So. Lincoln
 Berry, Charles H., Groton
 Berry, M. 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, Brookline
 27 Longwood Ave.
 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.
 Bogue, Nelson, Batavia, N. Y.
 Bolan, George, Gleasondale
 Borden, Clinton A., Worcester
 2 Sagamore Rd.
 Boston Produce Co., Boston
 93 So. Market St.
 Boutwell, Lewis T., Lowell
 R. No. 1
 Bowditch, John P., Framingham
 Bowen, Everett A., Lakeville
 Bowker Insecticide Co., Boston
 43 Chatham St.
 Bowker, W. H., Boston
 43 Chatham St.
 Boyer, Elmer E., Lynn
 30 Endicott St.
 Bradbury, John P., Worcester
 120 White St.
 Brennan, Timothy J., Marlboro
 Bridges, Robert S., Wakefield
 167 Prospect St.
 Brierley, Benjamin, Stratham, N. H.
 Briggs, Frank P., Ayer
 Briggs, 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,
 Brooks Ethan W., Springfield
 Brooks, George A., Boston
 18 Deane St.
 Brooks, I. H. & Sons, Ashby
 Brown, Eben E., Lakewood, R. I.
 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., Manila, P. I.
 Box 338
 Brown, George H., Box 151, Medway
 Brown, George, Harvard
 Brown, Harold L., R. No. 1, Groton
 Brown, J. F., So. Lancaster
 Brown, Lyman C., Natick
 Brown, Sydney F., 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
 Burdett, Curtis H., Northboro
 Burgett, Leon H., Great Barrington
 Box 6
 Burnett, Harry, Southboro

Burt, Edward H., E. Longmeadow
 Butler, Windsor T., Holliston
 Butterfield, E. S., Brimfield
 Butterick, 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, Malcolm D., Still River
 Campbell, William H., Wayland
 Cannon, B. B., Boston
 11 Stillings St.
 Carine, Batholomew,
 So. Glastonbury, Conn.
 Carkin, John, Boston
 64 W. Newton St.
 Carlson, Louis J., Wrentham
 Carmichael, George A.,
 Shannock, R. I.
 Carpenter, A. M., Monson
 Carpenter, Charles W., Monson
 Carpenter, Gardner H., Marlboro
 Carpenter, Jesse A.,
 Valley Falls, R. I.
 Carpenter, Jesse, Jr., Attleboro
 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
 Caswell, Albert B., R. D., Fitchburg
 Chadwick, Cyrus W., Cochrattate
 Chadwick, J. Gilbert, Wardhill
 Chamberlain, B. M., Holden
 Chamberlain, Montague, Groton
 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.
 Chapman, L. R., Boston
 4 Allston St.
 Chase, Harris E., Clifford
 Chase, Homer N., Auburn, Me.
 Chase, O. P., Andover
 Chenery, Charles H., Belmont
 161 Washington St.
 Chenery, David, Belmont
 Chenery, W. B., Brookfield
 Chenoweth, W. W., Amherst
 Childs, William C., Woodstock, Conn.
 Church, George B., Shelburne Falls
 Church, Stephen B., Boston
 66 High St.
 Clafin, Frederick L., Marlboro
 Clapp, Raymond K., Westhampton
 Clapp, Albion B., Wellesley Hills
 Clark, Charles M., Dorchester
 60 Thetford Ave.
 Clark, Clarence W., Boston
 43 Chatham St.
 Clark, Elton, Framingham
 Clark, H. A., Belmont
 519 Pleasant St.
 Clark, Herbert L., Ashfield
 Clark, J. Maxwell, No. Hadley
 Clark, Richmond T., Medway
 Clark, John W., No. Hadley
 Clark, Tyler, Newton Centre
 85 Homer St.
 Clark, Winslow, Shoreham, Vt.
 Clayton, Walter, Middleton
 Clifford, J. E., Danvers
 Clough, Thomas R., Groton
 Cobb, Gardiner N., Boston
 U. S. S. Ranger
 Cobb, George R., Kingston, R. I.
 Coughlan, Peter A., Worcester
 Box 35
 Colburn, Frank A., Cambridge
 19 Ware St.
 Colby, Charles C., Hubbardston
 Cole, E. E., Boston
 186 Commonwealth Ave.
 Cole, Harold W., Greenbush
 Cole, Walter, Berlin
 Collier, Eugene O., Groton
 Colling, Edward F., Southboro
 Comfort, Edward W., Winchester
 Conant, Wilson H., Buckfield, Me.
 Condon, Albert O., Worcester
 Greendale
 Cook, Herbert A., Shrewsbury
 Cook, H. H., Northboro
 Cook, Howard G., Leicester
 Cook, Lyman C., Millis
 Cook, Walter F., W. Roxbury
 2 Ruskin St.
 Cooke, Dr. William P. Boston
 330 Dartmouth St.
 Coolidge, George A., Hudson
 Coombs, Edward W., Colrain

Coombs, Ernest W., Peabody
132 Andover St.
Coombs, Robert, Colrain
Cooper, Frank I., Boston
89 Franklin St.
Copeland, Edgar F., Colrain
Copeland, Harvey L., Colrain
Corey, Allan P., Dover
Cotter, Patrick, 25 Aborn St., Salem
Coughlin, Joseph P., W. Acton
Couper, Henry J., Concord, Junction
Cowper, J. E., Allston
427 Cambridge St.
Crafts, Storer F., Boston
Commonwealth Hotel
Craig, David R., Boston
69 Mt. Vernon St.
Craig, William, Boston
95 F. H. Market
Crane, Henry L., Westwood
Crane, Samuel V., Blackstone
Craine, A. W., Boston
222 So. Station
Creswell, George N., Seymour, Conn.
Critchett, Edward R., Amherst
Croft, Dr. B. F., Bernardston
Cross, Robert F., Osterville
Culver, Roy R., Groton
Cunningham, Fred H., Bolton
Cunningham, Paul, Box 49, Bolton
Curtis, Arnold S., Marlboro
Curtis, Ellicott D., Bantam Conn.
Curtis, Louville, Tyngshoro
Curtis & Co., Boston
104 F. H. Market
Cushman, Miss Florence, Harvard
Cutler, Warren A., Bedford
Cutter, Charles B., Auburndale
Dadmun, Earl W., Watertown
194 Arsenal St.
Damon, Ralph C., Ashby
Darling, Robert, Shmsbury, Conn.
Darling, S. W., Spencer
Daugherty, Allen E., Boston
218 Tremont St.
Davenport, Jonathan E., Colrain
Davenport, S. Lothrop, Danvers
Davenport, Rev. William H.
Griswoldville
Davis, E. Norton, Hampden
Davis, Harry P., R. D., Hudson
Davis, L. C., E. Longmeadow
Davis, William M., Boston
93 Broad st.
Deane, John M., Assonet
Deering, Fred W., Topsfield

DeCoster, Harry W., Lynn
304 Balsam St.
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
39 Centre Ave.
Dickinson, E. F., Billerica
Dickson, Walter A., Harvard
Dimick, Orlando W., Watertown
51 Russell Ave.
Doten, Scott T., Lincoln
Douglas, Edward S.,
Douglas Hill, Me.
Douglas, 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
Dummer, Joseph N., Rowley
DuBois, Goddard, New York City
105 Riverside Drive
DuBois, J. Frank, Lynn
20 Conomo Ave.
Ducy, David L., Framingham
Duplisse, Winn., Northboro
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
Earle, Thomas, Steelton, Pa.
Easterbrook, I. Harold, Dudley
Eaton, Horace, Box 1951, Boston
Eddy, Jeremiah P., Providence, R. I.
Box 343
Edgett, Edwin F., Arlington
200 Pleasant St.
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 Farms
 Fairbanks, A. N., Keene, N. H.
 Farrar, Edward R., So. Lincoln
 Farrar, Herbert C., So. Lincoln
 Farrar, Samuel, So. Lincoln
 Farwell, S. E., Boston
 55 Congress St.
 Fay, John S., Northboro
 Feller, J. Foster, Linlithgo, N. Y.
 Feeney, John Jr., Westford
 Felton, Arthur S., Bolton
 Felton, T. 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, Adamsville
 Fisk, Nathaniel B., Stoneham
 Fiske David L., Grafton
 Fiske, O. H., Huntington
 Fiske, Ralph T., Northboro
 W. Main St
 Fitch, George, A., Sterling Junction
 Flag, Charles V., Littleton
 Flaherty, T. F., Portland, Me.
 21 Arlington St.
 Fletcher, E. S., Thompson, Conn.
 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, William, Box 47, Weston
 Foster, George H., Shrewsbury
 Box 194
 Foster, Mr. and Mrs. Harlow R.,
 Ashby
 Forbush, Gilbert N., Marlboro
 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, Harold L., Arlington
 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.
 Geer, H. D., Three Rivers
 Geer, Mr. and Mrs. J. T.,
 Three Rivers
 Geissler, J. J., Box 144, Sharon
 German Keli Works, New York City
 Gerrish, Miss Isabel F., Ashland
 Gibson, John F., Southboro
 Gifford, John E., Danvers
 Gilbert, A. M., Boston
 810 Barristers Hall
 Gilbert, Orrin, Middeltown, Conn.
 Gilligan, Sidney D., Warren
 Gilmore, Abiel P. R., Acushnet
 R. No. 1
 Gilmore, Edwin M., Marlboro
 Hosmer St.
 Gilmore, Howard P., Westboro
 Gilson, Dr. Earland, Groton
 Ginty, Daniel, Framingham
 Gleason, Walter D., Pratts Junction
 Goldthwait, Addison B., Bardwells
 R. D.
 Goodell, Everett E., Westboro
 Goodell, W. A., Station D., Worcester
 Goodrich, James H., W. Newbury
 Goodrich, Walter H., Hudson
 Chapin Road
 Goss, B. J., Ayer
 Gould's Mftg. Co., Boston
 58 Pearl St.

Gould, Sydney C., No. Andover
 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, Holden
 Graham, G. S., Holden
 Granger, Miss Helen, Griswoldville
 Graves, Arthur E., Worcester
 17 Somerset St.
 Graves, G., 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
 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, Thaddeus, Wellesley Hills
 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
 Hansen, William, North Granby, Ct.
 Hardy, John H., Jr., Littleton
 Harlow, Harry J., Shrewsbury
 Harper, Henry, Marlboro
 Hartshorn, Dr. W. N., Boston
 54 Fenway St.
 Harris, Roland W., No. Andover
 316 Johnston St.
 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.
 Hayward, Cecil F., Ashby
 Haywood, Dr. Sumner, Covert, N. Y.
 Heath, Elmer H., Neponset
 72 Minot St.
 Heggie, James, Somerville
 102 Flint St.
 Henry, Robert J., Sherborn
 Hersey, Everell A., Westboro
 Hessel, Robert, Framingham
 R. No. 2
 Heywood, Mr. and Mrs. Ezra K.,
 Pratts Junction
 Higbee, Harry, Hyde Park
 13 Austin St.
 Higbee, William E., Hyde Park
 21 Webster St.
 Higgins, Charles H., Arlington
 Higgins, Robert H., Arlington
 Hilton, Edwin M., Framingham
 Hittinger, Richard, Belmont
 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. J. C., Boston
 170 Marlboro St.
 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
 Bolton St.
 Howes, Abbott L., Ashfield
 Howes, Albert, So. Ashfield
 Howes, Alvah W., Ashfield
 Howes, John W., Ashfield
 Howes, Raymond G., Ashfield
 Howes, Wesley E., R. No. 1, Medway
 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.
 Hulst, Alfred N., Amherst

Hungerford, Newman, Hartford, Ct.
 45 Prospect St.
 Hunting, A. I., W. Boylston
 Hutchings, C. L., Concord
 Hutchinson, R. H., New York City
 51 Front St.
 Hutchinson, Walter K., Arlington
 Hyde, Wheeler Co., Boston
 41 No. Market St.
 Ilsley, Fred, Newbury
 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
 Mercantile 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.
 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
 707 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, Wililam F., Holliston
 Kelly, Charles P., Newburyport
 Kemp, Charles J., Ipswich
 Kemp, Walter H., Colrain
 Kendall, Charles E., Milford, N. H.
 Kendall, E. Dana, Holden
 Kendall, H. Prentice, Sterling
 Keyes, Frederick S., Bolton
 Keyes, Louis G., Nashua St., Woburn
 Keyes, G. Harvey, W. Boylston
 Keyes, John F., Lancaster
 Kilburn, Joseph H., Pratts Junction
 Kimball, Alfred, Haverhill
 Kimball, H. L., Northboro
 Kimball, Leonard H., E. Haverhill
 Kinney, F. J., R. D., Worcester
 Kinney, Herbert R., Worcester
 Kinney, Robert F., Worcester
 Kinsman, Ernest E., Heath
 Kirby, Ralph J., Arlington
 Kittredge, George D.,
 Mt. Vernon, N. H.
 Knapp, George S., Groton
 Knight, T. M., Brooklyn, N. Y.
 381 McDonald St.
 Knight, Willis E., Gardner
 Knights, Arthur A., Worcester
 100 Beacon St.
 Knights, Harry W., Boston
 87 Commercial St.
 Kyes, Arthur N., Hopkinton
 Labouteley, Gaston E., Three Rivers
 Lamb, H. J., Pittsfield
 Lamphear, Arthur S., Hubbardston
 Lamson, Arthur C., Marlboro
 Lamson, E. M., Hudson
 Lane, Gilbert E., W. Peabody
 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.
 Leitch, W. J., No. Andover
 Leland, P. F., Holliston
 Leman, J. Howard, Box 2365, Boston
 Leonard, F. M., Boston
 52 Clinton St.
 Lewis, Frank D., Groton
 Ley, Harry A., Springfield
 Care 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, Jas. E., Belmont
 575 Pleasant St.
 Locke, Isaac H., Belmont
 561 Pleasant St.
 Lord, Carey S., Richmond

Lord, Walter E., Newfield, Me.
Lord & Spencer, Boston
21 N. S. F. Hall Market
Loud, Chas. E., Framingham
Lovell, Henry, Worcester
12 N. Ashland 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.
MacDonald, Allan, Yalesville, Ct.
MacInnes, John C., Worcester
462 Main St.
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 Grey Cliff Rd.
Makepeace, John C., Wareham
Mann, Chas. W., Methuen
Mann, Horace W., Stoughton
1057 Wash. St.
Mannion, Thos. J., Concord, Jct.
Margeson, Ingram I., Westwood
Marshall, A. A., Fitchburg
Marshall, Geo. A., Fitchburg
Marshall, Jas. A., Tewksbury
Martin, Geo. J., W. Newton
Mason, Daniel, Ayer
Mason, Joseph, Newton Upper Falls
Mason, Otis N., Box 1, Wrentham
Maxam, Chas. W., Adamsville
Maynard, C. & 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
McKay, Wm. L., Geneva, N. Y.
McNeish, Dr. Alex., Leicester
Mead, A. & O. W. & Co., Boston
Mead, Harlow E., N. Andover
Mead, Herbert O., Lunenburg

Measures, Daniel E., Rowley
Mentzer, Cyrus H., Northboro
Mentzer, Thornton E., Northboro
Merrifield, Fred L. Colrain
Merriam A. C., Leominster
Merriam, Herbert, Weston
Merrill, Amos A., Hampden
Merriman, Jos. L. Bolton
Merritt, C. 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
Minn, Miss Susan, Boston
14 Louisburg Sq.
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., Gleasondale
Morrison, John D., Manchester
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
Morton, Prof. O. A., M. A. C.
Amherst
Moulton, Geo. D., Boston
141 Milk St.
Moses, H. A., Woronoco
Moxley, Chas. S., No. Andover
Moxon, J. R., New York City
6 Wall St.

Mudge, Everett P., Swampscott
Munroe, Howard M., Lexington
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
Nelson, John Walter, Lexington
R. No. 1
N. E. Nurseries, Bedford
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
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, F. R., Fitzwilliam, N. H.
Parker, Horace B., Brookfield
Parker, Jas. F., Medway

Parker, Walter S., Reading
55 Walnut St.
Parker, Wm. E., W. Boylston
Parks, Wm. A., Needham Heights
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, 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.
Payne, Horace, No. Jay, Me.
Peabody, Geo., Williamstown
Pearson, Benjamin, Byfield
Pease, Arthur D., R. No. 2, Chester
Pease, Chas. F., Chester
Peck, Austin, Shelburne
Penney, Arthur S., Saugus
199 Essex St.
Fenney, Walter H., Saugus
220 Essex St.
Perkins, Frank, Newburyport
42 High St.
Perkins, Robt. F., Framingham
Perry, J. A., Newburyport
Perry, Leonard F., Millis
Perry, Rolland, Reading
Perry, W. I., Newburyport
Care 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
Pickard, P. W., Hopedale
Pickard, Wm. L., Littleton
Pickens, J. M., R. No. 2, Ludlow
Pierce, A. F., Marlboro
Pierce, Alfred, Lexington
Pierce, John W., W. Millbury
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
Pope, F. H., Auburndale
108 South Ave.

Porter, Jonathan L., So. Hamilton
 Porter, Sylvester E., W. Berlin
 Potter, Geo. A., Great Barrington
 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, Orestes M., Plymouth, N. H.
 R. No. 4.
 Proctor, Albert E., Hopkinton
 Prescott, Chas. W., Concord
 Prichard, Asa B., Somerville
 City Hall
 Prichard, Reuben P.,
 State Rangers School,
 Wanakeena, N. J.
 Priest, Edwin H., Littleton
 Priest, Geo. L., Littleton
 Priest, Lyman F., Gleasondale
 Priest, Harold A., Gleasondale
 Proctor, Albert E., Hopkinton
 Purington, Geo., Colrain
 Purington, Nelson, Colrain
 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
 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., Mason, N. H.
 Rees, Prof. Ralph W., Amherst
 M. A. C.
 Reynolds, Daniel W., Haverhill
 R. No. 2
 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, Hayes, Winchester
 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. No. 1, Monson
 Rothwell, Mrs. B. J., Needham
 Root, Herman D., Colrain
 Ross, Walter D., Worcester
 Rowell, John, 33 Beaver St., Salem
 Russell, Fred. A., Methuen
 Sabin, Leroy C., Hadley
 Sage, Chas. D., N. Brookfield
 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., Arlington
 Schworm, Chas. S., Boston
 Back Bay
 Scott, John H., Wrentham
 Scott, Walter, Cranbury, N. J.
 R. No. 1.
 Sears, Arthur E., Mason, N. H.
 Sears, Prof. & 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., Bernardston
 Sevey, Glen G., Russell
 Shattuck, Mrs. Bertha B., W. Acton
 Shaw, Dr. J. K., M. A. C., Amherst
 Shaw, John L., Natick
 Shaw, Silas A., Auburn, Me.
 Shea, Robt. O., Boston
 623 Tremont Bldg.
 Shearer, Jas., Colrain

Shedd, Warren F., Wakefield
Sherman, Ellsworth P., Marlboro
10 Farm Rd.
Shinkwin, Wm. A., Hudson
Shumway, E. F., Belchertown
Sims, Rev. Thos., Melrose
119 Foster St.
Small, Chas. E., Berlin
Smith, Chas. A., Ashfield
Smith, Chas. S., Lincoln
Smith, Fred A., Danvers
Smith, Geo. N., Wellesley Hills
Smith, Geo. W., Melrose, Ct.
Smith, Harton A., Leicester
Smith, Hiram N., N. Andover
Smith, John L., Barre
Smith, Phillip N., Worcester
63 Pleasant St.
Smith, Robt. B., No. Andover
Box 3
Smith, Walter J., Ashby
Sowerby, Edmund, Marlboro
Spalding, Geo. F., Newton Centre
Spaulding, Percy F., Ashby
Sprague, Geo. H., Ipswich
Sprawl, Paul & Co., Boston
23 N. Market St.
Stacy, Albert B., Charlemont
Standard, F.W., Tyringham
Staples, Geo. W., Hartford, Ct.
Stearns, Chas. M., Springfield
244 Main St.
Stearns, Wm. H., W. Boylston
Steele, Burpee C., W. Acton
Steele, Fred, Hersom St. Stoneham
Stene, A. Everett, Kingston, R. I.
Stetson, Archie B., Griswoldville
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
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. No. 2, Ludlow
Storer, John H., Groton
Stowe, A. Byron, Adamsville
Stowe, Geo. Burton, Millbury
Stowe, Geo. I., Box 5, W. Millbury

Stow, Harris C., Grafton
Stratton, Edward N., Marlboro
Stratton, Herbert, Hudson
Stuart, Louis A., Pratts Junction
Swain, Allen N., Boston
623 Tremont Bldg.
Swain, Donald N., W. Roxbury
95 Mt. Vernon St.
Swain, Dr. Mary L., W. Roxbury
73 Garfield Ave.
Sweet, L. C., Cummington
Symmes, Samuel S., Winchester
Taylor, Arthur G., Fitchburg
R. No. 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, J. O., Lexington
Titcomb, Walter H., Littleton
Titus, Edward, Glen Cove, L. I.
Tookey, 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 E., W. Boylston
Townsend, Fred R., Ashfield
R. No. 1.
Trask, Fred R., Sterling
Tucker, Clarence, Readville
Care Thos. Leyland Co.
Tufts, William, Sudbury
Turner, N. B., Great Barrington
Tuttle, Archer N., Warren
Tuttle, Horace F., Acton
Tyler, Alonzo W., Peabody
Tyler, Nathaniel P., Sterling Junct.
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Underwood, Herbert P., Gleasondale
Upham, F. A., Three Rivers
Van Deusen, N. S., Ashley Falls
Vincent, M. H., Conway
Vinton, G. N., Sturbridge

Wakefield, Mr. and Mrs. Alonzo C.,
 Orange
 Walker, C. S., Boston
 90 Commercial Whf.
 Walker, Henry P., R. D., Hudson
 Walker, Herbert F., Lynn
 Washington St.
 Walker, Wm. B., Pratts Junction
 Wallace, Thomas C., W. Somerville
 83 Irving St.
 Wallace, Wm. N., R. No. 2, Ludlow
 Walton, Perry, Belmont
 Ward, A. W., Auburn
 Wardwell, Edwin, Danvers
 31 Elliott St.
 Ware, Arthur L., Framingham
 Ware, Henry, 82 High St., Brookline
 Ware, Lyman E., Norfolk
 Warner, Goodwin, Concord Junction
 Warren, Edwin, Leicester
 Warren, Henry H., Stow
 Warriner, 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
 Webling, Walter, Boston
 46 Clinton St.
 Weeks, A. H., Somerville
 52 Boston St.
 Wescott, Wilmarth A., Hopedale
 Wetherbee, Mrs. A. E., Worcester
 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. L. E., Wellesley
 White, Walter E., W. Boylston
 White, Warren, Holliston
 Whitelock, Wm. M. E., Marlboro
 10 Farm Road
 Whitney, Chas. A., Upton
 Whitney, Daniel L., Sherborn
 Whitney, Harry F., Harvard
 Wieren, Geo. Von, Framingham
 R. D.
 Wilbur, Emery S., Ipswich
 Turner Hill
 Wilbur, Walter M., Marlboro
 Wilcox, Howell G., Boston
 18 Pearl St.
 Wilder, Chas. L., Lancaster
 Wilder, E. B., Dorchester
 90 Columbia Road
 Wilder, Fred E., Sterling
 Wilder, Henry J., Washington, D. C.
 Bureau of Soils
 Wilkins, Geo. G., Box 47, Carlisle
 Williams, Elroy C., Marlboro
 Williams, Geo. F., Fitchburg
 Williams, Robert E., Ashfield
 Wilson, Chas. A., Medway
 Wing, Hugh B., Ashfield
 Wingett, A. H., Lenox
 Winn, Richer & Co., Boston
 93 F. H. Market
 Winn, Willard A., Worcester
 11 Berkshire St.
 Winn, Wm. N., Arlington
 77 Summer St.
 Winship, Fredk. H., Wakefield
 Jordan Ave.
 Winsor, Thos. K., Greenville, R. I.
 Wister, John C., Germantown, Pa.
 Wister St.
 Witherell, Warren F., Boston
 91 Causeway St.
 Wood, Benj. F., Newton
 11 Waverly Ave.
 Wood, Burt T., 128 Allen St., Athol
 Wood, C. M., Upton
 Wood, W. L., Westford
 Yeaton, Geo. A., Augusta, Me.

York & Whitney, Boston
P. O. Box 3456.
Young, Edwin B., Granville
P. O. Box 30.

Young, Alan J., Winthrop Highlands
The Cliff House

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241 Lowell St.
Brickett, John C., W. Springfield
169 Park Ave.
Brooks, Mr. & Mrs. J. L., Springfield
42 Monmouth St.
Brown, Myron L., Chicopee
Canlett, T. S., Bedford
Castle, F. A., Springfield
168 Bridge St.
Clark, Saxon D., Springfield
403 Maple St.
Cobb, J. B., Chicopee Falls
Crafts, Royal L., Ludlow
R. D. 2
Forbes, D. A., East Hampden
Geer, A. S., Three Rivers
Gibson, Fred J., Hillsboro, N. H.
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McMillan, Geo., Mt. Hermon
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Nichols, Earl M., Lyonsville
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142 Main St.
Wait, Minor S., Hampden
Weeks, S. C., Falmouth
Willcutt, Walter G., Plainfield
Winsor, Jas., Greenville, R. I.

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.

