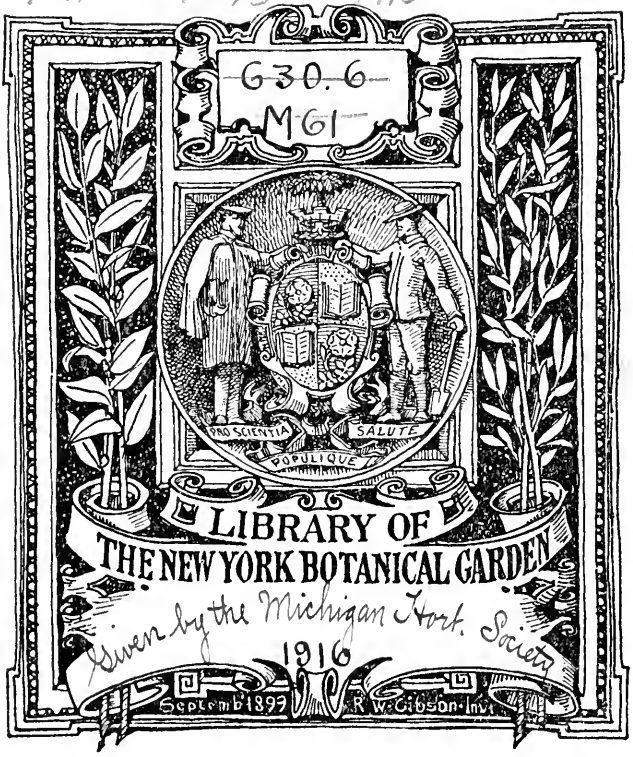

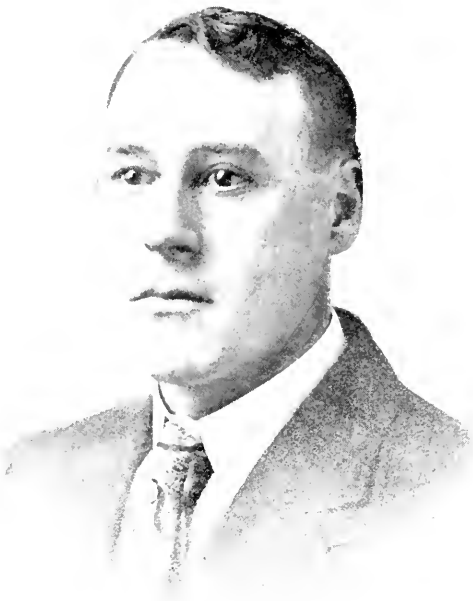

President T. A. Farrand, Eaton Rapids.

FORTIETH ANNUAL REPORT

OF THE

SECRETARY

OF THE

STATE HORTICULTURAL SOCIETY

OF

MICHIGAN

FOR THE YEAR 1910

BY AUTHORITY

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REPORT OF THE SECRETARY OF THE MICHIGAN STATE HORTICULTURAL SOCIETY.

FENNVILLE, MICHIGAN,
January 1, 1911.

TO HON. CHASE S. OSBORN, *Governor of the State of Michigan:*

I have the honor to submit herewith, in compliance with legal requirements, the accompanying report of 1910, with supplementary papers.

Respectfully yours,
CHARLES E. BASSETT,
Secretary Michigan State Horticultural Society.

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VICE-PRESIDENT—O. S. BRISTOL, Almont.
SECRETARY—CHARLES E. BASSETT, Fennville.
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CHAS. F. HALE, Grand Rapids, 1 year.
H. J. EUSTACE, Agricultural College, 1 year.
EDWARD HUTCHINS, Fennville, 2 years.
CHAS. A. PRATT, Benton Harbor, 2 years.
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LEGISLATION—President T. A. FARRAND; Secretary C. E. BASSETT.

FORTIETH ANNUAL MEETING OF THE MICHIGAN STATE HORTICULTURAL SOCIETY, HELD AT BENTON HARBOR, MICHIGAN, DECEMBER 6-8, 1910.

The fortieth annual meeting proved to be, without doubt, the best in the history of the State Society. Not only was the attendance better from all over the State, but the local members turned out in force and from the moment when President Smythe called the first session to order until the last event of the last day the opera house was well filled, there being over 1,000 interested listeners present at most of the sessions. The Berrien County local society had done their best to have every comfort attended to and their numerous committees are deserving of great praise.

Much of the success of this annual meeting is also due to the manner in which President Smythe presided—calling the sessions promptly on the moment scheduled and conducting the program and discussions without delay or allowing the discussions to get away from the question then being considered.

The fruit display was arranged on the large stage of the opera house and, considering the poor fruit year just experienced in Michigan, was a very creditable showing. George Chatfield of South Haven won the silver cup, offered by the B. G. Pratt Co. of New York for the best three boxes of apples, but will have to win it two more times to make it his own.

LIME-SULPHUR VERSUS BORDEAUX.

Perhaps the most interesting exhibit at the meeting was the collection of fruit from the various growers in the State, showing a comparison of fruit from the same orchards sprayed with Bordeaux and with lime-sulphur. The exhibit was collected by the horticultural department of the Agricultural College, from growers about the State who had made a comparative test of Bordeaux and lime-sulphur for their own enlightenment. The samples comprised a half bushel or more of each variety, and the spray formulas used were placed with the exhibit, making it a very instructive comparison. We give below particulars concerning these exhibits, with a few notes on each:

1. Wagner and Baldwin varieties from L. H. Stoddard, Kalamazoo Co. Those sprayed with lime-sulphur, 3:2:50, with arsenate of lead, after blossoming, had little russeting and very little scab. Those sprayed with Bordeaux, three sprays, 3:4:50, and lime-sulphur last spray, 3:2:50, had much russeting and the fruit was rather small, and dull in color.

2. Mr. Alwin Coith, Van Buren Co., showed Wagners sprayed with

commercial lime-sulphur, 1:40 arsenate of lead, 2 lbs. The fruit showed very little russeting and the color was fair to good. The sample sprayed with bordeaux, 2:5:50, had about the same color, but there was much more russeting.

3. Wagners from Ed. Hissong, Mason Co., where commercial lime-sulphur and arsenate of lead, 1 to 25 and 1 to 35 were used, showed very little russeting, with a slight trace of scab. While those sprayed with Bordeaux, 4:5:50, and arsenate of lead, had a more green color, fruit a little smaller, and more russeting.

4. Baldwins and Wagners from C. W. Wilde, of Kent Co., sprayed with four sprays of lime-sulphur, 3:5:50, boiled one hour and 2 lbs. lead, were clean, had good finish, color and size and almost no russeting, while those sprayed with Bordeaux four sprays, 2:5:50, were a little smaller, color more dull and green and some russet, especially on Wagner.

5. Baldwins from O. S. Bristol, of Macomb Co., upon which lime-sulphur was used exhibited good size and color, with a slight trace of russeting. Whereas, the samples from trees sprayed with Bordeaux were smaller, more green, and much russeted.

6. Baldwins from David McCann, of Van Buren Co., sprayed four times with commercial lime-sulphur, 1½ to 50 and 2 lbs. lead, showed some russeting, fair color and finish. But the other sample sprayed with Bordeaux, 3:6:50, and arsenate of lead, four sprays, presented a more green color and were russeted badly.

7. Baldwins from T. A. Farrand, Eaton Co., treated three times with commercial lime-sulphur, 1:10:50, 1:25:50, 1:35:50, were of good size and color and had a trace of russeting, while those treated with bordeaux, twice 2:4:50, were of good size and color, but had more russeting.

8. Greenings, Wagners and Baldwins from S. B. Hartman, of Calhoun Co., sprayed four times with lime-sulphur, 1½ gallons to 50, after blossoming with 2½ lbs. of lead, were of good size and color, a little russet, had no scab, and finish better than with bordeaux, while the ones sprayed four times with bordeaux, 3:5:50, 2½ lbs. of lead, were of good size and color, but finish more dull and there was more russeting.

It will be noted then, on the whole, that the lime-sulphur as a summer spray gave the most satisfactory results as regards russeting, color, and finish, and in some cases apparently size, though this may have been due to other conditions. The Bordeaux gave more russeting, and a duller, greener color, lacking the gloss of the lime-sulphur sprayed fruit. Both were comparatively free from scab. This exhibit presented a good argument for the use of lime-sulphur as a summer spray for apples.

OPENING SESSION—10 A. M. TUESDAY, DEC. 6.

The meeting was called to order by President Smythe with a few well-chosen words, followed by invocation by Rev. Diefenbach.

INVOCATION.

"Our Gracious Heavenly Father, we come into Thy presence at this time, and before we take up the duties of this occasion, we desire to thank Thee for the blessings we enjoy and to acknowledge Thee as the giver of every perfect gift. We bless Thee for the occasion that has brought us together this morning, and we do ask that Thy spirit may rest upon us in a large measure. May we realize that Thou art the one from whom all good things come, and that in the work in which we are engaged we are working together with Thee. May we know and appreciate that Thou doest send to us the sunshine and the shower and that all the blessings which come to us, come from Thy bountiful hand. We ask Thy blessing upon this Association, upon the president and officers under him. And we do pray that as we gather here today that the experiences exchanged and the information gained may help us to make life easier for us and for those who come after us, our children. So, dear Father, bless us with Thy rich heritage. May we more and more realize that the great aim of living is that we may bless others—that we may be helpful to each other. So, Father, we ask that Thou wouldst come very near to us. Knit our hearts together in the bounds of fraternal love; and as we go forth from this meeting may it be with the determination to so profit by all that we hear and learn that our lives will be richer with blessings in the years to come. And so again we envoke thy blessing upon this occasion; we ask that thy spirit will be present to guide and direct, that everything will be done acceptable to Thee. We ask it in the name of the Father, the Son and the Spirit. Amen."

President Smythe: The first number of our program, as you will see, is an address by Mr. Frank A. Wilken on the subject "Results from Spraying During the Past Season." It is hardly necessary for me to throw any bouquets at Mr. Wilken. He is so well known in our territory and has accomplished so much by his experiments, that I do not feel that it is necessary to take time to make any extended remarks in regard to him and his work. Mr. Wilken.

RESULTS FROM SPRAYING DURING THE PAST SEASON.

(FRANK A. WILKEN, SOUTH HAVEN EXPERIMENT STATION.)

Mr. Chairman, Fellow Fruitgrowers: You know each season brings us new experiences, experiences that are different and are valuable to us and will be worth much to us in years to come. Last year I spoke on "Scale and Scab," but it turned into a talk on Lime-Sulphur. Our experiences and our observations so far this year have backed up what I said then; and now I desire simply to reenforce what I said last year.

At the station we started out with good intentions. Several tests

with the various mixtures Lime-Sulphur, Bordeaux, Copper Sulphate, etc. were started, but the weather got the best of us and our test failed us on account of lack of fruit. But on the Station grounds proper we sprayed everything with Lime-Sulphur, and the results were very good.

As you perhaps remember, I spoke of spraying with Lime-Sulphur, winter strength, one to eleven, just before blossom, and some were inclined to take exception to what I said. We carried out the same program this year. We used the Commercial Lime-Sulphur one to eleven, and the home-made at the rate of 15 lbs. sulphur to 8 lbs. lime and 50 gals. water, and tried it on all the different fruits except the peach, and at the same time we usually put on Bordeaux, just before blossom. The results were that in some cases, for instance the pears and the plums where the blossoms and buds were fully opened, once in a while the blossom stem would be burned and the blossom shrivel up. On the apples I noticed no bad results at all. The last season was rather peculiar; in the spring when we had our warm weather first and cold weather afterward, and there were a great many growers around South Haven whom I advised to spray quite late with the Lime-Sulphur. None of them reported bad results. I think we can arrange to spray our strong solution of Lime-Sulphur at such a time so that we will not have to spray again until after the blossoms open. For the spray after the blossom we use one to 50. This is weaker than many use. Some use down to one to twenty-five, but we got very good results with the strength we used. We sprayed just after blossom petals dropped and then again in ten days and then the last week in July, using the commercial article one to fifty, and the home-made at five times the winter strength, or at the rate of 1½ lbs. of lime to 3 lbs. of sulphur and 50 gals. of water, and our results were very good all the way through. We had but little scab on apples and the apples were very much better colored than in other years. I noticed in other places where I have visited various orchards that the trees that had the Lime-Sulphur spraying had better colored fruit than where the fruit was sprayed with the Bordeaux mixture. The Lime-Sulphur does not seem to cover the fruit the way the Bordeaux does; that is, there is not so heavy a coating, and for that reason the sun has a better chance to color the fruit. The College has an exhibit of its fruit on the table back of us here which shows the difference in the color of the fruit sprayed with Bordeaux and Lime-Sulphur.

What brought the Lime-Sulphur as a summer spray to the attention of the fruit growing world was the fact that there was so much russeting when the fruit was sprayed with Bordeaux. Many have thought that this was not a good season to demonstrate the real worth of Lime-Sulphur and make a comparison with the Bordeaux mixture because the weather we have had has been the cause of a lot of fruit russeting. Especially Baldwins and other varieties of this type, because of the bad spring, have shown decided russeting. The russeting caused by the weather is not as deep as that caused by Bordeaux. It is also generally more scattered than that made by the Bordeaux. In all cases where trees were sprayed by Bordeaux it was much worse than on trees not sprayed at all or sprayed by Lime-Sulphur. This shows the difference in the amount of russeting done by the weather and by Bordeaux. I know of many cases where fruit growers say themselves that they lost quite a little money by not using Lime-Sulphur, which, by experience, it has

been shown will effectually eliminate the russeting caused by Bordeaux.

There have been various results this season with regard to the control of codling moth and many of us have laid our poor results to the use of arsenate of lead with lime-sulphur. The way I account for the general poor results this year is not on the account of the use of arsenate of lead with lime-sulphur but because the spraying was not done at the right time. I believe that this is going to be an important point with spraying the codling moth. The Government men doing work at Douglas watched the moth this season and found out that it came out three weeks later. There were several growers in the vicinity who followed their instructions with regard to the spraying for the moth and got excellent results. In several cases both Bordeaux and Lime-Sulphur were used with arsenate of lead for comparison and in each case the results in the control of the moth were equally good.

Of course, getting good results with the Lime-Sulphur and Arsenate of Lead together shows that Lime-Sulphur does not have any bad effect on the Arsenate of Lead if they are used immediately after mixing. One thing, however, in spraying with the Arsenate of Lead and Lime-Sulphur, the person should use it as quickly as possible. There is a chemical action between the two and if the mixture is allowed to stand over night or for four or five hours there is apt to be a bad effect; but in ordinary spraying just mix up your solution as you go along—the Lime-Sulphur and the Arsenate, and you will get very good results.

We use the Arsenate of Lead at the rate of two lbs. to 50 gals. of water. Most of the fruit growers that I know of have been using it at that rate and with very good results.

Now regarding the effect of Lime-Sulphur on other fruits: We tried it on most all kinds of fruits and we found that it gave very satisfactory results. We have about 150 varieties of apples in bearing and our fruit was never better colored nor freer from russet and from the scab than this year.

And we have all the tender varieties. The use of Lime-Sulphur on plums improved them very much. We use it at the rate of one to fifty on them. Some varieties that are very susceptible to rot, such as the Lombard and Victoria were more free from rot than ever before. The Victoria which is the worst rotter of them all, by using the Lime-Sulphur about three times after the blossoms at intervals of about three weeks gave us fruit that we could pack without any rotten spots. Other years this variety would probably have half of them rot near packing time.

Another advantage in spraying with Lime-Sulphur on plums is that you can use it later than the Bordeaux, as it does not stain the fruit as does the Bordeaux, and therefore can spray later. This is quite an important fact in seasons when the rot is bad. Of course, under ordinary conditions you would not have to spray later than the usual time.

Our crops of almost everything else were more or less of a failure so that we could not get very telling results so far as the spraying was concerned. We had, however, some Flemish Beauty trees that we were never able to keep free from the scab until this year, when we used Lime-Sulphur one to fifty on them, and when I saw that we kept these Flemish Beauty trees so free from disease and the color of the fruit so

good and the quality of the product so good, we were more pleased than I can tell you with the effect of the Lime-Sulphur as a fungicide.

We started out to test the Lime-Sulphur on the peach, comparing Lime-Sulphur and Bordeaux for the control of the black spot. As the black spot or scab was not found in any of the trees in the orchard we had nothing to show comparative results. All we learned was that Lime-Sulphur at one to fifty did not injure the foliage in the least.

In general I believe that one to forty is a good strength for the summer spraying of Lime-Sulphur on apples and pears. One to fifty is a good strength for plums and peaches.

Where a man wants to make his own Lime-Sulphur, I find good results in making up the following formula: 15 lbs. Sulphur, 8 lbs. Lime, 50 gals. Water; or 180 lbs. Sulphur, 90 lbs. Lime for a 50 gal. barrel of Concentrated Mixture. Some stations recommend 125 lbs. Sulphur to 50 lbs. Lime, but I hardly think that is strong enough; but making it 180 lbs. Sulphur to 90 lbs. Lime and boiling an hour, you will get a mixture that will do the best work. As to whether it will be chemically right or not I can not say but I know that the above formula will give good results when given field tests for either summer or winter spraying.

I will now leave the matter open for discussion with the hope that we can all get some good out of it.

DISCUSSION.

Q. Did you notice any damage to the foliage, whether sprayed by Bordeaux or Lime-Sulphur? Was the foliage of the Lime-Sulphur-sprayed trees as good as that of the Bordeaux?

Mr. Wilken—There was not very much difference. Sometimes trees sprayed with Bordeaux have a darker green color. The Bordeaux being of a bluish tint when put on the green of the apple foliage has a tendency to make a deeper green. Lime-Sulphur on the other hand being a yellow transparent color, will leave a yellowish tinge. But if the spray is washed off in either case the foliage will be the natural color. I think the Lime-Sulphur will leave a more healthy color than the Bordeaux as it has a stimulating effect that the Bordeaux has not.

Q. Do you recommend Sulphur for the mildew and black rot on grapes?

Mr. Wilken—We have not fully tested the Lime-Sulphur as far as grapes are concerned. We did not have a very good crop this year, but I believe that the tests carried on at Lawton showed that it was valuable for that purpose.

Q. What is the difference in the test between the 180 lb. Sulphur and 90 lbs. Lime and the 125 lbs. Sulphur and 65 lbs. Lime—did you test the difference between them in your Concentrated Solution?

Mr. Wilken—Do you mean the results?

Q. No, the hydrometer test.

Mr. Wilken—I did not use the 125.

Q. I believe our State Board recommends 125 lbs. Sulphur, 65 lbs. Lime. In my boiling I use the State Bulletin formula and that is 125 lbs. Sulphur and 65 lbs. Lime and mine always tested 30, and this that we buy, the commercial products, tested 34. I wondered if your 180 lbs. did not bring it to your higher test.

Mr. Wilken—There are so many things that influence the test—if you get it strained well the reading will be different than if not strained well. Then it will make a difference if the solution is not stirred up well. I would not put too much dependence on hydrometer tests, for the home made mixtures but I know that if 180-90 formula is boiled from an hour to an hour and a quarter you will get good results with it.

Q. What is the cause of the crystalizing of the home Lime-Sulphur solution and is there any way to prevent it?

Mr. Wilken—When Lime-Sulphur is exposed to the air, it will evaporate some and you will have crystalization. We have had no more of it with our home formula than with the commercial. In several barrels of commercial Lime-Sulphur we found much settling on the bottom. This is on account of the exposure to the air.

Q. What formula do you use, how much lime and how much sulphur? I use double the amount of sulphur that I do lime, that is 2 to 1.

Mr. Wilken—You use the same as we do.

Q. Does Lime-Sulphur diluted in hard water act the same as when diluted in soft water?

Mr. Wilken—I do not think there is any difference.

Q. Do you use your home made at the same rate that you use the manufactured?

Mr. Wilken—We use the home made winter strength, 15-8-50; for summer strength we dilute it five times.

Q. Do you dilute one to eleven same as commercial?

Mr. Wilken—That depends upon how much water you have left after you get through boiling. You start with 8 gals. of water for every 50 gal. (diluted) batch you boil or one gal. of water to every pound of lime you use. These 8 gals. will boil down to about 6 which will make it about one to eight. It can be got down to one to eleven by using less water to start.

Q. You spoke of using the 180 sulphur, 90 lime to 50 gallons of water. Would you use it at one to eleven?

Mr. Wilken—When you boil it up you use more than 50 gallons of water to boil up. In making the home made mixture you put a gallon of water to a pound of lime. You want to get down to 50 gallons of concentrated mixture, so you boil down to 50 gallons. You can make it with more water than that—with 60 or 75 gallons of water. The point is to keep the right proportion.

Q. By using the hydrometer what per cent would Lime-Sulphur figure, or test on a hydrometer, the home-made or commercial?

Mr. Wilken—That all depends, the most of the commercial Lime-Sulphur will register about thirty-three.

Q. The home-made, what about that?

Mr. Wilken—You can vary five or six degrees on that. As I said before you can get readings of home made Lime-Sulphur that will properly denote its strength. A home made mixture reading thirty may be as strong as a commercial preparation reading thirty-four. The difference in reading may be entirely due to the difference in straining and not to strength. For commercial preparations the hydrometer gives us somewhat of an idea of their strength, even in such cases it is not an accurate indication of strength.

A Member—The manufacturer of the chemical article conducts the

operation in such a way that the strength of the solution is based entirely on the reading of hydrometers. In the manufacture of sulphuric acid, you buy 60, 52 or 66 degrees. It stands 66 degrees on the hydrometer and all contracts are based on hydrometer reading. We would never think for one minute of not using the hydrometer at all times all through the operation. You can take mud and water and it won't stand zero although the liquid is zero. The mud will make it stand at a higher figure. The reading of the hydrometer will be based on clear solution, and it is very easy to get it to read wrong by holding your wet finger on the reading, and that extra weight will make it sink down. But with the top dry, and the temperature somewhere normal, the change in reading is very slight. If you get your home-made mixture with a lot of sediment and then take a reading, it will be entirely wrong. That sediment will make it appear to be stronger than it is. A good deal of sulphur goes into soluble forms, and it is possible that you can use ten pounds of sulphur and wind up with one pound. All the rest is gone.

MORE MONEY FOR THE APPLE CROP.

(PROF. H. J. EUSTACE, MICHIGAN AGRICULTURAL COLLEGE.)

There are about as many ways of disposing of the apple crops in Michigan as there are of growing it and they all have their advantages and disadvantages that are worth considering.

To enumerate some of these ways would be to mention the method of lumping all the fruit in the orchard for a stated sum. A sharp buyer can size up the yield of an orchard and tell what it is worth to him and then size up the grower and tell what he will have to give to get the fruit.

This is what might be called a crude way of disposing of fruit and you do not get all that it is worth, but it has the advantage of letting the grower out of a lot of work and when a man has other crops, he may be justified in selling this way, but after a few experiences, it will generally be found an unpopular way of selling fruit.

A more common way is when the fruit is sold by the barrel at a stated price—so much for No. 1s and No. 2s—to include all or any certain varieties. This deal is modified in many ways, the buyer to furnish the barrels and do the packing and the grower to do the hauling. The grower sometimes furnishes the barrel and in some cases, the grower makes the barrel and sells it to the buyer. An eager buyer is open to any kind of deal that will give him a desirable crop at a profitable price. This method is common in New York but probably more so in Michigan. It has the advantage of relieving the grower of a lot of work especially where the deal is so arranged that he only has to haul the barrels or to do the picking aand hauling and it gives him money at picking time. It is, however, the same old story of some of the value he has accumulated going into the hands of another.

Considerable of Michigan fruit is consigned to commission men in large cities. Results from this method have been various. When fruit has been

sent to unreliable and dishonest men, the returns, if any, have been disappointing, but there are some notable instances of where reliable commission men have done very well for men who have stuck by them, year in and year out, who have packed their fruit honestly and have given the dealer a chance to work up a reputation for them. The advantages and disadvantages are similar to the preceding methods. Though the grower requires more help and working capital and the returns may not be quite as quick. It is not as common to find a grower who ships his fruit to one of the cities to be held in cold storage and sold at a favorable time to dispose of it in Michigan as it is in New York. In New York state there are many large cold storage houses in the apple belt and this is a thing that must come for Michigan. This system has advantages that are well worth taking if the grower has the necessary capital to do it and if the packing is done so that the fruit does not have to be repacked before it is sold.

Whenever a grower is found giving more attention to his fruit and making the growing of fruit a more specialized business to the exclusion of general farming, you find he is giving more attention to the disposition of his crop and is eager to get the most for it, if it does take more time and trouble.

In any of the ways mentioned, the "middle man," the "go between," is always to be found. True he fills a certain useful place and probably will always be with us, but it is of interest to see how some of the progressive Michigan fruit growers have gotten along very well without him and to their decided advantage financially.

May I call your attention to a few that have come to my notice?

Mr. S. G. Power, Northport, sold his crop of Steel's Red in 1909 to a grocer in Detroit for $1.25 per bushel for tree run. The grocer furnished the packages, sent them to the orchard (which is situated on an interurban road from Detroit) and Mr. Power has only to pick the apples into the crates and put them on the electric car. He thus saved the expense of packing, packages and hauling. A straight, clean deal, with a man who retailed them to the consumer and satisfaction to both parties.

It is possible for Mr. Henry Smith of Grand Rapids to secure $6.00 per barrel for fruit in a barrel of Jonathans where Mr. J. H. Crane of Fennville got but $3.25 for his barrel and all. The fruit in both cases was very fine but Mr. Smith sold direct to the consumer and charged $2.00 per bushel for the fruit and in addition, the cost of the barrel. Mr. Crane sold to a dealer and probably the consumer had to pay more than $6.00 a barrel for the fruit.

The method of marketing that Mr. David Woodward of Clinton has worked out for himself is unique and interesting.

Mr. Woodward has an orchard of but five acres, four miles from Clinton and for the past four years has boxed his apples. Sometime during the fall, he will load a car with boxes of No. 1 and No. 2 and a grade between No. 2 and cider stock, which he calls "bulk" and ship it to some medium sized city in Indiana. He would go to the city and work up a trade. After it as established, it would take care of itself. Another year he would send a letter to his customers stating what varieties he would have and what the price would be and asking for the amount they would want. This year he secured $2.50 a box for No. 1 Steel Red and Grimes; $2.00 and $1.75 for No. 2 which were also boxed and $1.00

and $1.25 for the "bulk" stock. His method of packing is simple and easy and the expense is not much larger than barreling. As the fruit comes from the orchard, it is placed on the packing house tables and then sorted by girls into No. 1, No. 2 and "bulk" and cider. The 1 and 2 are placed in boxes lined with white paper, no attempt being made to make any special pack, between each layer of fruit is placed a paper. The cover is pressed on with a press and the variety name stamped on the neat label pasted on the end of the box. The box costs 10½ cents, the paper about one cent and so the package cost is about the same as a barrel.

Many of you are familiar with the method that Mr. C. W. Wilde of Grand Rapids disposes of his crop of apples. His farm is six or seven miles from Grand Rapids. As soon as his fruit is packed, it goes into a cold storage house on the farm (a convenience more Michigan fruit growers must have) in bushel crates. During the fall and winter, it is sold in Grand Rapids to grocers, no packages are lost, nor is any packing done and the price received is a fancy one for Wilde's Northern Spys have a permanent reputation in Grand Rapids groceries. Last year and two years ago, they brought $2.00 a bushel, no packing or packages. A good illustration of how a local market can be developed.

The case of Dr. W. P. Morgan of Saginaw is of special interest in that it shows how a beginner can "make good." Dr. Morgan is a retired dentist. He selected a neglected orchard a few miles from Saginaw and appealed to the College for advice in improving it. He was successful, has a good crop this year and has disposed of it in Saginaw, another case of working up a local market.

All of his fruit went into bushel boxes and he received $2.50 a box for No. 1; $2.00 for No. 2, and $1.00 a bushel for the others. It paid well to box and it paid well to develop the local market.

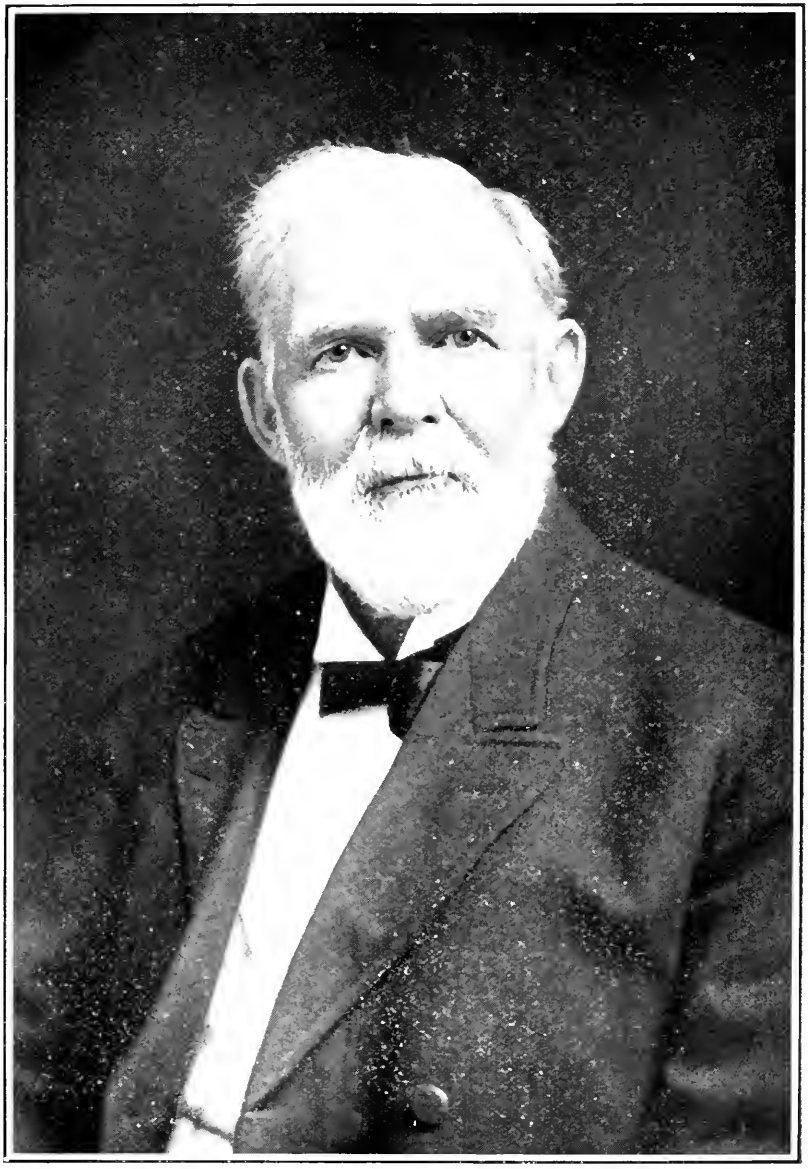
Messrs. Stoddard & Son of Kalamazoo, store their winter fruit and sell it out during the season. Last year I had occasion to buy apples for a few of my neighbors and inquired of the Stoddards of what they had to sell and the price per barrel. I will quote a part of their letter:

"In reply to your letter regarding apples, will say that we do not care to quote a shipper's price as we dispose of all our apples locally. If you want any at $1.25 per bushel and the cost of the barrel, you to pay the freight we can supply Baldwins, Greenings and a few Kings."

Another case of a local market developed to the advantage of a grower.

These experiences only go to show what can be done under various conditions for among them are to be found experienced fruit growers and beginners, some located in rural communities and some adjacent to good sized towns or cities, some in general farming sections and others in strictly fruit growing regions, but all of them have worked with marked success, a superior way of selling their crop of apples. These specific cases are brought to your attention to show methods that are being commonly practiced in this State among men we all know who "get more money for the apple crop." It is a live question and one that is going to be livelier in the future when the immense area that has recently been set out, comes into bearing and progressive fruit growers must give to it some of their best thought and attention.

Jonathan apple trees loaded to the ground in orchard of O. C. Edwards near Battle Creek.



Alexander Hamilton

Entered into rest at Bangor, October 11, 1910. He was an honest man and a pioneer in Michigan horticulture. His memory is a blessing and should prove an inspiration to all who knew him.

DISCUSSION.

Prof. Eustace—I would like to take two or three minutes and have Mr. David Woodward, who is eighty-six years young, tell how he picks and packs apples.

Mr. Woodward—This is unexpected to be called upon to speak off-handed on the subject of packing apples. Before speaking particularly on that subject I would just like to say a word in regard to the matter that was up for discussion this forenoon. First, in regard to pruning: I do not prune so severely as some, but I give my trees a good thorough pruning every year. Sometimes it is almost impossible to get the help I would like, and have been obliged to take some that did not prove very satisfactory. Indeed, some of these professional pruners I would shoot as soon as they come on my place. (Applause). And there are grafters that are no better. My eyesight is getting a little poor, and I cannot do as well as I could once. I had a neighbor who was doing some grafting, and I got him to come and do some for me, but he had not done much till I said, "That is enough—I don't want any more of that kind of grafting"—he put in twice as many grafts as he should, and he wanted to go up 18 or 20 feet. When the pruning is done, I believe in thorough spraying, but for some unaccountable reason my spraying this year, especially on the Canada Red, has not been successful on account of the rust. I have had some trees that the fruit in it rusted so badly that there was scarcely an apple that was merchantable. Then perhaps the very next tree would have no rust at all. Just what is the cause I can not say. Some say it is the cold weather; others say it is the kind of spray used, and still others something else. One of the main reasons why I came to this meeting was to get some light on these subjects, but so far I have not found out very much.

Now in regard to picking apples. When the time comes, I like a good crowd. I get if possible fifteen to twenty sorters. The apples are picked in half-bushel baskets, and are drawn to the packing house where they are emptied on a table. Then have girls do the sorting, grading them as fancy, seconds, thirds and fourths, and each goes to a separate place. Then the fancy are packed in boxes, with paper between every layer, and they must be in so as not to shift about. The top and bottom of the boxes should be sprung a little so as to take up the shrink.

My apples are largely sold before they are picked. There is one concern that I have been dealing with in Indiana, and usually arranged for them by the carload. This year he made arrangements for a carload, but the order was cancelled before the apples were shipped, and I have that carload of apples still on hand, but that does not bother me, as I can easily get rid of them around the holidays.

There is one feature of apple raising that is really a trade of itself, and that is the marketing of the apples. To work up a good trade and hold it takes considerable time and some money, and then you must deliver the goods true to name and of a quality that will prove the same every time, and when you have established a reputation for handling first class fruit, and you get the trade started, you will forever have it.

Mr. Smythe—I think Mr. Woodward told us at Kalamazoo that he had planted an orchard last year, which he expected to live to eat apples from it. I wish more of us had that kind of spirit.

A Member—I think Mr. Woodward told of a man that was going to cut a tree and graft it, and live to see it grow over and the tree bear fruit. I would like to know how that tree is coming on.

Mr. Woodward—I believe I said at Kalamazoo that a neighbor has a tree about fifteen inches in diameter, which it was thought could be cut off and a graft put in down low and a success made of it. I was very anxious to try it. So I got him to saw it off, but it was a little late, the bark had begun to tighten up, and I did not have the best of success. I put in some 22 or 24 grafts, but only about two-thirds of them grew. I will put in the rest this spring. In my own orchard I had some limbs eight inches in diameter that I cut off and grafted two years ago. I said at Kalamazoo that I had taken that kind of a graft and in four years it had grown over and borne apples. It bore more apples this year, and it is nearly grown over now. This 15-inch diameter tree I said over at Kalamazoo I expected to graft last spring, and which I did, I expect in fifteen years it will grow up and I will be present at the annual meeting and report. (Applause.)

A Member—I would like to have question No. 13 answered: "Who is growing successfully the King David and Delicious apples in Michigan?"

A. I have a neighbor who has some Delicious, but the apples seem rather small.

A Member—I have quite a good sized block of King David apples but from my experience with them for several years I would advise going slow. It is liable to be water-cored if the season is rainy. The Delicious is a good apple, and where the soil is right and other conditions favorable it will do all right.

Mr. Woodward—I had twenty trees of each, and they are both very successful growers. There will be a tendency to water-core in the King David, especially in rainy seasons.

A Member—In 1901 I was in Arkansas working, and visited the original tree of the King David apple, and I have a top-graft in my orchard from that tree seven years old. It is a very fine growing apple, not as large as the western apple, but in putting them away for winter use, I find them water-cored, and none of them remained in perfect condition after January.

Q. Where were these apples grown?

A. At Laurens.

A Member—They are both new apples. I have seen them grown in fifteen different states. King David, so far as I have observed, in Northern Michigan, Colorado, Wyoming, California, Washington, Oregon and up in the Canadian Provinces, gives good promise; is about the same size and color in Northern Michigan as it is in the west, ripening a little earlier with them, along with the Jonathan, so that it is not a good winter apple in the west.

The Delicious, so far as I know, has not from the time it was first introduced, proved satisfactory. The first two or three years they were very uniform in size, but later they proved to be not uniform in size. There would be a few nice large applies that would run 28 to the box, but three-fourths of them would vary ever so much in size and quality, being rough in appearance and undesirable as a marketable product. The Colorado people, especially the large orchard people, are grafting them

all over. They are a fairly good apple for eating, all right for home use, but not a satisfactory apple for commercial purposes.

Mr. Farrand—We can not in Michigan begin to supply the demand for Northern Spies, Steele's Reds, and types of apples of this class, that we know what they are and what they will produce, why do we want to grow something that we do not know what is, and that will only be an experiment at most? (Applause).

Mr. Wooward—How shall we know what are good apples if we do not experiment? Someone had to experiment before we got our standard varieties. So I would suggest that we plant just a few of these new varieties, and try them out. If they do not turn out well, we will not lose much, and if they do, we have gained a point. This is the way I am doing. (Applause).

Mr. Farrand—There may be better apples than those named, but we don't know of them. I would rather plant two that I know are all right, than to take my chances on an untried and unknown variety.

Mr. Woodward—But if one of mine happens to be good, I will have enough to let you have some. (Applause).

A Member—I would like to ask what new apples you are testing?

Mr. Wilken—At the Station we haven't anything very new. We are so crowded with the old trees that we do not have time to do much experimenting. We have the Delicious and one apple of the King David type. The other apples that are doing well with us are the Aikin, a dark red, medium sized apple, no good until after Christmas. The Fulton, a fall apple, like the Spy, a little flatter. Springdale is another apple, a good winter apple, excellent keeper, dull in color. The Spencer is a pretty good apple, of the newer kind. Then of the Duchess type we have the Milwaukee, and one or two other varieties.

Mr. Smythe—Do you think these varieties so superior that they do not need to be tested out?

A. No, sir.

Q. What about the Ontario?

A. Our Ontario apples are in a poor place, and they have not shown up with the other varieties, but personally I prefer to set the Wagners in place of the Ontario.

Q. Anyone else had any experience with this variety?

A. Member—I have raised Ontarios, but I would not set any more.

A Member—I have some Ontarios, but I did not get a crop of apples from them this year.

Q. What is your experience when you do have a crop?

A. It is an excellent cooking apple.

Q. What season?

A. Fall and winter. They come in the same as the Wagner.

Q. Would you advise setting them?

A. No, sir.

Q. I would like Q. No. 9 answered: "Are we planting too many Duchess apples? Can Maiden Blush be substituted?"

Mr. Farrand—At the present time we haven't set too many Duchess, providing the stock is good. The Maiden Blush has been a drug on the market until now.

Mr. Howard—As to the first part of the question, I would say that we are not, that is, if the stock is first class. The Maiden Blush is a

good apple, and at the present time and for some time past, very few of them have been set.

Q. Of which would you set the more?

A. The Duchess.

Q. How about the Chenango Strawberry?

A. I got $3.50 per box, and I understood that the buyer had to pay $4.

Mr. Smythe—As I remember, there were 80 apples in the box, and for this you received $3.50. I wish we could all sell our apples that way.

Q. Are they productive?

A. They are with us. And we have trees 25 and 30 years old.

Q. At what times does the Strawberry apple begin to bear?

A. At about 10 years old.

Q. Has anyone set the trees as young trees?

A. Yes, I have had some experience, but you should go carefully in setting, as they are very tender, and won't stand shipping very well, especially in warm weather.

A Member—My experience with the Strawberry is that they bear quite young, grow rapidly. They will mature to a given size more rapidly than any tree I know of. They are very tender and delicate, and in harvesting, they should be picked about twice a week in order to get fruit of the right quality and proper color. And where the fruit is in prime condition, it will bring a good price.

A Member—I would like to know if the Chenango and the Strawberry Pippin are the same. I had good results from them after I began to take good care of them, and spray with lime-sulphur. But they are very tender, and when ripe have to be picked two or three times a week. I get fair prices for them—indeed, very satisfactory.

Mr. Ballard—The Strawberry Pippin and Chenango are practically the same, and as set by my father and uncle forty-five years ago, have been a very profitable apple, although they are very tender, and more subject to disease than the Duchess. But if we spray properly there is not much trouble. It is an apple that scabs and is subject to rot. We have to spray pretty carefully on that account. We get better prices for them than for the Duchess, the very top of the market.

Mr. Wilde—I would like to say that the Chenango Strawberry is doing well with us, when properly sprayed, trimmed and taken care of. In its prime it is a good seller, but it is an apple that when neglected you will hardly know what it is. It has one fault—it is a bad scabber, hard to ship. These apples are like some people,—very good, but not without their faults. I would not advise planting very many of them, unless you have a market where you can dispose of them. Do not ship them in barrels. When the trees are overloaded, the fruit is of a poor quality.

Q. Don't you think the spraying tells better on the Strawberry Pippin—the results show better than on some other varieties?

A. It tells very quickly; indeed if you did not spray, you could not tell what it was.

Chairman—That is true of all apples, is it not?

Mr. Kelley—I beg to say that I think you are on the wrong line altogether. The Chenango and the Strawberry Pippin are two different trees,

but not two different apples. The Strawberry Pippin is a small slow-growing tree, and is often taken for the Chenango Strawberry, but the trees are different. The real Strawberry Pippin is a very hard apple to grow. This I have found out by a number of years' growing of it. It has a tender skin, but in good condition commands the highest market price. I have made a real success with the Strawberry Pippin, while in some of the adjoining orchards, the Chenango Strawberry was a total failure. It is also known as Sherwood's Favorite.

Q. What is its shape?

A. Like the Gillflower.

The Chairman—The Chenango that I spoke of is long like the black Gillflower.

Q. What is the shape of the Strawberry Pippin?

A. Almost the same—can not tell the difference only as to size and color.

President Smythe—The next topic on the program is by Prof. Waite, but as it is impossible for him to be here at this hour, we will let Mr. Farrand occupy the hour which is the same hour he would have to-morrow. He will talk upon the subject of "Pear Culture." He is too well known to need any introduction to this audience.

PEAR CULTURE.

BY T. A. FARRAND.

Ladies and Gentlemen, Fellow Fruit Growers—I am very sorry that the topic of the hour is to be changed, because I think this is an important one, one that is of vital interest to every fruit grower. However, I will do the best I can.

In taking up the topic of Pear Culture, I do not know as I have anything new to offer beyond what you have heard before. I do believe there is a great field yet for the planting of more pear orchards, but of course there is one serious drawback which will always remain with us. In taking up the subject of Pear Culture the first consideration would be soil and the best location for the pear. My experience and observation have lead me to prefer a heavier soil for pears, as I believe that better results can be secured there than on light soils. Then along with that, would come the question of variety. This is a point that has been fought over and over again. While I believe that the great standard pear is the Bartlett, there are other pears that can be planted with profit.

Among these I might name the Anjou, Clapp's Favorite, Kieffer, etc. You will hear derogatory remarks made of this last variety; so I will not say that you shall plant any more than you would say what I should plant. That is a question that each individual must decide for himself, taking into question his location, soil, market, etc., but we all

must concede the one point and that is that the Bartlett is the standard.

With many the Kieffer is a profitable pear. It is the least susceptible to blight of any other variety, but you know its characteristics as well as I do. So far as I am concerned personally, I would not plant a Kieffer pear and yet as I said they have been very profitable to many.

The same can be said of some other varieties of fruit; for instance, the Ben Davis apple is one that I would not plant, yet it has been very profitable to many, and is in favor with quite a few in this section of the country. So in selecting your varieties of pears, you should decide for yourself, those varieties which you like the best and which will prove the most satisfactory to you.

There is the Duchess pear if you prefer it. There are those who prefer the Dwarf variety, or, this variety on Dwarf stock, and this is always something that you must decide for yourself. Personally, I prefer the standard.

Now, as to the treatment and cultural methods. The culture of the pear is always a question on which there is a great deal of diversity of opinion. Shall it be the higher culture methods, or shall it be the opposite? Then there comes in the question of blight, for as you know, this question of blight is the one great serious drawback in the cultivation of pears.

I have seen whole orchards go out with pear blight. Others succeed in holding them and keeping the pears by very thorough work in keeping the blight under control. I do not think there is anything in the line of a remedy for pear blight, only the cutting-out system, by watching very carefully and keeping this infection from your orchard. But I will tell you that it requires very close watching. If you can get around this question of blight in your orchards you need have no question but what they will prove very profitable.

There is less tendency to plant pear orchards now than other kinds of fruit. We do know that in some sections of the country, especially in central and southern part of Indiana, they cannot grow anything but the Kieffer. The blight there is so bad upon the Bartlett and other varieties of that class that they can not grow them there. However, wherever the Bartlett can be grown, it will always be a profitable investment.

I believe in the heading-in system. I have always practiced it in my own orchards. Some think that by heavy fertilization and heavy pruning, you induce a condition that causes pear blight. Indeed I have seen some conditions that would lead me to believe that this is so.

So far as cultivation is concerned I have seen orchards well cultivated with no more blight than those not cultivated. I think the tendency is toward seeding the orchard with the idea of stopping its spread. I think I should cultivate a pear orchard just the same as an apple orchard where I could do so; that is, I would give it the same cultivation. The whole system is summed up in this, produce the very finest pears that you can.

Spraying must be done as with everything else. Your trees are liable to be attacked by the leaf blight and other pests common to it, and you should always spray in anticipation of these pests, even though none for the moment show themselves.

Then of course the application of fertilizers of different kinds must be considered. I know of pear growers who are in it for commercial purposes and would not allow stable manure to be placed in their orchards, preferring to use potash, etc. That are not strong in nitrogen which would induce a strong sappy growth that would induce blight conditions.

Many are here who have had experience in pear growing and are rich in knowledge as to the effects of various fertilizers as well as conversant with all other phases of the subject, and I shall be more than pleased to hear these experiences, believing that out of them we can gain valuable information of great value to us all.

In summing up the matter I would say that the one great thing is to be able to keep the pest ravages under control. Many have neglected this and have lost their trees. Others by exercising care and diligence on this point have made great success. I believe in pruning a pear tree and heading it in; giving it cultivation and with the cultivation a liberal use of fertilizers. Use your own judgment as to what your orchard really needs to bring you the best results and remember that at all times the thing we are after is the production of the very best fruits which it is possible to raise.

I will leave the subject with you, trusting that the discussion that will follow will bring out the queries that are in the minds of the members of this association.

DISCUSSION.

Q. Do you consider it a paying proposition to work the Kieffer pear on a Bartlett?

Mr. Farrand—I have had no experience. Personally I have heard the remark made that the Keifer was so much stronger in growth that the union would not be a good one.

A Member—I have grafted the Keifer pears to some Bartletts, and I have never seen a finer looking tree than that is today.

Mr. Bassett—We tried the same thing on a number of varieties and our objection to it is, that it makes a bad union, fear when the trees come into full bearing they will break at the union. It makes a big knob-looking affair. We grafted the Kieffer to six or eight different varieties. Prof. Eustace saw the trees and will bear me out.

A Member—How long have they been grafted?

Ans.—Six years.

Q. Has there been any break down yet?

A. They have shown a weakness.

Q. Did they have any pears on?

A. Yes, some. In grafting the Kieffer we should leave a part of the old wood standing so as to take care of the extra sap. This is a caution that an old grafter gave me. The large amount of sap that the Kieffer carries, the scions will not take care of. The union seems, for some reason, to allow a leakage of sap.

Q. Why I ask this question is because that one-third of my Kieffers I grafted to the Bartletts and so far it looks as though it has been very successful. The Bartlett scion made a wonderful growth, fully as much as any part of the Kieffer tree itself. I have scions that made a growth

of four feet and it looks now as though the union is good and will be almost perfect.

Mr. Farrand—Although I never had any experience in budding or grafting pears, I don't see why it would make any difference, whether the new growth came from a bud or from a scion.

Mr. Eustace—I was very much interested in these trees that Mr. Bassett tested. They did not look promising at all. The union was a great coarse affair and when they get a good load of fruit I know the tension will be very great and there will be trouble. It is the opinion of many that Kieffer stock is a poor one on which to graft. I know, however, that there are a great many Kieffer trees that have been planted in Michigan with the intention of working them over to Bartletts and the result will be watched with interest.

Mr. Smythe—I have a neighbor who tried budding, but I believe he turned it down.

A Member—I grafted some Lawrence and some Kieffer, the Kieffers are the best, better than what I put on the Lawrence.

Q. What did you graft on the Kieffer?

A. Lawrence.

Q. How did they come out?

A. The Kieffer did the better of the two.

Q. What about the union?

Ans.—It is strong, though bungling.

Mr. Farrand—While everything looks as though it would be all right now, have any of the trees broken down with crop?

Member's answer—I did have some that broke down but they broke above the union and not at the union.

A Member—I have had a little experience in grafting different varieties on Kieffers. I was abroad three years ago and brought back some stock with me. This I grafted on the Kieffer but the graft did all right, although as yet, they have not borne fruit.

Mr. Smythe—My experience with foreign fruit is that it is so very poor that it would grow good on any pear. (Laughter.)

A Member—I would like to ask Mr. Bassett what age his Kieffer was when grafted.

Mr. Bassett—About four years.

Q. I would like to ask why it is that we haven't had as much blight during the last three or four years as previously.

A Member—I think that we have had more, at least in our section.

Mr. Smythe—I would like to hear from Mr. Fritz on this question of blight.

Mr. Fritz—I do not know of any other way to keep the blight out than to cut it out, and I go through my orchards and look very carefully for every evidence of blight, and where I see it, or even suspect it, I cut the affected part out and am careful to cut it far enough below the appearance of the blight to insure absolutely that it is all cut out.

Mr. Smythe—I wish that fruit growers did things as thoroughly as you do.

Mr. Farrand—I would like to ask Mr. Sherwood what varieties he would plant, if he should plant another orchard.

Mr. Sherwood—I lost eighty per cent of my Bartletts, attributed to excessive trimming and over fertilization, but I go below St. Joe on the

lake shore and I see there, old orchards that have been pruned and thoroughly cultivated, twelve to twenty-five years old, without any vacancies in the orchard, and I do not know what to say.

A Member—I have been raising pears for some time and have had more or less trouble with blight. I have adopted the practice of looking very close to the wood in March and every limb that has any discoloration in it, I cut out very low, the same as Mr. Fritz, and since I adopted this plan I have had little or no trouble, so I think the way to secure control of the blight is to nip it before it develops, and the way to do this is to cut out every particle of it, and do the work thoroughly.

A Member—Four years ago when I was in Colorado, they were cutting the blight out and binding the wound over with petroleum. I had a small orchard of pears, Clapps and Bartletts, and I have had more or less trouble with the blight. Since then I have used clear kerosene oil as an application wherever I cut off a limb and I find that for some cause or other,—whether the kerosene has anything to do with it I do not know—but it seemed to work well with me.

A Member—We have not had very much blight in our pears but we have had much of it in our apples. We came to the conclusion that the spreading of it was due to our not sterilizing our instruments with which we did the cutting. Corrosive sublimate as a means of sterilization has been advocated; but we used straight commercial lime sulphur and always dip either our knife, hand-shears or long pruning hook into this solution every time we use any of them. We had some Sutton Beauty apples, same which last year we lost entirely through blight, and would have lost this year but we think we now have the disease under control by adopting the principle of sterilization of our instruments, which we have never done before. In other words, now we sterilize, whereas before we did not.

Mr. Smythe—I would like to ask if anybody else has used kerosene or has tried any other disinfectant.

A Member—I have used kerosene on my knife.

Q. I would like to have question number 20 answered. It is, "Do Bartlett pear trees blight any more when well cultivated than when kept in sod?"

Mr. Farrand—I do not think there is any definite reliable information that can be given on this point, but I think the general tendency of information has been that very intense cultivation, and possibly the other methods with it, heavy pruning and strong fertilization, would induce such a growth as to make the tree susceptible to blight. And then acting on this theory, I have known of parties who have seeded their orchard down to check their growth and consequently check the blight, and in some instances, at least, it has looked as though it helped to do it. But, on the other hand, I know of orchards that have been thoroughly cultivated and highly fertilized but with only the ordinary methods of prevention of insect pests, have shown no signs of blight. The fact is that in some years and in some orchards the blight does not seem to appear, or if it does show itself it is easily controled while in other orchards it will stay right there year after year in spite of the best eradicative measures that the owner can give. Mr. Sherwood's orchard I have seen often and he was troubled greatly with the blight. He fertilized very heavily and we laid it to that; but still I am not sure that is it.

Q. Does not the season have something to do with the blight? A year ago this summer we had much blight in our young orchard. We cut it out when the trees were dormant. It seems to me that the blight appeared one hundred to one, last year to what it did this year. I think heavy pruning has a tendency to cause pear blight, so I would not top-graft any more pears. I have lost three-fourths of all the pears I have top-grafted within three or four years after I did it. Personally I would not advise any one to top-graft a pear orchard, on account of the blight taking them then or a few years afterwards.

Mr. Farrand—I may say one thing I have observed and it brings up the problem of pollenization in connection with fruit. Some say that the Duchess pear is not susceptible to blight, but in an instance that I know of in every one of the blossoms you could see where the blight had definitely entered these blossoms and I think it spreads in this way. There is a great chance to spread infection through the blossom. I laid it to the bees working on some infected branch and then coming to these trees and infecting them in that way. This observation is made after I have watched the matter very closely and this is the only logical conclusion I could come to in regard to the blight in that instance, the leaf spurs did not have a particle of it but every blossom spur did.

A Member—Always when you cut a limb off for blight, you will find sap will come out and when it does you can almost always find bees on it. The theory was largely, in putting the keresone on there, that the bees would not work on there until it got seared over, until the sap quit coming out of the wound. There must be some cause for the blight spreading. Mr. Farrand has spoken of bees and I am inclined to think that his theory is correct.

Mr. Smythe—In putting kerosene on that stub did it heal eventually?

A. I could not see any bad effects, one-half of the tree was gone and the other half matured the pears and the part that we put kerosene on healed over and it has borne ever since. The theory was that the kerosene made it so obnoxious to the bees that they would not want to light on there, but would stay away, and so the poison was not carried from one tree to another.

Mr. Welch—I have been listening with much interest to this discussion. It seems to me that these terms, cultivation, excessive cultivation, are misleading. I have a neighbor who I notice gave his peach orchard good cultivation in October, the season was wrong and the results were not favorable. I had a young pear orchard 7 or 8 years old which has made an excessive growth every year, from 3 to 5 feet at a time. I had a theory that the early cultivation of the pear orchard would be a preventive of the blight—that it would leave very little room for the blight. I also have another opinion that I believe will work out as the cause of excessive blight, that is, I question whether our summer spraying may not be an advantage in preventing the blight. This orchard I have I haven't given it a summer spraying of lime-sulphur, but it has been fairly well cultivated and what has been done was done early and the trees made a great growth. I would not say that this is a sure preventative of blight, or that it is a preventive at all, but it seemed to work well in this particular case.

Q. I would like to know what to do with the blight. Perhaps this has been answered before, but I have just come into the hall.

Mr. Smythe—Mr. Fritz, will you please tell your experience.

Mr. Fritz—Well, I just cut it out whenever it occurs and I have been able to control it for years. I have had no damage from the blight now for six or seven or eight years. I cultivate very thoroughly and quit the first week in July. I use no fertilizer to amount to anything except bone meal and potash. When I cut the blight out I burn it, and as I said before, have been able to control it for a long time.

Q. When you cut out the blight do you paint it over with anything?

Mr. Fritz—No, sir.

Q. Do you disinfect your tools?

Mr. Fritz—No, sir; I do not think it necessary. I cut eighteen inches below the infected part and so do not think it necessary to sterilize my instruments.

Q. Have your pears been heavy bearers?

Mr. Fritz—Yes, for the most part. I have 4,000 trees and a great many of them produce from three to five barrels a year. The Bartlett is the best bearer. My success has been very gratifying to me. I average a profit of about $150 per acre above all expenses.

Q. What do you spray with?

Mr. Fritz—Only the Bordeaux mixture, as a rule, for three or four years. I have sprayed with lime-sulphur a little before the buds come out—that is for the scale, but for the most part I have used only Bordeaux.

Q. How many times do you spray?

Mr. Fritz—Three times.

Q. When?

Mr. Fritz—Before the buds are out and immediately after the blossom falls and then about ten or twelve days after that.

Q. Have you ever had to spray for the codling moth?

Mr. Fritz—No, however, this last year I have had some worms but they have not bothered me to any extent.

Q. Why do you think you have worms?

Mr. Fritz—I suppose they come the same as any worms.

Q. What is the nature of your soil?

Mr. Fritz—Clay soil.

A Member—I would like to ask if these trees are not heavily in bearing at the present time, I have an idea that the whole trouble with pear blight is not with trees after they come into bearing but before. I would like to ask Mr. Sherwood this question.

Mr. Sherwood—I am quite sure that trees that are bearing do not have so much tendency to blight as those that are younger. It is up to the time that the trees are four or five or possibly six years old that blight is a greater danger to the orchard. Mr. Fritz is not that so?

Mr. Fritz—Yes, sir, I think it is.

Mr. Smythe—Mr. Fritz began pear raising as a novice but has kept at it until now he has become a real expert and an authority on the subject.

A Member—That has been my experience in raising pears. The blight does not trouble the tree so very much after it is in bearing.

Mr. Smythe—The fruit takes what the blight would.

Q. Will Mr. Fritz give us his method of trimming?

Mr. Fritz—I used to prune a little too much, but of late, I only take

out the water sprouts and keep them down and do not trim the main tree very much. Of course this I cannot do myself very much, in my orchard and am obliged to have it done. I may say, however, that I do not believe in severe pruning.

Mr. Smythe—It is not always necessary that a man who owns his orchard, do all the pruning; some one else can do it for him.

Mr. Fritz—I used to be better on the board of trade than in a pear orchard. (Laughter).

Q. I would like to ask Mr. Fritz how long he cultivates. Does he cultivate for a while and then stop?

Mr. Fritz—I cultivate right along until the first week in July. That brings us out long enough so as to stand the drought. I have noticed a little in my orchard this spring. I plowed it, worked it, for quite a while and finally seeded it. Every thing was all right until it got very dry. Then I saw that the blight had started in that orchard. It went into the orchard that was not worked.

Q. What do you think started it, or what was the cause of its spreading.

Mr. Fritz—I think it was cultivating the trees for a time, and then stopping and vice versa. Any sudden change will cause it.

A Member—I do not think Mr. Fritz plows his orchard.

Mr. Fritz—I use the Disc harrow and the Acme harrow; I never plow.

Q. Do you seed the orchard down?

Mr. Fritz—Generally the weeds take it in July.

Q. How early do you begin to cultivate your orchard?

A. Just as soon as I can get on to it.

A Member—I have some pear trees that have been in bearing for twenty years, in sod. Two years ago I began working that orchard, since which time they have all died.

Q. Did you work the orchard all the time?

A. I worked it until July.

A Member—I would like to hear from Mr. Farnsworth.

Mr. Farnsworth—Well I may say that my experience has been quite similar to those that have been given. I have planted every variety I could find. The heavier soil is the best adapted to pear culture, and I only plant the Bartlett. I have only had one limb blighted during the last four or five years. I cultivate until about the time of blossom. I have found very little danger from pear blight until blossom time. Some of my orchard I have cultivated and some I have in sod and mulch, but I am like Mr. Welch, in my experience that since using lime-sulphur I have had little or no blight. Before that time I lost hundreds of trees. My method of pruning formally was to cut back the tops and especially of the Kiefers to keep them from growing too high. I am not planting any more Kiefers now, as I find the Bartlett much more profitable, however, I may say that where they are planted with other varieties I have not found that they bear so well.

Q. How often do you spray with lime-sulphur?

Mr. Farnsworth—Once when dormant, once just before blossom, then after that about twelve days or two weeks.

Q. What strength do you use?

Mr. Farnsworth—Lime-sulphur one to forty on the pear.

Q. How much arsenate of lead?

Mr. Farnsworth—Two and one-half pounds.

A Member—I want to say this in reference to Mr. Farnsworth's orchard: I was down there this summer and I noticed there were no neglected orchards anywhere near his place, so after he controlled the first codling moth, he had no other to contend with, so one spraying would protect.

Q. What do you think of the Worden-Seckel pear?

A. I do not know anything about it; but Mr. Wilkin has had some experience.

Mr. Smythe—What do you say Mr. Wilkin?

Mr. Wilken—It has not borne very much since I have been there. It is a little larger than the Seckel, but I do not think it is any improvement on it. I think I would rather set Seckel than Worden-Seckel.

Q. I would like to ask if he had no serious results in using lime-sulphur and arsenate of lead on pears this year. I used one to forty and it burned my leaves.

A. Not to any extent although we used one to fifty for the most part.

Q. Why I asked the question is, that there seems to be a difference of opinion and experience in the use of lime-sulphur at varying strengths. One man used it one to thirty and had very little damage. Others used it at one to forty and have trouble like myself, and others did not have trouble.

Mr. Farrand—Do you use any arsenate of lead?

A. Yes, I use two and one-half pounds to fifty gallons of water.

Mr. Farrand—Maybe it came from the lack of agitation.

A Member—I would like to know any further results from Mr. Chatfield, if we are being led along this channel of lead-sulphur.

A. The experience I had, was on apples, where we drew out the material from the barn, without agitating the barrel, and we did not have an agitator in our tank and as the result, where we commenced the machine in operation we lost a great many leaves, but as we went down the rows farther with the rest of that spray we saw no damage, so I rather think that this damage of Mr. Chatfield's was one of a local nature. But so far as spraying with lime-sulphur I can well afford to lose all the apples off a dozen trees, for what I would gain by the presence of lime-sulphur on the trees.

Q. What variety or varieties did Mr. Chatfield have?

A. Kieffers.

A Member—I have used lime-sulphur one to thirty-three and there was no ill effects at all.

Mr. Wilken—We had some experience. We burned some leaves of plums but the trouble was, the barrel was not stirred up as much as it should be and so the first that came out was too strong. We used one to fifty and still it burned, but we laid it to lack of agitation. Agitation is very important when you take the mixture out of the barrel, either the commercial or the home made. If you do not, the latter part of the barrel will be more weak and possibly not strong enough to be effectual.

A Member—It must have been the arsenate of lead, for last spring we used one to eleven just before the blossom opened and no harm was shown on our Kiefer pear trees.

Mr. Wilken—We have used this for two years as above given, with

practically no harmful results, but conditions may differ so that what would be all right early in the season would be harmful later.

Q. I would like to ask as to the advisability of planting Kieffer pears for fillers for a young apple orchard.

A. I have an orchard with the trees placed forty feet apart and Kieffer pears in the center.

Q. What is your object in planting them in this way?

A. The Kieffer pears would bring money before the apple crop. Then I could cut them out and the whole ground would be given up to the apple. I also have peaches in that same orchard.

Mr. Smythe—I would like to ask Mr. Sherwood what he is planting as fillers in his apple orchard.

Mr. Sherwood—I always plant fillers and I use pears and plums—mostly Kieffer pears. I had an experience with Duchess apples that I would like to relate. I set an orchard with the trees a rod apart and set out one row of Burbanks, then one row of Kieffers and a row of Abundance, then a row of Bartletts. Then I put in every other square in the center a Duchess apple. I was told to do this by Mr. Morrell. He had large experience and I felt that his advice could be relied upon. I was told by one who had had experience that my trees were ahead of his trees planted the old way by two years, so I feel that I was reasonably successful. I would never set an orchard without setting fillers.

Q. Why not use apples as fillers. We have Duchess, Jonathan, etc., so when we spray, we can spray all together.

Mr. Woodard—I prefer to grow corn instead of trees. So far as I am concerned, I am done with filling in with trees.

Q. I would like to ask Mr. Fritz how long he plants corn?

A. For four or five years until the trees take the ground themselves.

Mr. Hale—I am pleased to know that I am not the only one in the county with filled in orchards. Two years ago I filled in with plums, Kieffers, and some Duchess apples. The plums are gone but we are not far away from getting the Kieffer before the apples are in bearing.

Q. I wish some one would tell the cause of the late pears russeting last fall.

A. Warm weather in March and cold weather in April.

THE PEOPLE'S PLAY GROUNDS.

HON. CHAS. W. GARFIELD, GRAND RAPIDS.

I feel, Mr. Chairman, in discussing the topic which is on the program opposite my name that I am taking some liberties in injecting into a severely practical program a bit of sentiment. The only excuse for it is that the most real thing in the world after all is sentiment, and when we sum up what there is in the world, it consists of labor, recreation and affection. All work and no play makes Jack a dull boy. All play and no work makes Jack a real shirk. Love is the greatest thing in the world. It is very easy for me to eliminate the work proposition because that is what you have all been talking about in the most severe terms

from the beginning of this convention, and you will continue to do so until the end. I would like to talk about love as the ruling sentiment of the world and the danger that menaces the American home, which is the unit of our civilization, when love grows cold or is buried by commercialism. But that is another subject. So I hope you will bear with me for a little while as I chat with you about play.

My first experience with things in this world was living in a log house just a few steps from the Menominee River, by a rambling path through the woods. That was my playground for ten years. I knew the names of the trees; I knew the peculiar things that grew in certain localities and under certain trees. I knew where the wild egg plum was; I knew where the best thorn apples grew; I knew where to dig for angle worms; I knew the curves in the stream where the fishing was, and I knew the extreme pleasure of sitting on the bank of the river and dangling my feet in the water. I was not much of a philosopher—a child is rarely that—but I was an observer, as all children are observers, and because this is so they are entitled to the best that we can give them in the way of places to see things and enjoy them.

I have forgotten most of the things that happened in the school room during those five years—the last of the ten; I remember one teacher in particular above all the others, and she was the one who took us to the woods. I do not remember very much of what she taught in the school room, but I do remember many things she taught me outside of the school in that playground along the river.

We came to Michigan when I was 10 years old, and a little way from my home was Plaster Creek, a small stream perhaps twenty miles long. That stream was my playground during the next six or eight years and with my companions, who had similar tastes, we traversed that creek bottom. We knew the individuality of a great many trees, the location particularly of the sycamore that had been eaten out by decay and provided a safe retreat for us on every occasion when it rained. We knew the deep hole which was afterward turned into a swimming place in summer and skating rink in winter; we knew the kinds of fish that made their home in that creek. We even had a boat and paddled up the stream for miles and enjoyed each summer the beauties of that most delightful natural playground.

The Menominee River watershed for miles and miles was covered with a beautiful growth of timber in those early days, with all the delightful accompaniments of the woods; the banks of this river are now as bare as your hand. The farms run close down to the border of the stream; there is no waste land. The farmers could not afford to leave a single tree along the border of the river, and the playground that was my delight is no more. This playground should have been preserved for one hundred times as many children who live near that border today. There is absolutely nothing that will take its place in the child's heart.

The second stream, Plaster Creek, that gave me this joy in abundance so many beautiful days in the year has almost nothing now in the way of tree growth from its source to its confluence with Grand River, and instead of being the beautiful evenflowing stream through the year, as in my childhood, it is now a most fitful affair, full to the brim and running over at times, yet most of the year it is only a trickling rill that a boy can easily vault over without wetting his feet. When I was a boy

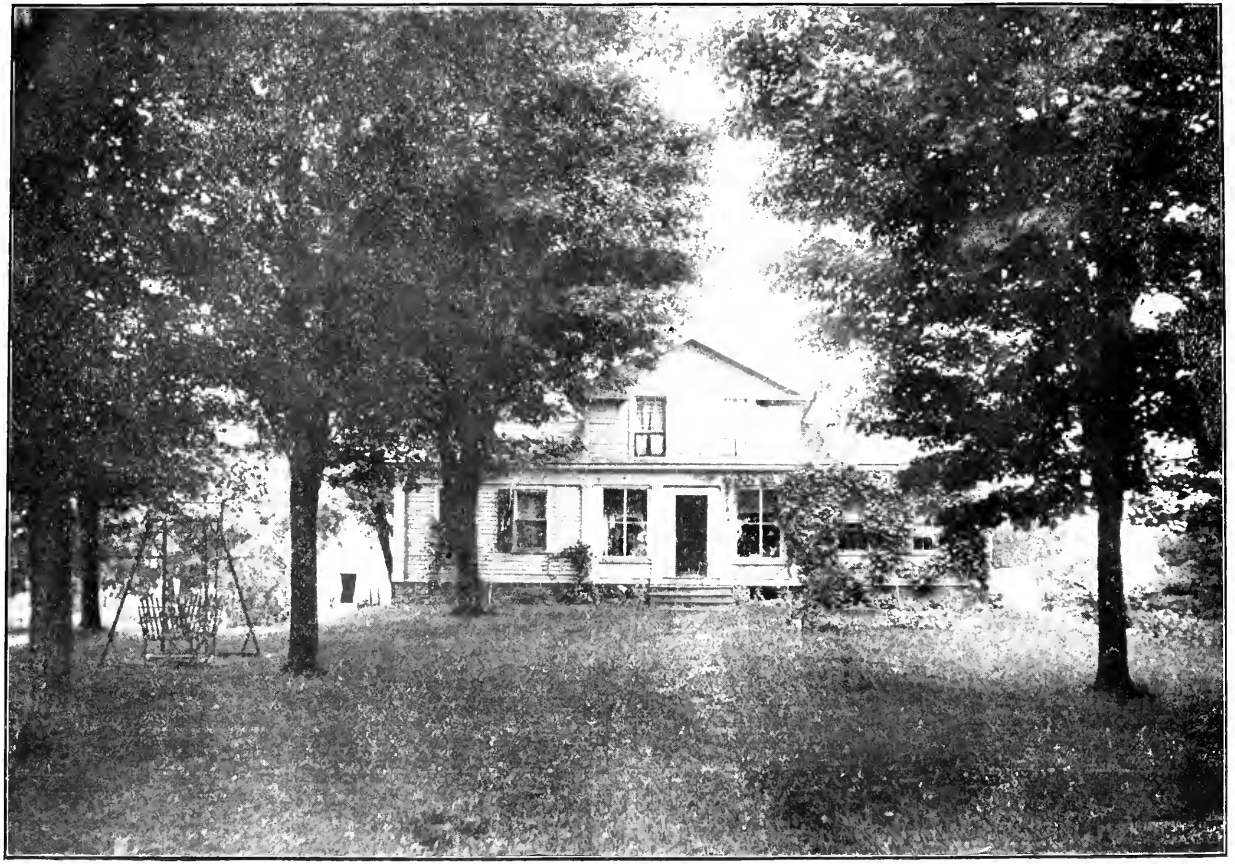
we could traverse it with our home-made boats; now only chips and toy boats can be floated except at rare occasions. The playground is gone. Where there was one child then to enjoy that playground there are now eight thousand children who ought to have a playground like this, but a near sighted utilitarianism has snatched it away. We have stolen their rightful heritage from them, and when you are discussing so splendidly today the methods of getting a living in horticulture and securing a competence for old age, I would have you think for a moment at what a sacrifice some of us are acquiring what we call betterments through our labor while we are forgetful of the children's playgrounds and the children's rights in play.

I went to the Agricultural College afterward and there was a playground at the college. In those days we didn't know very much about that kind of play which is now so important—baseball games, football games, and those things—but our play was in Number Seven, a beautiful piece of native woodland along the Cedar River. There is where we derived, as college students, the keenest enjoyment. Number Seven, that beautiful riverside forest, was sacrificed some years after in the interest of having a more symmetrical farm on two sides of the lane. But it was a sacrifice with no commensurate benefits and it would be the envy of every student who attends the school now if he could know the beautiful times we boys had in that grand piece of woodland. Then, following my school days in the country and before my college course, I was a country school teacher. My first school was ten miles from home, and I particularly recall the peculiar individuality given those school premises by the playground. This attribute ought to give individuality to every school in the Nation. We have been spending millions of dollars in devices to place our scholars inside under the most unsanitary conditions and have been forgetful of that outside playground in which they can get the equally important physical development which should be the accompaniment of that brain power for which we arrange a system of education.

My first school had as its distinguishing characteristic a playground which was eighty acres of virgin timber across the road from the school building. I did not know very much about teaching things inside of the schoolhouse. I was only 17 years old and most of my pupils were as old as I, but I did, from my education in former playgrounds, know something of the woods; of the beauty and variety and grandeur of the woods; of the education that the woods can give to any child, and from that time until this I have rarely passed a year when some one of those scholars has not said to me: "What splendid times we used to have in those woods." They have forgotten much of the arithmetic, the algebra, the grammar and the rhetoric but recall with vividness the details of the playground. Through that education which I was able to give them in connection with woods life I furnished those thirty boys and girls something that stays with them and will stay with them clear to the end, and will be helpful in appreciating that, as our friend from Ohio so well said, "This is God's world." It seems to me from my own experience as a student and as a school teacher that we must not be forgetful of this kind of recreation and educational environment in connection with the development of our boys and girls, which should give them some definite knowledge of the attractive features of this world outside of the school

Residence of Chas. W. Wilde near Grand Rapids.

Mr. and Mrs. Chas. W. Wilde, Rural 2, Grand Rapids.



Residence of O. S. Bristol, "IXL" fruit farm, near Almont, Lapeer county. Note the beautiful hard maples for shade.

room and teach them to appreciate the evolution of a balanced character in connection with the preparation for usefulness and happiness in this life.

A little later, a short distance south of my own home, in which I have lived most of my life, three miles away and six miles from the city, was a little plot of pine upon eighty acres of wood land. It was the last remnant of a splendid pine forest which stood upon the southern border of Grand Rapids when I was a child, and because there were only a few of these trees and all the pine woods exhausted, and because of the nobility of these individual specimens of the white pine, it became a favorite place, a playground for a large number of people in our city, and the Allen woods were known to almost every citizen of Grand Rapids. On all the holidays and on Sundays when the weather was good and the people could get out they took the opportunity to go to these pine woods and sit beneath the wide-spreading branches, admire the great clean boles, listen to the soughing of the winds through the evergreen tops and study with ecstacy the natural concomitants of this virgin timber.

Mr. Allen owned it, and because of the rapid growth of the city and the high price of lumber he said he was sorely tempted to cut off these trees. When I found this was true I went to him and said, "Mr. Allen, do you intend to cut off these pine trees?" His reply was, "Surely I have been greatly tempted to do so." Then I said to him, "Will you not resist the temptation?" After considering the matter he replied with emphasis, "I will resist and those pine trees shall never be cut while I live because I appreciate the value of that little piece of land to the whole community of Grand Rapids. I will not commit vandalism for a money consideration." Mr. Allen died and in less than two years the heirs eliminated that beautiful piece of pine woods because $10,000 was too great a temptation, and the whole eighty acres were swept away as far as their value to the city of Grand Rapids for a recreation ground was concerned.

Now, my friends, I want to ask you, was that $10,000 a drop in the bucket as compared with the real value of that land to our city? Suppose that little piece of land had been allowed to stand there until those trees should fall in decay? What a heritage it would have been to our city. Was it not a playground worth considering in connection with the growth of our city and the development of the best type of citizenship? But we neglected the opportunity. Most cities are neglecting such opportunities; most people are thoughtless of their responsibility in connection with saving the play places in the world for the children and for the grown-ups also.

There is a beautiful book which some of you have read and enjoyed, and if you have not read it, you should. It is written by Henry Van Dyke and is entitled, "Little Rivers," in which he speaks of the marvels of the sea as affecting the sensibilities of mankind; the wonderful impressions that the great mountains make upon the human mind, and then, in an eloquent manner, he exploits the fact that there is nothing after all quite so satisfactory to the human heart as the delights that accompany the lines of a little river. So it seems to me, in the interests of those who shall come after us, we should preserve the natural beauties of the little rivers here and there for the benefit of all the people for all time. You who love to take a hunting trip and put your gun upon your shoulder and traverse our North country know that the greatest assets in that

Northern region are the beautiful streams and their environments. Can we afford to sweep this playground out of existence, so that the people will lose the splendid enjoyment that so many of them are now getting?

When you talk about utilitarianism, that you can not afford to keep the timber on the land because it is worth so many dollars for wheat and corn, or for orchard and vineyard planting, I say to myself and to you, that as great as is this estimated value, you can not compute in money how much greater would be the value of much of this land in genuine satisfaction to the human soul if preserved in all its sylvan beauty for the recreation of the congested population which will surely need it in the centuries to come. So it seems to me we should broaden our angle of vision and comprehend in it something beyond the mere acquirement of a living. Scenic pleasures, it seems to me, are of great importance to the human race, and it is a satisfaction to all of us who are interested in things of this character to know that the National Government is saving here and there over our country reservations to remain forever in the interests of the play of the people, the recreation of American citizens. All hail to the government that recognizes this important factor connected with American life.

Perhaps you will remember that at one time it was a question whether certain parts of these reservations ought not to be utilized for what was termed more practical purposes than recreation. There was a temptation to reduce the beauty, utilize the water power and thus diminish the relightful scenic features. I am glad that Yellowstone Park is as big as it is. It is going to be a permanent playground for all the people, and the marvelous Yosemite Valley is also safe. We are glad that these splendid trees, the oldest living things in the world, are going to be saved for all the people instead of being converted into lumber that will simply line the pockets of a few. It seems to me that therein is a recognition of the unparalleled value of the great natural features of our country and the preservation of them in spite of the selfish encroachments of individuals and corporations who only see power in a waterfall to run machinery and lumber, laths and shingles in the great trees. Just as I am thinking and talking to you about the grand values of that wonderful people's playground, the Yosemite, my eye catches the smile on the face of my Scotch friend from the Michigan Agricultural College and I am reminded of an incident connected with this marvel of nature. There is in connection with it a volume in which all the visitors are supposed to write their names and put down below any word of appreciation that occurs to them, and in that book are some wonderful pieces of poetry and prose expressing the exalted condition of the human mind while viewing the stupendous illustration of God's handiwork. After writing his name one will say, "The most glorious thing in the world; over there is God." Another will say, "Nothing can compare with this mighty illustration of the wonderful power of the Creator," and so on. A Scotchman once visited this region and, as you know, a Scotchman can not believe there is anything quite as good as his own native land, and so after signing his name, this particular Scotchman wrote just above it, "Rather remarkable—a good deal like Scotland, only not quite so condensed."

The saving of Niagara Falls in all its gradeur and beauty has been placed plainly before the American people in connection with the utili-

zation of the water for commercial purposes. While we can recognize the importance of the conservation of power in the great streams of this country, it has seemed to the broader men and women of this country that we could afford to conserve this water in its grand demonstration of power for the hearts of the American people rather than their pocketbooks.

The White Mountains—the lumberman has tried his level best through the securing of rights in that marvelous piece of scenic beauty to raze to the ground and thus destroy the distinctive characteristics which make them really the most valuable thing New Hampshire owns. All hail again to this spirit which has been sufficiently dominant in state affairs in that commonwealth which asserted itself and said, "We will save the best for all the people and we will not turn this beautiful region into a barren waste in the interest of a few men who seek riches.' The conservation, it seems to me, that we must talk more about is the conservation of the natural playground of the world, and the conservation that we should consider in our own State of Michigan is the saving of the beautiful features of our North country that are treasures of inestimable value to so many people. If we must take the more sordid view and measure values by material income, we will then preserve the natural beauty of our Northern landscapes because of the large revenue that accrues to the state from the people who do value the forests and the waters and spend their money freely in the enjoyment of these great natural playgrounds. So if we are not willing to save it for any other purpose, do so on utilitarian grounds.

What about the great playground of the world, Switzerland? People from all sections go there to enjoy the scenic beauties of the most important playground on earth. Vast numbers of people in crossing the continent always take in this country as a part of their trip. The values of this wonderfully gorgeous and most marvelous scenery in this mountain republic have been sung by people for centuries. It is no wonder that we find so very few Swiss scattered over all this earth. They are in the midst of scenic splendor which makes so strong an appeal that they cannot leave. When they do go away and remain for a time from their native land the one cry that fills their hearts is, "Give me back my Switzerland, my own, my dear, my native land." We love to think of the sentiment that lies at the foundation of the patriotism of the people in that Swiss republic which leads them to admire, utilize and glorify the natural beauties of their country.

And now will you let me pass for a moment to a few of the practical things I desire to talk to you about? They are things that touch me most of all in connection with my everyday work and thought—the things connected with the city playground. There is no question but what in recent years there has been sweeping over our country a mighty wave interest in this playground question. We think of it now in connection with congested population. We also think of it in connection with every home, because we recognize in our minds and hearts, in the development of the highest type of American citizenship, the value of play. There is a philosophy in play. There is a philosophy behind football and baseball which really explains the relationship of those games to the development of a well-rounded fighting character. We know this world is a fighting ground against all the various forms of evil and we

want to develop at least the masculine element sufficiently to take care of the elements of destruction that are going on in our midst.

The evolution of the playground movement has been rapid within the last ten years. It will be more rapid in the next ten, twenty or thirty years, especially as the centers of population become more congested and there is seen the crying demand for an outlet for the exuberance of spirits which is the accompaniment of childhood growth. It is emphasized when these congested centers begin to grate upon the nerves of the people who are responsible for child life and its environments. Those who are interested in the moral development of boys and girls in the cities and who regard it as vital that these boys and girls shall grow up to the best kind of citizens, recognize that they have been wrong; they have been wicked; they have been senseless in connection with the removal of all open spaces where the children had a chance to play and covering them with wood and brick and stone until the children have no place to go for recreation except in the streets; then the policemen, in the interests of preserving life, drive them from this last resort. I think it is only a question of a few years at most when at any expense we shall have playgrounds established in the congested neighborhoods of every city so that the children will have a chance to play.

Bear with me in a simple illustration from my own city, which I will briefly relate as an incident showing our great and immediate need: There is a little region on the west side of our river in Grand Rapids that furnishes the largest number of delinquents in our Juvenile Court. One day the Judge was faced by twenty-three boys for committing vandalism in connection with the right of way of the Grand Rapids & Indiana Railroad. The Judge was astonished to see that bunch of boys. For the most part they were very decent looking chaps. As soon as he took in the situation he dismissed the officer, then he closed the door and said, "Boys, we are all alone here now, and I want you to tell me what is the matter. What are you twenty-three boys here before me for? You have certainly committed the crime with which you are charged—there is no question about that for I have the evidence. I know the facts and I know your names. Now, why did you do it? Come, be frank now and tell me the honest truth about the matter." Then one after another of those boys stepped forward and began to talk. "Judge, you see we hain't got no place to play. If we go to play in one place, then the cop drives us off, and finally we got out and went where we were bein' watched in our play, because it's fun to take some chances—fun to see the cops run after us and we get away and hide from him. And then you know, Judge, when we scooted away we found a box car and we got into it, and when we were in that box car we saw something that interested us and we just looked into it and it was something we liked and,, Judge, we took it; that's all there is of it."

"Boys, if we will furnish you a playground will you try to be decent and clean up and be good?" And they were all ready to make the promise. "Well," said the Judge, "we will see what we can do," and without saying more he dismissed the boys and asked them upon their honor to come back on a certain day and hour. In the meantime the Judge scurried around to see if there was not some place which could be secured as a playground for these youngsters, and he found it. Then when the boys came back to see him at the appointed time he was ready for them and

said, "Boys, I have you fitted out for a playground now." The boys were all interested, yes, deeply interested. Then the Judge gave them a good fatherly talk and said, "I am not going to commit you to jail; I am not going to send you to the work house, but I am going to let you go back and try it over again, believing that when you have a good place for a playground, where you will not be molested, you will do the right and square thing."

Well, that playground was secured and it has been used to the very best advantage. These boys, the very ones who were up before the Judge, are among those who use it, and a better lot of boys it would be hard to find; and in months since that time there has not been a single boy brought into the court from that locality.

Is not that playground worth something in the maintenance of law and order? Has it not a large value in the making of good citizens? Surely we must reckon with it in the development of human character since we recognize it as one of the chief elements in the reduction of crime.

We have accomplished a great deal in the way of playgrounds in some cities in this United States, and it is because we have interested the women in connection with their club life to investigate along these lines, and when they become imbued with the real benefits to accrue from playgrounds they are not slow to take hold of the matter and act. Something good and great is coming out of the study which the women are carrying on, because they are mothers of the boys, and I welcome with a great deal of joy the results of this investigation, the results of the methods that shall be developed in the interest of child life for the reduction of crime. And I welcome also the men and women who will give their own lives to the development of this thought in American growth. Conservation of forest is good; conservation of water is all right; but the conservation of human minds and hearts is far greater. We are reaching the viewpoint which establishes in our purposes the fact that the greatest of all problems in conservation is the proper salvation of the child.

We talk in connection with play of duty of happiness; that is, the responsibility, the obligation we have to ourselves and to give to others the happiness that every human being should have as a legacy. If we pursue this line of thought and endeavor to weave it into our activities we shall above all other things demonstrate not the duty of happiness but the happiness of duty.

"Straight is the line of duty,
Curved is the line of beauty.
Follow the one and thou shalt see
The second ever following thee."

MY EXPERIENCE WITH APPLES.

(MISS GRACE TAYLOR, DOUGLAS.)

"As 'one swallow does not make a summer,' neither does one apple crop make an authority on apple culture, but the experience is as follows:

Our orchard consists of about six acres which were planted in 1875-8, and one and one-half acres surrounding the house, planted several years earlier. The apple orchard proper was set alternately with peach trees in a light sandy soil, the soil usually considered more suited to peach trees than for apple culture. It is located directly on the Lake Michigan bluff, but is protected from the southwest, west and north winds by a windbreak of evergreen and forest trees.

This orchard received the usual cultivation given such plats up to the time when the peach trees succumbed to old age, being some years more and some years less.

Upon fruiting, a large number of the trees were found to be our old friend "Uncle Ben," living under an alias, and in the years '94 to '98, many were top grafted to more desirable kinds. The principal varieties now are Duchess and Maiden Blush for early, Wagners, Greening, Jonathan, Hubbardson, Baldwin and Ben Davis.

The last of the peach stumps were pulled in 1906, having been left there longer than was best for the apple trees. For two or three seasons previous to this, cultivation had been late and limited, so that, in the fall of 1906, after maturing a heavy crop of fruit, a majority of the trees presented a most unhealthy appearance, the tops being covered with dead twigs. It was clear something had to be done to save the trees, if indeed they could be saved. We commenced giving them liberal quantities of stable manure, more thorough cultivation, and sowed rye each season as a cover crop. Fortunately this soil can be worked, wet or dry, and when long continued rains prevented working heavier soil early in the spring, this orchard was tackled greatly to its benefit.

The habit of the orchard has been to produce a heavy crop alternate years. As the season of 1910 was to be an "apple year," at blossoming time it gave every promise of a full crop. The abnormally warm March had forced vegetation far ahead of schedule time, but near the lake it is always held back from three to eight days behind the blossoming time farther away from the water. Thus those frosts of early April caught us before the blossoms had opened to any great extent. The cool weather following kept them back, and the blossoming season lasted fully three weeks; a condition often said to be prophetic of a light crop of fruit.

The cold spell of April 18 to 23, when the mercury played hide and seek with the freezing point, convinced all hands that early and continuous cultivation, in order to force growth quickly, was all that would save this year's crop of apples. The rye was now a thick growth, from ten to twelve inches high, and the orchards were all plowed by the tenth of May. From the middle of May until the middle of August the orchard was dragged about once a week, besides being hoed around the

trees by hand four times. The second week in August vetch and rye were sowed for a cover crop, the vetch being gone over with a cutaway, and the rye harrowed in. This made twelve times with the drag, and once with the cutaway, that that piece of ground had been harrowed—do you wonder it groaned and bestirred itself?

As to spraying. Records of the purchase of copper sulphate, lime and nozzles date back as far as 1894, which would indicate that spraying operations commenced on the farm about that time. But they were irregular and some seasons they were omitted entirely, when other farm work pressed.

In the spring of 1909 I purchased a small one-horse power spraying outfit, and that has done our work these two seasons. While its work has pleased me, I am now convinced that a larger engine can do the work easier and with less wear than one of this size.

In spite of the short time there was this year, after winter left and before growth started, all the orchards were sprayed with the lime-sulphur, 1 to 10, by the second of April.

Just before the blossoms opened, commencing April 16, we sprayed with Bordeaux, using the 3-4-50 formula, without poison.

With a blossoming season a month long it was worse than a Chinese puzzle this year to determine just when the blossoms dropped, but on May 18 we struck an average and began spraying to fill the calyx cups for codling moth, using seven pounds of arsenate of lead to 150 gallons of lime-sulphur solution, 1-30 strength.

This spray had been very thoroughly applied, and as other work pressed, the spray outfit was stored away to remain until July. At this time we were warned by Mr. R. W. Braucher, in charge of the U. S. department of Agriculture experiments in Douglas, that the codling moths were hatching later this year than usual, and we must spray the week of June 20 if we would catch it. Accordingly the engine was again started, and an application of arsenate of lead and water given. We planned to use the arenate of lead in the 1 to 30 lime-sulphur solution, but the supply of lime-sulphur gave out when only part of the trees were covered. We noticed no material difference between these and the others when handling the mature fruit.

The last application was made the fourth week in July, arsenate of lead solution alone, and there was still spray on the apples when picked for market in October.

Now as to results: Out of 44 barrels of Duchess there was one bushel thrown out as culls, and of these six apples were wormy.

Right here I would add that this season's work has convinced me that if we pretend to spray at all we must spray at the proper time or half the benefits are lost. Among the trees planted near the house are a number of Northern Spies, and this variety blossoms later than the others. These trees were sprayed six days later than those in the orchard proper. Result: The same gang that put up fifty to sixty barrels of the better fruit at harvesting time, packed only twenty-one barrels from these trees. Note the difference in expense of handling, as well as loss of fruit from imperfections.

From 225 trees that bore apples this year, we harvested 900 barrels of fruit, one Baldwin tree yielding 14 barrels.

MICHIGAN AT THE CHICAGO LAND SHOW.

Why go to Washington, Oregon, Montana or Colorado to raise apples? That is the question that thousands of people are asking who attended the great land show in Chicago and inspected Michigan's wonderful display of Northern Spies, Baldwins, Greenings, Jonathans and other varieties of apples almost without number.

Michigan was certainly "there with the goods" when it came to making a show of agricultural and horticultural products that is unrivaled in diversity and in general excellence.

The Wolverine state was represented at the land show by a lusty and industrious bunch of hustlers representing respectively the original fruit belt, the Western Development association and the Northwestern Michigan Development association. Thousands of people thronged the attractive displays made by the three Michigan organizations and it is now stated that practically everybody was stricken with the "back to the land fever" with Michigan as the objective point.

Michigan, long famous as a marvelous fruit state, is preparing to make even better use of its advantages along this line. Both the Western Michigan and Northeastern Michigan associations are doing everything in their power to induce prospective fruit growers to locate somewhere within the state's confines. They stand ready to furnish the necessary information about the kind of crops that can best be raised and where excellent farming lands are obtainable.

While there is a broad awakening interest in general farming, the question of apple culture easily holds first rank and an unusually large number of people are making efforts to secure a good producing orchard and thus be free and independent of the daily grind of the city office.

A special incentive toward intensive and scientific farming are the many Alladin tales that have of late been sent out from the various sections of Michigan. Well cultivated and handled apple orchards in the northern part of the state are yielding profits from $200 to $500 an acre, while cherries, raspberries, strawberries and similar small fruits frequently show a net profit of $1,000 an acre. All of which shows that a man with ten to twenty acres of land is on easy street.

The most interesting feature of the growth of the apple culture is the fact that in the lower part of Michigan, where the apple orchards have been practically abandoned for years, except as a run lot for pigs and a storage place for discarded hay racks and other litter, an era of reclamation has set in. Many of these orchards, counted as worthless, have during the past year or two been properly fertilized and cultivated. The old trees have been sprayed, all the dead timber cut out and as a result a neat profit is returned on the labor and investment.

That brains count in the working of a farm as well as in the conduct of commercial or manufacturing enterprises is manifested by a tale recently recounted of a Chicago business man, who was forced to leave the city on account of ill health. He came to Michigan to rusticate.

He was stricken with the apple culture fever and after looking around for a time found an abandoned orchard in the southern part of Allegan county. He leased this orchard for $100 a year, the lease running three

years with an option to renew for five more, no damage to be done to the property.

That was back in 1908.

The Chicagoan got busy. He began to improve the trees. In 1909 he quit even, but this fall he sold over $1,000 worth of apples off this self-same orchard, and it is rumored that the farmer went out behind his barn and kicked himself several times in sheer desperation. He would like to have that contract set aside, but there is no chance.

In Branch and Calhoun counties several abandoned apple orchards have been picked up and rejuvenated with the result that they are now profitable. The good work is spreading.

MARKET RIGHT AT HAND.

Hon. C. E. Monroe of South Haven summed up the whole matter of Michigan's ability to retain first place as a fruit state when he said: "Michigan apple growers have the market right at hand for their product. Michigan apples have the flavor.

"When you have a thing to sell a profitable market is of the first importance.

"When you eat an apple it is the flavor or taste that appeals to you. Color, or bloom may count, but you can't eat that. For those reasons I believe that Michigan is and always will be the ideal fruit state of the Union."

DISCUSSION.

Q. I would like to have Miss Taylor tell us about pruning.

Miss Taylor—Where do you want me to begin?

Q. The general system by which you prune.

A. We do not prune much on the apples; our apples have been pruned years before; and there was very little pruning done in the orchard because it was not thought it was in need of it.

Q. Do you do any thinning of your apples?

A. The apples set very full, but there were so many that dropped off at the time of our June drop that I thought that nature was going to take care of them. My York Imperials were not thinned in this way so as that the thinning was of much value. Otherwise the trees thinned themselves this year.

Q. Do you think the York Imperial a good apple?

A. If they are not too full on the tree they will bear all right. Our orchard has borne too heavily on alternative years. We will have to thin on these alternate years. When they bear too heavily they are small in size.

Q. How about the quality?

A. The quality is good. It is a late keeper. Of course you know that when you don't have other apples, some apples which we would not consider as the best, we relish and call pretty good. They are not ready to eat at this time of the year but are all right late in the spring.

Q. Are they about the same quality as the Ben Davis?

A. A little better.

Q. Do you think there would be any danger of injury to an old apple tree trimmed any time in the winter?

A. We are doing a little experimenting on this point and have trimmed them in the winter, but not when the wood is frozen.

Q. I would like to ask Miss McIsaac if she does any trimming in the winter?

A. I trim all through the winter when the tree is not frozen.

A Member—The other day I heard that Miss McIsaac was so industrious that she would prune every day when the wind would not blow her out of the tree.

Miss McIsaac—I would be more likely to spill out. (Laughter).

Q. What stress do you lay on wind breaks?

Miss Taylor—I prefer a wind break.

Q. Would you want them on a peach orchard?

A. We have them on our peach orchard.

Q. The idea is that we have to have the wind to keep off the frost, but perhaps the elevation has something to do with it.

A. We have found wind breaks of great advantage to us, not perhaps this year on account of frost but there is very seldom a fall on the lake shore that we do not have a heavy frost before the apples are ready to pick and our orchard has often held its fruit when neighboring orchards suffer injury by the dropping of the fruit because of the wind. Some of our neighbors have felt and we have occasionally felt that possibly there might not be enough circulation of air, but with the right spraying we do not think it would make much difference.

Q. So many are interested in the matter of help that I would like to inquire if Miss Taylor has found trouble in getting help to carry out her ideas? Can you depend on the help you are able to secure?

A. I have had no trouble.

Miss MacIsaac—Have you had trouble with the male help you have had to have. (Laughter).

A. I haven't had very much. (Applause).

Q. I would like to ask Miss Taylor if she does her own work or if she hires it done?

A. Shall I say both?

Chairman—I would like to ask what should be done with two hundred Ben Davis in a two thousand apple orchard? Should they be grafted when growing better than any other of the apples.

A. We are re-grafting our Ben Davis.

Q. With the present prices of apples and conditions as they are would it pay to do that?

A. Possibly our experience might help a little. We have sold our apples and have always had to take a reduced price for the orchard when we sold as an orchard because there were so many Ben Davis apples in the orchard. And that has convinced us that if we can change our orchards to different varieties it would be better.

A Member—Some years Ben Davis will bear when others will not.

A. Yes that is so. Of course I have not been able to take into account every little item of cost, and charge up the interest against it. Some things you have to take a collection of years in order to get.

A Member—I would like to ask Miss Taylor how she disposed of her crop of apples this year.

A. We sold by the barrel; we did the packing and barreling and delivered them to a firm in Indiana.

Q. How much would the entire crop bring?

A. About $32.50.

A Member—I understood that you sprayed the first time with diamond sulphur before the leaves were out; second time with bordeaux; third time with lime sulphur diluted, and then next time with arsenate of lead and the next time with arsenate of lead.

A. Yes that is right.

Q. I would like to ask whether it would be advisable to take an old run-down orchard and commence at the present time spraying for the scale?

Mr. Farrand—Yes, begin any time. Right now would be all right, when the foliage is off. I cannot see how we can spray an apple tree to very good effect for the scale when the foliage is hanging. If the foliage is all off and you have your pruning done, do it now. Generally speaking when it is cold weather you have so much trouble with your nozzles and other parts of your spraying apparatus that you do not gain much. It is a matter of time. As far as value of spraying is concerned, now will do the work as well as any other time.

Mr. Smythe—If you didn't spray before you might get so discouraged that you wouldn't go at it in the spring.

Mr. Farrand—There may be something in that.

A Member—I would like to ask Miss Taylor if she has any russeting of apples back of a wind break?

Miss Taylor—Do you mean russeting from the cold or whatever it may be?

Member—What I want to know is, does the protection from wind breaks do any good? In other words do you think that the protection from a wind break has anything to do with preventing russeting?

Miss Taylor—We have had a few apples that showed a kind of rust and it was supposed to be from the cold weather which we had.

Q. Did you see any difference where the trees were exposed to the wind and cold than right near this wind break?

Miss Taylor—The whole orchard is protected so I could not tell.

A Member—I have seen some orchards where there was a wind break that protected them from the north east and seemingly the apples were not so badly russeted there as where they were more exposed. In other places there did not seem to be any differences and I was wondering whether a protection of that kind really did help us.

Miss Taylor—Of course as far as my experience is concerned I could not say for certain.

A Member—Miss Taylor laid stress on rye as a cover crop. Why not use sand vetch and get the value of the nitrogen that it gathers from the air?

A. We are using that now. We are using sand vetch in the peach orchard but have not had it in this particular orchard until this fall.

Q. Do you grade your apples or straight-pack?

A. We grade as demanded.

Q. What was the relative for No. 1's and No. 2's?

A. There was no difference; they were all packed together and we

received the same price for both. Remember that number two was a perfect apple except for size.

A Member—I would like to have an answer to Question No. 6: "What are the best combinations of cover crops?"

A. I use vetch alone, not in combinations.

Q. How is vetch on heavy lands?

Mr. Smythe—Search me, I don't know; I haven't any heavy land.

Q. How would field peas do with cover crop?

A. We have put in hogs, fed them down, and find them a complete cover crop grown through May and June.

A Member—I have tried oats and vetch this year and have found the oats to make a very good combination.

Mr. Smythe—We must not get confused—oats is a catch crop—a cover crop is one that stays all through.

A Member—I would not want any crop growing when fruit trees were maturing their fruit.

Q. How early should the vetch be sown to be successful for a good cover crop?

Mr. Hilton—You can sow vetches any time after the first of July.

Q. How late would they be successful?

A. That depends upon the season. Last year we sowed the 7th of November and they came up and while they did not do anything as a winter cover they grew well this last spring. We have had a fair cover given by vetches sown on the 20th of October, but they did not do as well this year. As a usual thing they will make a fair growth if sown as late as the middle of September. There is no crop that we have tried that will do as well sown over as long a period as winter vetches.

Q. Have you had any experience with them on clay?

A. Not on true clay, but on a very heavy loam, a loam that has a stiff blue clay only a few inches below. I will bring down a sample plant that grew on that kind of land last year. I dug the plant last June.

Mr. Roe—I took a trip last summer for the purpose of examining orchards in western Michigan and covered 500 miles through the fruit section and visited a great many of the leading growers of western Michigan, and I found that the one cover that has given the best satisfaction—and it was proved to be so from the crops of fruit—was rye and vetch. I notice this more marked in Mr. Sessions' orchard, and he had been using it for a number of years. So all along up the line wherever it had been tried the results had been very satisfactory.

Chairman—For my own part I prefer either oats or barley to rye.

Mr. Smythe—That is my experience.

Chairman—My reason for this preference is that the vetches will always make a marvelous growth in the spring after very earliest opportunity. The oats and the barley make a good lusty growth in the fall which the vetches do not do. The rye will not make the growth in the fall that oats or barley do. Another thing, if for any reason the cultivation is delayed a little in the spring you will not be troubled with a a lot of hard straw for the season because the barley and oats are done with their business in the fall.

Q. What proportion do you use.

A. For a bushel of oats or barley we use from twenty to thirty pounds

of vetch seed, depending on how good the seed is and how much other stuff there is in it.

A Member—I am much of the same opinion as Mr. Hilton in regard to cover crop—I prefer barley. Of the three, rye, oats and barley, I think barley is the best. I am not so sure but what the spring rye is very good. I tried it this year for the first time. The fall rye did not stand up as it should, but the spring rye grew up rank and headed out fine this fall. That would be out of the way for the vetch in the spring.

A Member—Vetch with us has not been so satisfactory on clay. We have spots on side hills where there was considerable red clay and the vetches have not set unless there was a lot of humus on the clay—then the vetch is alright. In regard to the rye and oats—you come to an apple orchard and you do not want oats there at harvest time for the dew will make it so you will be wading around in water, because it will not dry out.

Q. Why will not Mammoth clover do alright?

Mr. Smythe—I think it would be alright provided you can get a stand. Our people here in this vicinity have found it difficult to get a stand. Of course there is not so large a per cent of nitrogen in Mammoth clover as in vetch, and the vetch seed being so much larger, it stands the drouth better than the clover seed. If it once germinates it will grow.

ANNUAL REPORT OF SECRETARY BASSETT.

I am glad to be able to announce that the Michigan State Horticultural Society now has the largest membership in its history—over 300 life members, 600 annual members and over 1050 auxiliary members, a total of over 2,000 members. Interest in Michigan horticulture never was so active and progressive and the educational work now laid out by the Executive Board must bring results that will be very gratifying to the members as well as profitable to the State.

During the past year your Secretary has organized eight new auxiliary societies, with a total charter membership of nearly 1,000. He has made 24 visits to different fruit sections in Michigan and has assisted in four horticultural meetings in other states. No state society with which I am acquainted is attempting more for the good of its members than is our own and if all would preach our mission of "More and Better Fruit in Michigan" we would soon awaken an interest that would accomplish more for our State than can be expected from any similar enterprise now before our people. Not but a few of the people know what the State Society is doing and it is the duty of every present member to urge all to enlist under its banner.

In regard to our co-operative buying plan, I submit that it cannot well be carried on without running up against occasional snags, and we have had a lot of them the past year. However, we have learned much from our experience which we hope will be of much benefit to us in the future, which will assist in perfecting our plan so that we will be able to do better work, and save the growers a large sum of money.

While I am not able to give you a direct report on the amount of business transacted by our Association during the past year, as that is a matter which is still unsettled, I can state in a general way that, as near

as I can figure it, we have saved the growers of this Society not less than $13,000 the past year. When we take into consideration that a great many people in the state of Michigan purchase goods outside of the Society, and because of our co-operative efforts, the price is greatly lowered, so that other firms who handle these products are obliged to come to our prices in order to sell their goods, you can see something of what this co-operative plan has been in the way of a benefit to our fruit growers, who have to purchase spraying materials and fertilizing products. I say frankly, that I believe we have reason to be grateful for the way in which this is working out.

There is a plan at the present time, but which is not yet completed, for this Society to have issued each month from the Secretary's office, a Bulletin in the nature of an official organ. It should contain much of information from the Secretary's office concerning co-operative plans, crop reports, prospects for the future, etc. We certainly should have such an organ; in fact, we have needed it for a long time, and now it is almost imperative. I believe that the plan laid out by the Board for this publication can be carried to completion, if we can arrange to have it entered for delivery through the mails at second class rates. The state of Michigan can be greatly benefited by having such a medium. It is not the idea that one man will do all the writing, but copy will be furnished by the members from all parts of the state. This publication must be your organ, and if it is attempted, you must send it items of news that will mean something and which will be of interest to the members.

One other matter that I wish to urge. Many of you have nice orchard scenes which show and prove something, that we want to impress upon the public at large. We want pictures of these but we don't care for them merely as pictures. I don't want any pictures unless they have an educational value. Send these pictures to the Secretary and on the back of each picture indicate from whom it is sent, place, and what it represents. I have received more than one picture that didn't have a single thing on it, so it was impossible to tell from whom the picture came, or what it represented and therefore was worthless.

During the past year we have lost some members by death. I desire especially that our life membership be corrected to date and I wish that you would look through our life membership list and tell me of any deaths that do not appear, and if the friends can send me a biographical sketch of that person's life I will see that it is incorporated in the annual report, so that our members may know of the good deeds of those who have passed from us. We want to keep their good example before the public and I hope you will furnish me with any information regarding the passing away of our life members, or for that matter of any of our members who have been helpful.

Two members to whom I wish to call your attention are Mr. Edward Hawley and Mr. Alexander Hamilton.

Edward Hawley was born in Paterson, New Jersey, Sept. 20th, 1836. He was educated in the public schools of Brooklyn and there learned the trade of machinist and draftsman, at which trade he worked for a number of years. In the early sixties he came to Michigan with his family and settled on a farm at Burr Oak. Later in 1868 he moved to Ganges, Allegan county, where he began to raise fruit. For the rest of

his life he was very active in the industry, being interested in the nursery business as well as raising the fruit. He became interested in this society at an early date and, while he did not often take part in the discussions, he quite regularly attended its meetings and was very much interested in its work. He counted some of his best friends among its members. His regard for those men who aided and are building up the horticultural science of today was very high and his faith in the future of Michigan's fruit growing was unbounded. He died at Fennville in February of this year.

Mr. Hamilton passed away during last October. He was a man that I have always held in very high esteem and I was glad to count him as a personal friend, as his example was one worthy of emulation. He was, from my very first knowledge of horticulture in Michigan, held up to me as an honest nurseryman and I know that there are many in this audience to testify to the honesty and integrity of Alexander Hamilton. Certainly if an honest man is the noblest work of God, Alexander Hamilton was one of the noblest works of the Creator.

On motion, duly seconded, the report of the Secretary was unanimously adopted.

President Smythe—I believe there is a resolution before the House, introduced last year, the purpose of which is to change the annual membership fee from fifty cents to one dollar. We cannot change the constitution of our Society without giving a year's notice. This notice was given last year by Mr. Hale, and would have to be acted upon at this meeting.

Mr. Hale—I gave notice last year that I would at this meeting, make a motion to change the constitution bearing on the annual membership, making the annual dues one dollar a year instead of fifty cents. Now, ladies and gentlemen, during the past years things have changed. We are not now in the day of cheap fruit and low prices for other farm products that we used to have. Everything is higher now than it was then, and it seems to me that it would only be in keeping with the times to advance the membership fee. Even one dollar is but very little for the amount of good we receive through the agency of the Michigan State Horticultural Society, and therefore I now make a motion to change the fee so that the annual membership will be one dollar a member.

A Member—I second the motion.

Chairman—You have heard the resolution and the second. Are there any remarks?

Mr. Keasey—In consideration of the fact that we are not yet out of the gloom of the past few years, and in consideration of the fact that we have many, many people, who today are not in attendance because of the lack of that little fifty cents; and in view of the fact that many here have sacrificed to be here at this splendid convention so as to be with us, it seems to me that this time is a little premature for raising this price. There is a better day coming for Michigan, when the one dollar can be more easily raised than now, so I am in favor of leaving the price as it now is.

Mr. Welch—I think the move is a good one, and we can easily afford the extra fifty cents. We are asking our Secretary to do a large amount of work in which there is involved considerable expense and much more

work than would be done by any other man who was not in it for the real love of the work. And right here I want to say that I don't believe that we can find a Secretary with the experience and the ability that our present Secretary has, who will do the work he is doing simply for the love of it. There is need of all the money that can be brought into the organization, and every cent will be wisely expended for the advancement of the individual members of this Society.

Mr. Fitch—I would like to inquire what effect this would have on the membership of auxiliary societies.

The Chairman—It does not affect the auxiliary societies.

Mr. Smythe—I appreciate very much what Mr. Keasey said. We had fifteen hundred dollars from the state. The state got poor and cut us down to a thousand, and we only have a thousand dollars a year to run this society and besides the little that comes from the Lyon Memorial Fund. It costs something to run a meeting like this. Our Secretary has to have a nominal sum—he is satisfied or he would not hold the office, but I must say that I think he ought to have much more for the work he does, so I do not feel, in view of the fact that we have so little to do with, that we should hesitate to raise our price to one dollar. Certainly fifty cents, or one dollar even is very insignificant in comparison with the results that come to every fruit grower through the efforts of the Horticultural Association of this State.

Mr. Friday—I agree that some of us have been pretty poor for several years past, but as I understand it, this raise in price will not take effect until next year, and as I believe we are going to have in Michigan this coming year the most abundant crop of fruit ever raised, I for one am in favor of the raise. (Applause).

Mr. Gleason—I would like to ask the last speaker who seems to be something of a prophet, what assurance there is that we are to have a better crop next year than in previous years.

Mr. Friday—If we do not have something good to look forward to in the future it would be pretty hard for us, for hope is the only thing we have left in Michigan to buoy up the possibility of our fruit growers and all the prospects seem to indicate that our hopes will be realized.

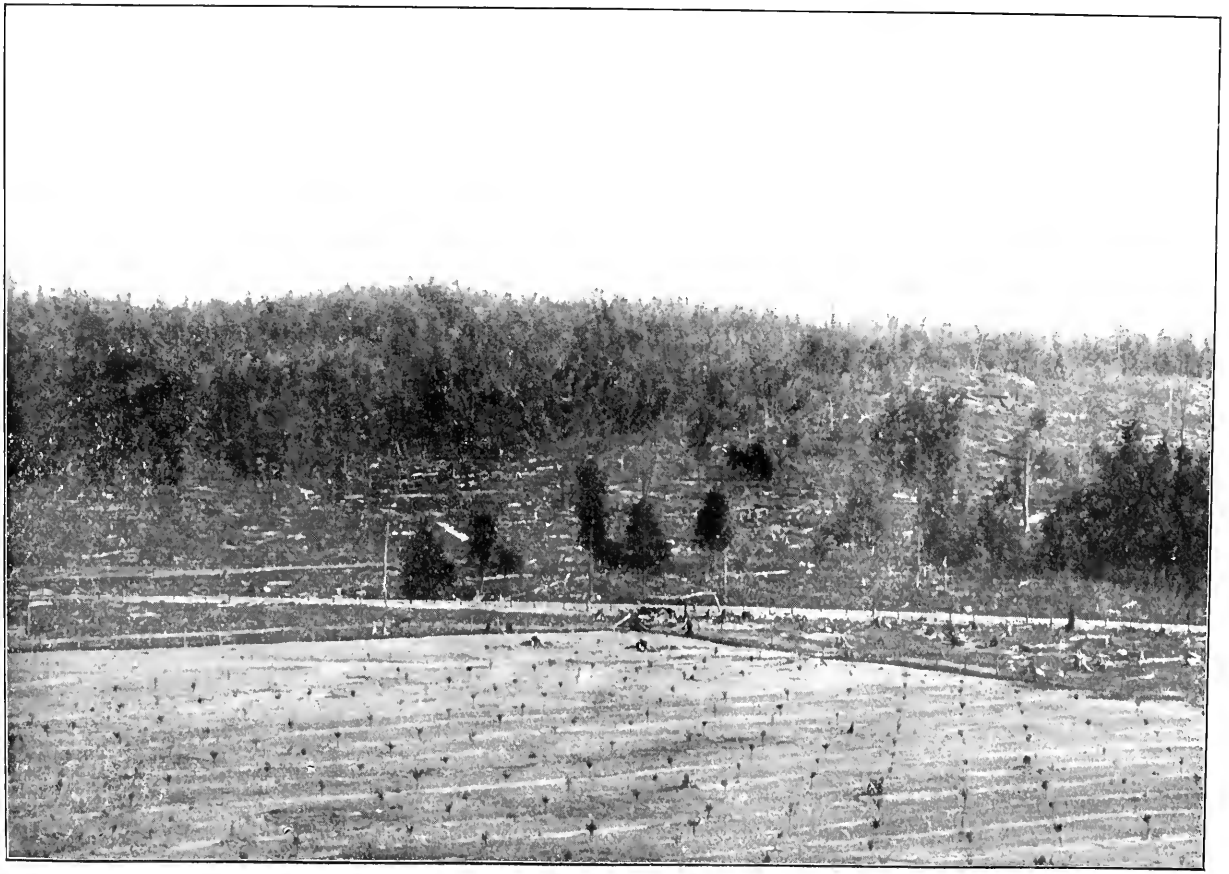
Mr. Gleason—It seems to me that if it can be shown that the Society needs more money to carry it on successfully, then perhaps it is all right to raise the fee, but if this can not be shown I do not think it necessary.

Mr. Smythe—We certainly need it.

Mr. Bassett—You know we are talking about going before the Legislature to ask for an appropriation and we are up against a pretty hard proposition, for this work cannot be done without funds. We were as you know, cut from $1500 to $1000 and the Attorney General ruled at that time that we were not even entitled to the $1000, and we would not have had it if his ruling had been carried out. We asked him to ask the legislature for a mandamus which would give us a day in court to present the matter before the supreme court. If we had been refused a hearing by the legislature we would not have had a day in court and now I do not know as we are going to get the support we anticipated for I do not know as our men and women in this Society will stand by us in the matter. The strongest Society in the United States today is the New York Society and they do not get one cent

Picking Strawberries on farm of S. B. Hartman, near Athens, the berries being grown among apples with peach fillers.

Two-year-old Elberta peach tree on farm of Friday Bros. near Coloma. See any reason for the smile on their faces?



Orchard being started by the W. H. White Company of Boyne City, on their 6,000 acre farm in Antrim county. They set 4,000 trees in spring of 1910 and will have 200 acres into fruit soon.

Farm Home of H. M. and F. H. Hemstreet, near Bellaire, Antrim County.

from the State, and they charge $2.00 and you cannot get into their front door until you have paid your $2.00. (A voice—"And it is worth it, too.) As for myself, I do not care for the salary. One dollar is nothing as compared with what many save on their orders of lime and sulphur and their products which they purchase from the Society. I firmly believe that this Society should be on a plane where if we ever had to go to the people for our support, there will be a ready response. I believe we could adopt the New York plan. Something that don't cost anything isn't worth anything. It is no more than right that the man who receives the benefits of the Society should be willing to pay for these benefits, but if no charge is made for them and they are had without cost, they are not appreciated as they should be. You go to the New York Society and the man who puts $2.00 into the treasurer's hand says to himself, "I am going after that $2.00 worth and I expect to get it."

And I want to tell you that you never saw a livelier horticultural meeting in your life than they have there. They do something, and the results that accrue to the members are very great as compared with the membership if even though it is $2.00.

We have here bought on the co-operative plan and all the materials we have furnished at much cheaper rates than they could be had for in the regular way. We bought potash last year for $3.00 less than it cost the company when they supplied it; but if they are so anxious for our business that they will pay us $3.00 for shipping the goods to us I think we have the warranty in asking for the advance, and I believe the society can use the extra money to a very good advantage.

Mr. Hale—I would like to hear from some of these old members. I have been a member of this Society for twenty-two years and I expect to continue to be a member as long as I am in the fruit business. During all this time I have taken an active part in the work and now I want to say that for what Mr. Bassett is saving for the members of this Society they could well afford to pay $5.00 a year. I would like to hear from Mr. Cook, Mr. Garfield and others.

A Member—I have no desire to clip the wings of these officials. No efficient mechanic can work without tools. I want it understood that I am going to follow this Society no matter what the membership rate may be. I simply want this to appear plain when this question is put to a vote.

Mr. Garfield—I am proud of the Michigan State Horticultural Society. Its standing and record are on a par with any other state or organization of its kind. I do not want to be responsible for the effort to cheapen this society as compared with other Societies, and there is no other Society that I know of that has a membership fee of less than one dollar. We cheapen the Society when we have a fee of only fifty cents. Then when it is known that every fifty cents that is put in comes straight back to us it seems to me that simply as a matter of investment we cannot afford to pay less than this amount and I am strongly in favor of the resolution to raise the price of membership to one dollar.

Mr. Cook—Having had considerable experience in connection with the inside workings of the Society, I know what it means to be shy of money with which to carry out the purposes and aims of the Society, so

I am heartily in favor of raising this fee of one dollar and I shall certainly attend the Society just the same. The farmer or fruit grower who will not be willing to pay out a dollar for the benefit that the Society can be to him, is to be pitied. It is my opinion that we are all the better for the Society.

Mr. Fitch—I am of the same opinion as Mr. Cook. It makes me feel rather small when the members of this State Association are willing to pay $1.00 to be a member here and I am a member of an auxiliary Association and entitled to all the privileges, getting the reports and the papers that are published. I am not only in favor of raising the price of the membership of the State Association, but if it is necessary, to serve a year's notice that a motion will be made to advance the price of membership in the auxiliary society to $1.00.

Mr. Bassett—You can give notice of that advance if you care to.

Mr. Smythe—I am in favor of raising the price to $0.75 but not to $1.00.

The Chairman—All that are in favor of Mr. Hale's motion of raising the membership of the State Society from $0.50 to $1.00 will signify it by raising the hand. Contrary the same sign. The ayes have it.

Mr. Welch—One year from today I will make a motion raising the life membership from $5.00 to $10.00 and increase the dues of auxiliary societies from 25 cents to 50 cents.

APPLE CULTURE.

(W. W. FARNSWORTH, WATERVILLE, OHIO.)

When I received a program from your secretary, and saw there were two good numbers on a kindred topic, I felt like the old darky who one day met one of his brethren in a cabin, and in the course of the conversation fell to discussing good things to eat. Finally a wager was made, and Dinah was to be the stake-holder, that Sambo could name the best things for tickling the colored palate. He began with 'possum, sweet potatoes and water melon and—"Hold on," said the other, his under jaw dropping, "Dinah, give him the money, there's nothing left for me to say."

But when I remembered that we all looked at these things from a different standpoint, and our experiences are different, so I presume there may be something left for us to discuss. Then, after listening to the discussion that has already taken place, and noting the variety of opinions and diversity of methods and practice, I thought I might tell my experience, and together we might talk over these points which we do not thoroughly understand, or about which there is a difference of opinion.

The first thing I will mention is the choice of soil. In selecting a location care should be exercised as regarding drainage, and if it is not naturally drained, it should be artificially done by tile.

I started from the very beginning of my career as a fruit grower to

fill the soil with humus by any methods that might be employed to best advantage with the means at hand.

In the planting of trees I have usually selected varieties that were hardy, and had a good root system, regardless of top system, using Northern Spy and Ben Davis, and top-graft from scions of other varieties, and think that by so doing I have gained some in early productiveness; and then, too, I know that the varieties that I will have when I gather the fruit will be right, and true to name; and more, I will have gained by having all of my varieties on a good hardy root system. Both of the above mentioned varieties have an excellent root system, and I think more uniform results can be secured by top-grafting. I presume you have all noticed a variation in the individuality of some kind of trees. For instance, one Baldwin will produce better fruit, higher color, more uniform in size, even in the same soil, than another tree of the same kind.

I have planted at different distances. I plant about 20 feet apart each way and use apple trees as fillers. If I plant a variety coming into late bearing, I would fill in with some other variety that bore at an earlier date. If I am planting Jonathan, I just as leave use Jonathans as fillers as anything else, and the same holds good with some of the earlier varieties. I am not condemning the use of other trees, such as plum, peach and pears as fillers, if you want to, but I see no objection to using apple trees. If your peach trees are properly cared for, they should last 12 or 15 years, and anybody would see that an apple tree should bear much sooner than that.

We keep our trees down by pruning. Keep them so that the sunlight will get to them. This is one of the essentials of fruit growing, and quite as much as spraying. High-colored fruit comes from the sunlight getting to it. It is not the crowding of the roots that does harm, for you can feed these roots and make up to a certain extent, at least, for the lack of fertility in the soil to support them when too much crowded, but when you neglect to let sunshine into your trees, then the fruit is going to suffer in more ways than one.

Our method of cultivation is not so much different than other growers, and is divided into three distinct periods. First, when the tree is first planted, we top-graft, yet most writers I believe advocate letting the trees stand a year before grafting. We plant the trees in the fall or as early in the spring as possible and then in the spring we graft with scions cut in the late fall, about the time of the holidays, as soon as the wood is ripened and we store them in any place where there is an even temperature. They can be stored in sawdust, moss or sand, and keep them dormant, as nearly as possible as they were when taken from the trees. In the spring, wait until the trees you have planted in the fall or spring, begin to leave out, even until blooming time and then do your top-grafting.

We use the old-fashioned cleft graft—we cut the tree off at two feet, from the ground. These are too small to put in two scions, so we use only one. The reason for this is that there is not enough force in the tree to support two. Then instead of leaving a square cut, and letting the opposite corner from the scion die, we cut off that corner. We have had excellent results by this method, and I do not think we lose more

than one per cent of the scions. We use scions, aiming to have one bud right down in the cleft where it will be waxed over.

For the first two years we either grow vegetables, such as potatoes, or small fruit, such as strawberries, currants, raspberries, etc. We have however, given up the plan of growing raspberries, as we doubt the advisability of it. We now use generally currants or strawberries, alternating occasionally with potatoes. You may know that all this time I am using every possible opportunity to fill that ground with humus. When growing strawberries, we plow under the straw used as a covering, the berry tops, also the potato tops, those all furnishing a certain amount of humus. So we put in a crop of sand-vetch, put on stable manure, and this practice we keep up for six, seven or eight years, varying according to the orchard.

In the second stage, about when the trees begin bearing, take out the small fruits and begin to put in cover crops. That is one thing that makes fruit growing so pleasant—it is this that makes it so interesting. If we had a set of rules that we could lay down and follow, if we could read from a book just what to do and how to do it, and then feel and know that everything would come out just right and as you expected, that delightful uncertainty that is always connected with this industry would not be experienced. It is this that gives zest to the work. We can have our plans; we can lay down our rules, but in the practical application of them we will find that they have to be modified, perhaps in 24 hours after the plan of action is determined upon.

We work up our orchard just as early in the spring as possible, because every day the ground lies undisturbed, we are losing a great amount of moisture by evaporation. So we plow our orchard just as early as possible, and as a rule, work the orchard until the 1st of July. One of our cover-crops is soy beans and cow peas. Perhaps you may not get the same results that we do, but you will get good results. We cultivate the ground as before stated, until about the 1st of June with harrows and discs and cutaway harrow, occasionally following with a spring tooth harrow. We drill in the soy beans with an ordinary grain drill, omitting every third row. This makes cultivation possible again, and this can be kept up until the latter part of July, and by doing so you can hold the moisture, growing a cover-crop that can be used to add humus and nitrogen to your soil.

If your orchard is so situated that you can keep hogs, you can by planting an earlier maturing soy bean, grow a good deal of hog feed, turning the hogs in there. To repeat, my idea is to cultivate the orchard, get a growth as much as possible early in the season, if you want to grow cover-crop without cultivation, do it when your trees are not growing, or bearing. This applies to young orchards that are just beginning to bear. Then after the cow peas and the soy beans are done growing, we have a multitude of plants that can be used. Sometimes I use turnips as a winter cover-crop. Much of the time I use vetch; indeed, I have used it for a number of years. We sow it sometimes during August, while it does not make a very heavy showing, in the fall, it will make a magnificent growth in the spring; it matures so much quicker in spring than clover does. There is, however, an objection that has been urged against this plan, and that is, that the water it draws out of the ground may be needed by the trees. But the vetch takes as

little moisture out of the ground as any other kind of cover-crop, and it retains a great deal of that mostnre, so that the ground that is growing sand vetch may contain just as much moisture in June and July, as the ground that is bare, that does not grow the humus crop. We sometimes sow clover. I have one young orchard of four or five hundred Jonathans eight years old that has been manured, and we plowed it early in May, in June sowed red clover, clipped it once or twice, it grew a good crop, the trees are young, not all the ground being occupied, so the roots had plenty of room, and an excellent crop of apples was harvested. Next year we will let the clover grow and lay on the ground. In other words, my rule is this: that you can grow a crop of fertility on the soil, under most conditions better and cheaper than you can draw it in. I will mulch the trees with that clover next year.

Now we come to the third stage, when the trees have thoroughly occupied the ground, and the limbs begin to spread; then I have found it better to abandon cultivation and use a mowing machine and scythe and haul in whatever we have manure, potato tops, etc., and by so doing add to the humus and yet not cultivate the ground. Perhaps I might explain that my land is not a heavy soil or a light sand. On some other soil you would have to modify this treatment.

Another thing I want to speak of in this connection, is the fact that I believe we have been planting our trees too closely together. It is partly the result of greed on the part of the nurserymen, and the inexperience of the grower. We have all made that mistake. Recently I went through a cherry orchard and cut out every other tree because I saw that if they remained in there, the orchard would soon be ruined. Of course when we plant, we usually do so with the idea and intention of taking them out when the time came in order to give room, but there are too many orchards that are altogether too closely planted for their good. I know that a good many have an idea that an apple orchard does not bear every year, and therefore does not need a great deal of feediag; and there are some pretty good so-called authorities of high standing in horticultural lines that advocate this idea, but I will have to differ from them. The men who are growing the best crops for eight or ten years and for forty years are feeding their orchards. I had a block of Greening on ground that had not been fed. The foliage was light, the growth small. Then the men began putting on some manure from the henhouse, also some ashes, and in a short time there was a marked change in the appearance, the foliage was ranker, and the yield of fruit was better, showing unmistakably the effects of the feeding.

Another thing that I learned right there was the danger of using an unbalanced fertilizer. These poultry droppings contain an excess of nitrogen. While the trees bore heavily, where this manure was used too freely the fruit did not color up. We made note of this, and the first time we picked a block of Baldwins we took particular note, and then a week later we picked some more and still they were not colored as they should be, and to test the matter out, we left a few on as late as we possibly could but they did not color up very well. It is barely possible that some ingredient such as phosphoric acid or potash could be used to neutralize or balance up the excess of nitrogenous element, but I think hardly possible to do it entirely, for the excessive growth of foliage caused by the heavy feeding, would interfere with the coloring. With

the Grimes Golden and the Greening it is not so important, but with the Jonathans, Spies and other varieties it is, and we should be careful not to give too much nitrogen, for a poorly colored apple is a poor seller in the market.

I feed from two to three car-loads of stock every year. I buy a good deal of oil meal, use clover and corn fodder, and I also reinforce this manure with phosphoric acid, so as to balance up the stable manure which is a one-sided fertilizer.

My method is not very different from what has been mentioned here today with this exception—I think it was Mr. Smythe who said something about there not being very many orchards around us—by brother and I have the only orchard right in our vicinity, and we have been taking care of these orchards right from the start. It is twenty-five years since we began spraying—I think I was one of the first in the state to do this work in a systematic manner,—so our orchards have not become infected by the insect troubles to as great an extent as some. My practice of spraying is quite in common with what has been outlined here, but as an illustration of what may be done under favorable circumstances, I will say that I have only sprayed twice for our apples during the past year. Our first spraying was made for scale, during dormant condition, about as late as possible with lime and sulphur about the last thing. We think we get better fungicidal effects by light spraying. Then we spray again as soon as the blossoms fall, doing a good job. For this spraying we use one to thirty-three, commercial lime and sulphur with two and one-half pounds arsenate of lead to 50 gallons of water. The results have been very satisfactory. In this connection I might mention one little thing that would be of interest, lime-sulphur and arsenate of lead makes a sticky mixture and we found difficulty in getting a good stream through the supply hose, so we got two screens so we could change them when one got clogged, and put the clogged one in an earthen jar of vinegar to clean it. We use a pressure of 130 to 160 lbs., and spray with two lines of hose and two large nozzles on each line. Of course just our modus operandi in each particular case always depend on the conditions of the weather, etc. You will understand that our orchards are clean.

Then for a number of years we sprayed a second time for the codling moth. This year, Prof. Green checked over the experiment and he stated to me that he thought that less than one-half of one per cent of the fruit was wormy. This meant spraying, and of course the result depends on how thoroughly you spray.

I spoke of thinning apples. I have been practicing it for a number of years, I think it pays on most varieties.

Just a word on varieties. When I began planting a commercial orchard, we were shipping to Toledo an apple better than the Ben Davis which had been on the market, and when their flavor and quality were recognized, there was a ready sale. The Ben Davis had been shipped in there, and that is what they knew as a commercial apple. The Ben Davis has a place, but that place is where they cannot grow as good apples as they can in Michigan, Ohio and western New York. Western New York, Michigan and Ohio grow the best apples in quality that can be found anywhere.

So let us not debase our calling by growing something that those fel-

lows down in the Ozark Mountains grow, where they can not grow any thing else. (Applause) . I can not call Ben Davis in my trade now. When I consign the Ben Davis, I get them as far away from my friends and neighbors as possible, and then they are usually sold as N. Y. Snows and Winter Pippins.

Mr. Edwards: They are sold in this country as American Beauties.

Mr. Farnsworth, (continuing). Well, they are American, and they are very fine lookers—but looks deceive. The San Jose scale has not been altogether an unmitigated curse—there are features about it that make it a sort of blessing in disguise. It has caused us to look about us and as we have seen the fine looking specimens come in from the West we have been led to strive for quality, and in so doing have demonstrated that we can grow them much cheaper and of better quality, and the public is fast beginning to find this out. And with a little more publicity, this fact will be so well known that there will be a greater demand for our first class products than we can supply.

As to varieties that we have been growing, we have given quite a preference to Jonathans. I would advise growing this apple, as it is a very safe apple to plant. It has a number of very strong points. It comes into bearing early; it has a fineness of texture and a delicacy of flavor that commend it to public, and it usually grows true to type. It is a beautiful apple, and this is one point in its favor as a seller. The tree is hardy, productive, and comparatively long-lived. It requires high culture, however.

Sutton Beauty is another variety that I should like to see generally introduced. To my fancy they are a better eating apple than the Jonathans.

Now a word about spraying materials. I think it was a year ago I stated at our state meeting in Ohio that I thought I had used my last gallon of bordeaux. My friends took exception to this, but since that time they have acknowledged the coin. Now they are satisfied with lime and sulphur. For a summer spray I use this 1 to 33 on apples; 1 to 40 on cherry and pear and plum. It controls the scab, and does not rust the fruit. Used in connection with the arsenate of lead it does the work all right, and gave me the finest color I ever had on fruit. I also found my plums were absolutely free from rot. I asked my son to count the plums that had rot on them that he found during the day, and in packing 104 bushels, he found only three plums that were even specked with rot, and that was from a variety that is notorious for the rot.

Now just a word about pruning. My theory is this, that pruning is a necessary evil. It is necessary because we cannot grow trees without it. It is an evil, because every limb you cut off weakens the tree, but we must do it. But I believe we should never cut off a limb without a reason. We should try to start a head low down, and then avoid unnecessary pruning after that. The last orchard that I started that is old enough to bear now, after we got it pruned four years ago, I began to practice this letting-alone method. Our foreman objected, and I sent him away to another part of the farm, and I took some of my green hands and we pruned that orchard in a hurry. We cut off the water sprouts and crossing limbs, but the side limbs that formed the fruit buds we let alone. We had orchards this year, five years planted, that bore fruit on a great many varieties, Rhode Island Greening, Rome Beauties,

McIntosh, Grimes Golden, and after they have borne a few years, and have formed the fruit-bearing habit, then you can prune them more and not detract from the bearing habit. I would not sacrifice the symmetry of a tree, for the first few crops do not amount to very much anyway. I think we have been pruning our trees too much in many instances. Fifteen years ago, before my apple orchards were bearing much, I used to buy fruit in the neighborhood—in one year I bought and packed the product from 110 orchards, and got considerable experience in handling the fruit, and one thing that struck me was, that the fruit was cheap, I was paying a dollar a barrel, but when the grocerymen came to dispose of it to their customers, it was at a very material advance over what I paid for it, but on investigation I found that no one made any very big profit. So I set about devising a scheme to cut out some of this unnecessary cost. The result was that when my own orchards came into bearing, I built a cold-storage of my own. I am so situated that we have good market facilities. If you have good transportation facilities, a few miles more or less do not make much difference. And having different varieties, Grimes Golden, Rambo, Sutton Beauty, that class of apples, I did not have to "work up" a trade—like Topsy, it growed.

A basket of these apples shipped to a friend, and their neighbors want some like them, and the consequence is, your product is soon easily disposed of. The first time I introduced them into a place I just took a sample of them to the grocers, explained our methods, and sent them packed in 20-lb. baskets, covered, and consigned them by electric car on order, and there was no difficulty in getting an order for supplying them.

The next thing is your price. Set your own price, and then let the grocer add to that to get his profit, and that will make the selling price. You see a much better price can be secured by myself, and not have them exorbitant in price, and then you are master of the situation—you dictate the price.

I advise a cold storage plant where it is possible. No one who has not had one can appreciate the joy of it. We have one on our place, and we find it a great help as well as very profitable. We go over our trees, such varieties as Greenings, Grimes Golden we pick at once, but the Spies and Rome Beauty, we do not pick at all until they have the color, and go over the trees several times. Everything is put in storage in bushel crates. They are hauled right in, and if the weather is warm, the apples are left to stand in the shade until the next morning early, when they are cold, they are placed in storage while the temperature outside is such as not to raise the temperature in the house. We sort them just as ordered, and that gives us a little less work at picking time and provides something to do when other work is not so plenty in winter. We find this a very satisfactory way of handling our fruit.

DISCUSSION.

A Member—How late in the fall would you advise planting apple trees?

Mr. Farnsworth—We have planted trees any time clear up to the winter, till it freezes up, though it would be better a little earlier.

A Member—Do you think that banking up the trees will prevent freezing?

Mr. Farnsworth—Yes. We bank up around trees as a protection against mice also.

Q. I would like to ask if there is any system of pruning that will control the growth of an apple orchard to the extent that we can keep it at the desirable height, and not allow the trees to crowd?

Mr. Farnsworth—Do you mean laterally or in height?

A. Both.

Mr. Farnsworth—If you will give your trees plenty of room they will spread more. We cut off the tops of trees to keep them down. I have never thought but what they should spread out and keep from going up in height. Our western friends are cutting the side branches off at ends also.

A Member—Is there anything better than tar paper that can be used as a protection from mice?

Mr. Farnsworth—Soapsuds and carbolic acid put around the trees is excellent and so also is lime and sulphur. Fine wire is often used.

Q. Have you found any cheaper substitute for arsenate of lead?

Mr. Farnsworth—Yes, but it was dearer—in the end. It is arsenate of soda—but after giving it a trial I have dropped it, as I think that it injures the foliage. It is not always that which is cheapest in dollars is cheapest in the end. I feel that arsenate of lead is cheapest in the long run.

A Member—How far apart would you plant an apple orchard?

Mr. Farnsworth—That depends on varieties—Yellow Transparent, Duchess and varieties of this class can be planted closer than others. The Spy, Baldwin, and Greening when fully grown should be 40 to 45 feet apart. That is the distance I planted mine. It is largely a question of varieties and cultivation.

A Member—How close was the cherry orchard that you cut out?

Mr. Farnsworth—It was about 18 feet; 22 to 25 feet is near enough—depends on varieties. The Montmorency and varieties like this make rather large trees, and they should be set further apart. You had better have 50 vigorous trees, with good sunlight, low enough so you will not be obliged to use long ladders, and then raise first class fruit, than more trees to a given area that raise fruit that you will be ashamed of. of.

Q. If the Rome Beauty does so well in Ohio, would it not do well in southern Michigan? I understand that it does well in sandy soil.

Mr. Farnsworth—The most that I can say is that it is worth a trial. One of my intimate friends is a leading grower of it in southern Ohio. I am understanding it more every year. You must be careful. Its home is on the thin hills of southeastern Ohio. If you will come to our annual apple show about the 10th of January, you will see such a display of these apples that it will dazzle your eyes.

Q. Would it be advisable to thin them out?

Mr. Farnsworth—There is something peculiar about that—we would have to thin them more here than there. They grow bushy down there. They are a commercial apple in the southern part of Ohio. Their beauty and shipping qualities are fine, and as for flavor they are about halfway between a Baldwin and a Ben Davis. They are only to be recommended on trial in Michigan.

Q. In your ice plant do you have an ice chamber overhead? I would like a little description of your plant.

Mr. Farnsworth—Our plant will hold between 7,000 and 8,000 bushels and cost $2,500. The ice plant is located above. In the basement we have a potato cellar. I am satisfied that it has more than paid for itself.

Q. In the planting of an orchard of a thousand trees, what varieties would you advise setting?

Mr. Farnsworth—I have one orchard in mind that I planted of the standard varieties, such as Jonathans, etc., forty feet apart, then filled in the first six rows with Yellow Transparent, six rows of Duchess, then three rows of Chenango Strawberrys and two rows of Ben Davis, two rows of Wagner, and since then I have top grafted Ben Davis to Chenango. I planted Greenings and Baldwins and then filled in alternately with Rome Beauty. By the time the trees between rows have developed I will find out whether my Rome Beauty will amount to anything. If so I will take out the Baldwins. That is one advantage of the filler system—when you have varieties you are uncertain about. I would plant on the first row, Jonathans, then, on the third, fifth and seventh rows, and in this way I would have a square that would check forty feet apart each way. The row in between the Jonathans would be filled in with the Yellow Transparent. This gives a chance to take out the one in the center and still have the trees left forty feet apart.

Q. Do you spray the plums just as you do the apples?

Mr. Farnsworth—We spray our plums once before the blossoms open for scale and scab; we go on the principle that the scale is there whether it is or not, and then as soon as the blossoms fall we spray again. Another point is the effect of the Lime-Sulphur which is somewhat cumulative. You can use the Lime-Sulphur once and arsenate of lead. The next spray I would use water and arsenate of lead and the third time over I would use Lime-Sulphur and arsenate of lead. We may thus spray the plums three or four times after the blossoms, then before the plums begin to ripen we spray again with lime and sulphur and arsenate of lead and the result is that we have no rot.

Q. Do you have any trouble with lice?

Mr. Farnsworth—We have had some, but we have kept it down fairly well by thorough use of Lime and Sulphur.

Q. Weather conditions in July enter into the question do they not?

Mr. Farnsworth—Yes, this has a great deal to do with it.

Q. What do you know about the Winter Banana Apple and what is your opinion of it?

Mr. Farnsworth—I have the apple in my orchard and have been growing it for eight or ten years and my opinion of it can be expressed by saying that I have not planted any more since the first lot I put out. I may be mistaken. Sometimes we get opinions that are not correct, but I don't like the apple. The flavor is quite like the old fashioned Mandrake of your boyhood days, and there is not more than one in a hundred that is really fit to show.

Mr. Woodard—Have you noticed any difference where the trees are cultivated and where they grow in the grass?

Mr. Farnsworth—Yes, we have found there is quite a difference where the trees grow or where they are cultivated. In the grass they seem to have a better color partly because the cultivation liberates the nitrogen, of course. Perhaps if we would put in more potash to balance it up it would be all right.

Q. Don't you get a better color by Lime-Sulphur than Bordeaux?

A. Yes. Last year I ruined a crop by Bordeaux, but this year I used Lime-Sulphur and it was all right.

Q. I would like to know a little about thinning of trees. How much you thin, etc?

Mr. Farnsworth—Of course the question of thinning is a pretty hard one, for which no definite rule can be laid down. The orchardist who has been picking apples knows how they bear. My way of thinning is to go into the orchard with my man, thin myself, just as I want the work done, and require that they do it that way. You may say to your man, "Leave the fruit so many inches apart?" and the chances are they will not do as you say; but if you will go with them and give them an illustration of just how you want the work done you will get reasonably satisfactory results. We thin our plums, apples, peaches, and pears, and we finish thinning peaches before picking strawberries if possible. The sooner you can thin a tree after the June crop drop, the better. The trees that are thinned later will not bear so large fruit as those that are thinned earlier in the season. There is some variation in different trees and the results we get in thinning as above indicated are very satisfactory.

Q. Do you mix your own Lime-Sulphur for summer spray?

Mr. Farnsworth—My brother and I have one of the best plants in the state for making the home made article. We have tried both this and the commercial article, but for the last two or three years we have used the commercial article entirely.

On the peach I used the self boiled this year, but I shall use the commercial product on the peach next year. I have never used it as yet. Taking everything into consideration, we are satisfied that the saving of time and the absolute uniformity we are able to get in the commercial product than in the home-made, though in point of first money cost it may be a little higher.

Q. I understand you to say that in planting in fillers, you would not use Wagners?

Mr. Farnsworth—We have other varieties that do better on my soil. Side by side Wagners are not bearing so much as the Duchess, Transparent or Jonathan. That may not apply on all soils.

Q. Do you believe in planting a great number of varieties in a commercial orchard?

Mr. Farnsworth—That is a pertinent question. If you are situated as I am it is all right. I have good facilities as regards transportation, nearby market, etc. But for the general farmer and small fruit grower I don't believe I would advise it. For years I have been planning to keep my work going over twelve months. We begin picking the apples as soon as possible and by having different varieties that mature at different times the labor of picking and getting on to the market is distributed over the entire season. Then as a rule growers want several varieties. Early in the season it is Rambo, Grimes Golden, then Baldwins, Spies, etc. We have to have the different varieties in order to meet this demand.

Q. What have you to say on the matter of wind-brakes?

Mr. Farnsworth—I have wind breaks, but they are around our buildings and not around our orchards. I prevented blowing off of fruit by

planting a row or two of apples like the Ben Davis or Stark on the windward side and I have no difficulty on that score.

Q. What do you consider would be the best of two trees of equal size, the Baldwin or Spy; in other words, what demand do you have for the Spy and the Baldwin?

Mr. Farnsworth—I would rather have the Spy than the Baldwin, it will sell better and yield better. Whenever I find a variety that is unsatisfactory I top-work it with Northern Spies.

Q. What is your opinion of the value of Grimes Golden, also of the McIntosh?

Mr. Farnsworth—If I were limited to one variety it would be the Grimes Golden. If I were limited to two varieties for market I would add the Jonathan. It is the best apple I grow.

Q. Do you grow the Hubbardson?

A. Not to any extent.

Q. How deep do you tile down?

A. Three to three and one-half feet.

Q. Do you have any difficulty with their filling up with roots or freezing?

A. We have not had any trouble of this kind.

THE ANNUAL BANQUET.

The Michigan State Horticultural Society without its banquet would not be a Michigan State Horticultural Society. As the years go by it becomes more and more the one event of the meeting which every member looks forward to with pleasant anticipation. The annual banquet this year did not fall behind those of previous years and was truly a flow of soul and feast not only of reason but of good things to eat as well.

The banquet was held in the Armory which was tastily decorated with bunting, potted plants, ferns, etc., and the supper was served under the auspices of the ladies of the Baptist Church. Covers were laid for three hundred people and at the tap of the bell when the seating was made every chair was occupied. The meal was a delightfully served three-course repast, and full justice was done to the good things provided for the inner man.

Hon. Charles W. Garfield acted in the role of toastmaster, introducing the various speakers in his inimitable manner. His bright and breezy sallies of wit and humor greatly pleased the banqueters.

On opening, Mr. Garfield related a bit of history in regard to the State Horticultural Society, saying that it was organized in Grand Rapids and that city tried for a long time to keep the organization there, but in 1872 its first meeting was held outside that city, going to Benton Harbor, and from that time until this whenever the annual meeting is announced to be held here all are confident of a good time.

Mr. Rowe was the first speaker, and he began by saying "The apple is king and the peach its blushing bride." Michigan, he said, was surely King Apple's throne. No apples in the world excel the apples that come from Michigan in quality and flavor. Mr. Rowe made an earnest plea for a greater development in horticulture. We are nothing near where we should be. California appropriates $50,000 for the promotion of fruit growing; Michigan gives nothing. He advocated stringent laws

governing the operations of nurserymen and their sale of tree stock, and he said that a commissioner should be appointed in every fruit-growing county. Nothing could be done without cooperation, and the better the cooperation the more benefit would accrue to the fruit-growers.

Mr. David Woodard was next called upon, being designated as the "youngest horticulturist" in the hall, being 85 years young. His personal experience of forty years as a fruit-grower were related in a bright and breezy manner and he said that he believed that the fruit-growing future of Michigan had in it possibilities that very few people realized. So optimistic was he that he declared that when the meeting convened in 1925 he would be on hand to show an exhibit of fruit from an orchard he had just set out as seedlings. A rousing tiger cheer from the M. A. C. students greeted him when he sat down.

Secretary Bassett responded to the toast "What Next." "For years," said Mr. Bassett, "Michigan horticulture has been asleep. Our greatness as a fruit-producing section has not been known or appreciated by the outside world as it should be. Indeed, it has not been understood or appreciated by ourselves, until the western fruit-growers brought their products and laid them right down at our very feet did we begin to bestir ourselves. It is our mission to exploit these great opportunities which lie in store for Michigan as a fruit state, to the extent that all the world shall know that Michigan stands at the head of the fruit-growing states of the union."

Professor M. B. Waite of Washington, D. C., a government expert, gave a very interesting and instructive account of what Uncle Sam is doing for the fruit-growers and the agricultural people in general. The United States Department of Agriculture is spending $13,000,000 annually for the promotion and investigation of the science of the soil; 12,000 people are on the pay roll and some 3,000 scientists are engaged in scientific research, the object of which is to aid the farmer and fruit-grower.

Mr. Paul Crissey of Geneva, Ill., spoke on the topic, "Who Is It That Gives the Blast of the Horticultural Bugle—The Newspaper Man." The speaker injected into his short address many witty sayings that kept his audience in a constant state of laughter and closed with an earnest appeal in favor of the Back-to-the-Soil Movement which he said was the hope of the future best welfare of the country.

Miss Chittenden of Lansing followed and made one of her characteristic pleas for women in horticulture. She said that the working women in the offices and shops of the cities were many of them specially fitted for many kinds of farm work, especially horticulture, small fruits, flower raising, gardening, etc.

At this point Mr. Daigneau of Benton Harbor, sang a solo which was enthusiastically encored.

Mrs. Ballard, wife of the president of the Berrien County Horticultural Society, was called upon by the toastmaster and spoke on the subject "The Life of a Farmer's Wife," declaring that she was not ashamed that she was the wife of a farmer and wished to enter a protest against the common idea that the life of the wife of the farmer was a hard one; on the contrary, if it is what it should be, it is an ideal one, for unlike the wife of the business man, the factory man, or the city man in general, the farm-

er's wife is close to her husband, she is interested in his work and she sees the fruit of his toil and rejoices in the success of his efforts.

Mr. J. G. France, a student of the Michigan Agricultural College, spoke of the hopeful future in store for Michigan horticulturists and especially the possibilities in it for the young man of today who would prepare himself to follow it intelligently.

Professor Enstace, also of the Agricultural College, gave an interesting talk on "Preaching and Practicing," bringing out the idea and emphasizing it that in order to have our work effective it must be demonstrated that our theories will work out in practice.

Hon. C. J. Monroe of South Haven, responded to the sentiment: "Lights in Michigan Horticulture Shining over there." He said in part:—

"J. C. Holmes of Detroit was the secretary of the first State Horticultural Society in the fifties. He was a ready writer and pleasing talker. M. A. C. was fortunate in having his active efforts in its establishment, and he was the first secretary and had charge of the Horticultural Department and was an all round assistant. The old College boys readily recall his genial and helpful companionship. In the seventies this society appointed him with S. O. Knapp of Jackson, who was an active member of the State Fair Board in its early days, and Judge H. G. Wells of Kalamazoo, who was prominent in many public and private activities, a committee to investigate the yellows. They formulated a number of questions sending them out to many whom they thought would take pains to answer and received many replies which they briefed in an elaborate report to the society. It is published in the society report of 1873 and is well worth perusal, not only for the valuable information, but as showing the amount of work done for the society without pay for time and expenses.

T. T. Lyon was the founder of the U. S. sub station at South Haven, President of this society for many years, a precise talker and a careful writer. He had an international reputation and was regarded as an authority on Horticultural matters.

Samuel Fuller was the society's first treasurer, a hustler for members and a leader in contributing to its financial success.

Prof. Asa W. Slayton was the society's treasurer for a number of years. He was trusty and faithful and always witty. His most practical services to the society were in asking pertinent questions, stirring up discussions, and giving terse answers to those put to him.

Benjamin Hathaway was a frequent writer on orchard and farm topics and the shade and ornamental trees, shrubs and flowers about his farm and home attested his love for rural life.

William Rowe was a popular and liberal contributor to horticultural literature. He was the father of Geo. E. Rowe who answered the first toast. Judge Ramsdell of Traverse City and a cousin of the same name at South Haven were pioneers in the nursery and orchard production and gave liberally of their time for the furtherance of fruit growing.

Among the pioneer fruit growers who have passed on, leaving practical examples of horticultural work and neighborly advice were Levi Loomis, Harrison Hutchins, W. A. Smith, and A. S. Dyckman. The latter, because of the large amount of peaches he raised, earned the title of "Peach King" of Michigan and held it for several years. Two who have recently passed on are Edward Hawley and Alexander Hamil-

ton, both useful citizens. It is especially fitting that the latter is mentioned at this meeting which is held on or near his first purchase in Michigan in 1864.

One other eminently worthy of mention is the Rev. J. F. Taylor of Douglas, who was not only a leader in good words and works in his chosen profession, but has left plenty of evidence that he was a worthy example and leader in horticulture. Let me simply recall his orchard and two of his children, W. A. Taylor, practically head of Pomology in the Department of Agriculture at Washington and Miss Grace Taylor continuing her father's work on the farm, as shown by her excellent fruit contributed to the Land Show at Chicago and here at this meeting.

The lives, words and works of the above horticultural lights are worthy of thoughtful attention and study, not only for our own instruction and inspiration, but to transmit them undimmed to those who follow us."

Mr. Fred A. Hobbs was one of the local speakers and kept the audience in an almost continuous uproar of laughter by his many witty sayings, as he gave advice to the fruit-growers present from his standpoint of a "telephone farmer."

President Smythe responded to the toast "Lake Michigan." In a most interesting and poetic manner he referred to the beauties of this grand body of water and the wonderful riches of the peach belt that lay along its shores.

"Pictures in the Trees and Grass and Flowers," was the topic of a talk by Professor Thomas Gunson. After listening to him for ten minutes we venture to say that many beautiful pictures were made to appear to the audience from nature that had never come to them before.

Mr. W. W. Farnsworth of Ohio was the last speaker and he gave a very interesting and helpful talk on the topic, "This is God's World."

The entire audience then joined in singing "America" and dispersed feeling that the evening was just another bright spot in their lives to which they could look back with satisfaction and pleasure.

PROBLEMS IN MAKING OF THE CONCENTRATED LIME-SULPHUR SOLUTION.

(PROF. A. J. PATTEN, AGRICULTURAL COLLEGE.)

I want to thank you personally Mr. Chairman, for the flattering introduction that you gave me but I am afraid the audience will feel that they have had the frosting heretofore and are now getting only the crust.

The man who undertakes to study the chemistry of lime-sulphur solutions is following the most illusive fantom that ever bewildered the mind of man. Oftentimes we do not know where we are on this matter because almost every time we go after this problem, we get different results. We have thought several times in our laboratory that we had found something that the other fellows did not know about this solution and particularly about the chemistry of it, only to find

out a little later that we were unable to explain the phenomena that we had discovered the day before.

However, we have carried on some experiments during the past summer, regarding the making of concentrated lime-sulphur solution and possibly I have some facts to present to you today that may be of interest.

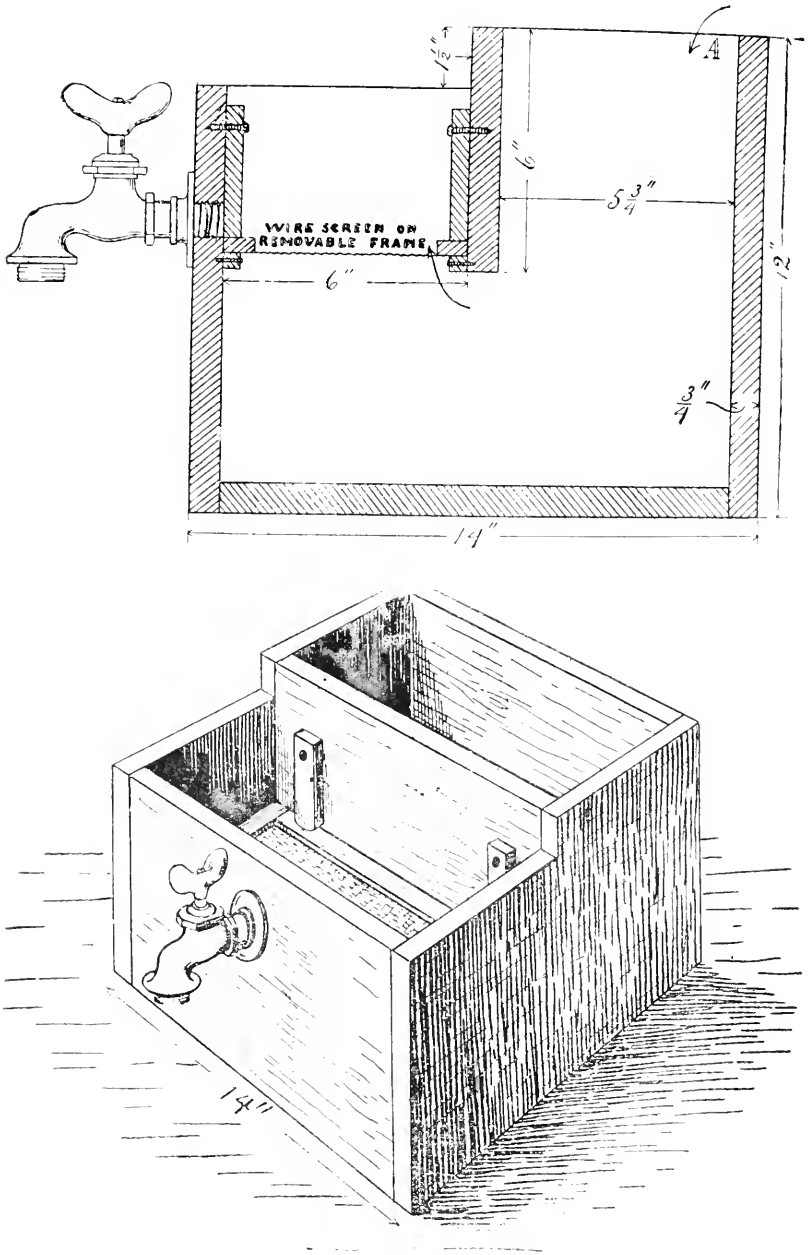
Now in the making of lime-sulphur solution, we use sulphur and lime, and boil this up with water. The two things to look after necessarily is the quality of the sulphur and the quality of the lime which you use. Although we have not made very extensive analyses of sulphur samples, yet, I want to say that I have never found a sample of sulphur that has been adulterated. They have been all pure sulphur. There is this point to guard against and that is the fineness of the sulphur. If you have a sulphur that is very coarse grained, and largely granular, it will not go into solution nearly as rapidly as the very fine flowers or flour of sulphur. That is quite an important point.

Now in regard to the lime. The lime is what will give you the greatest trouble in making a lime-sulphur solution at home because you may have lime which is only half lime. There has been passed out to you by the gentlemen papers on which I have had printed some figures which were obtained in our laboratory this summer, and the first table which is given here is the composition of some of the limes with which we carried on these investigation. The samples are given here by number and you will see that the amount of real lime, or calcium oxide, which is the valuable portion of the lime, varied in these six cases from 57.66 up to 96.4 per cent, while the magnesia varies from 0.13 up to 41.97 per cent.

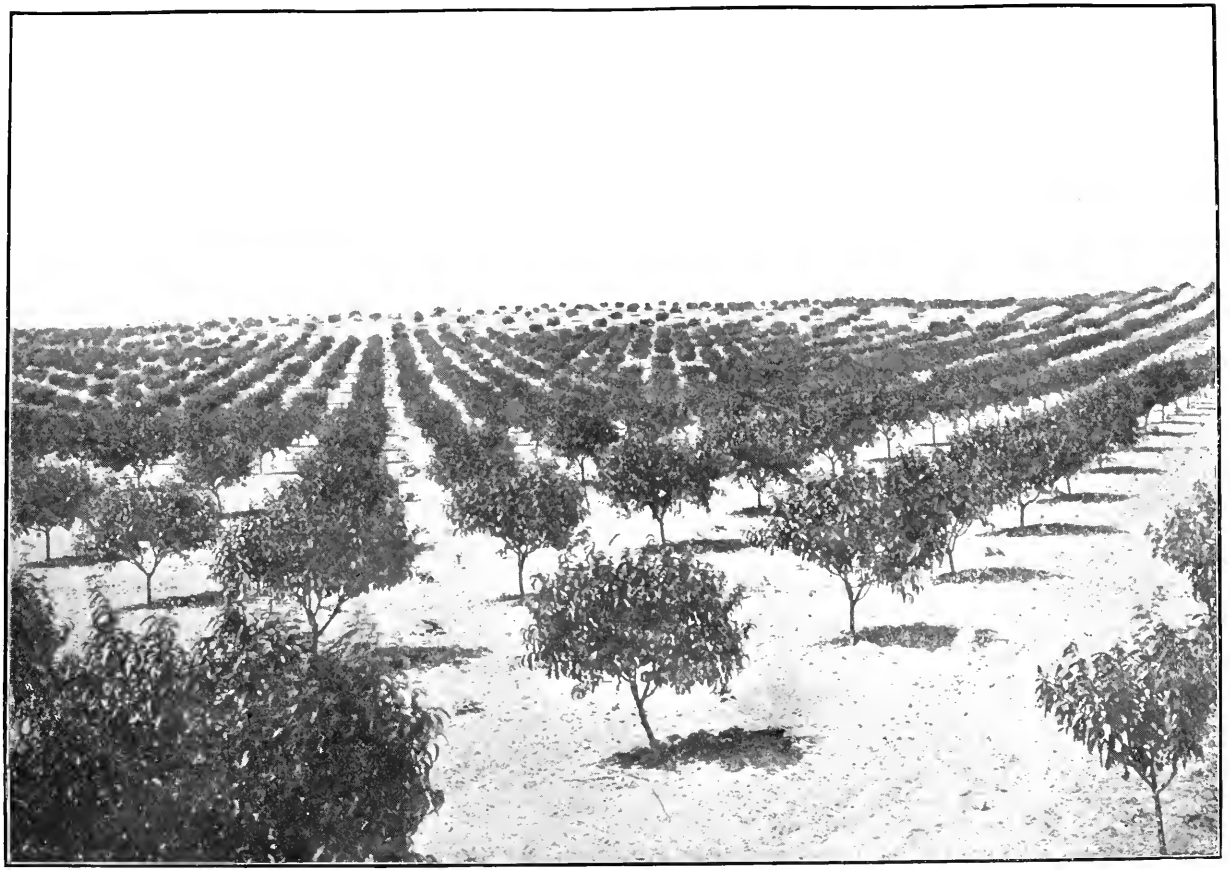
TABLE I.

Sample.	Calcium Oxide.	Magnesium Oxide.
	%	%
1	65.70	31.13
2	96.40	0.13
3	74.70	22.47
4	69.22	28.87
5	57.66	41.97
6	86.77	10.21

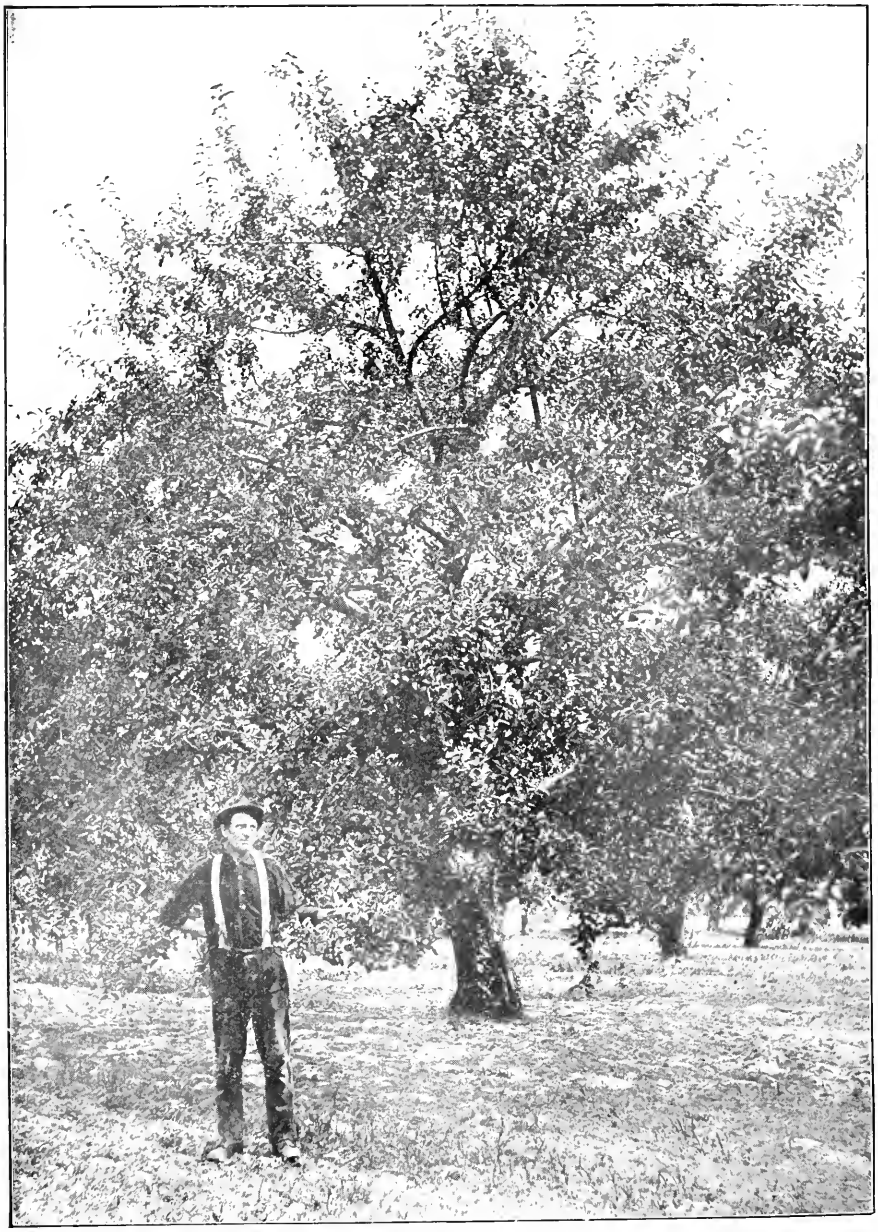
There is of course very much difference in the amount of magnesia in these samples of lime. Table No. II. gives the composition of the lime-sulphur solutions made from these six samples of lime and we made our lime-sulphur solutions in this work in a large tank used by the



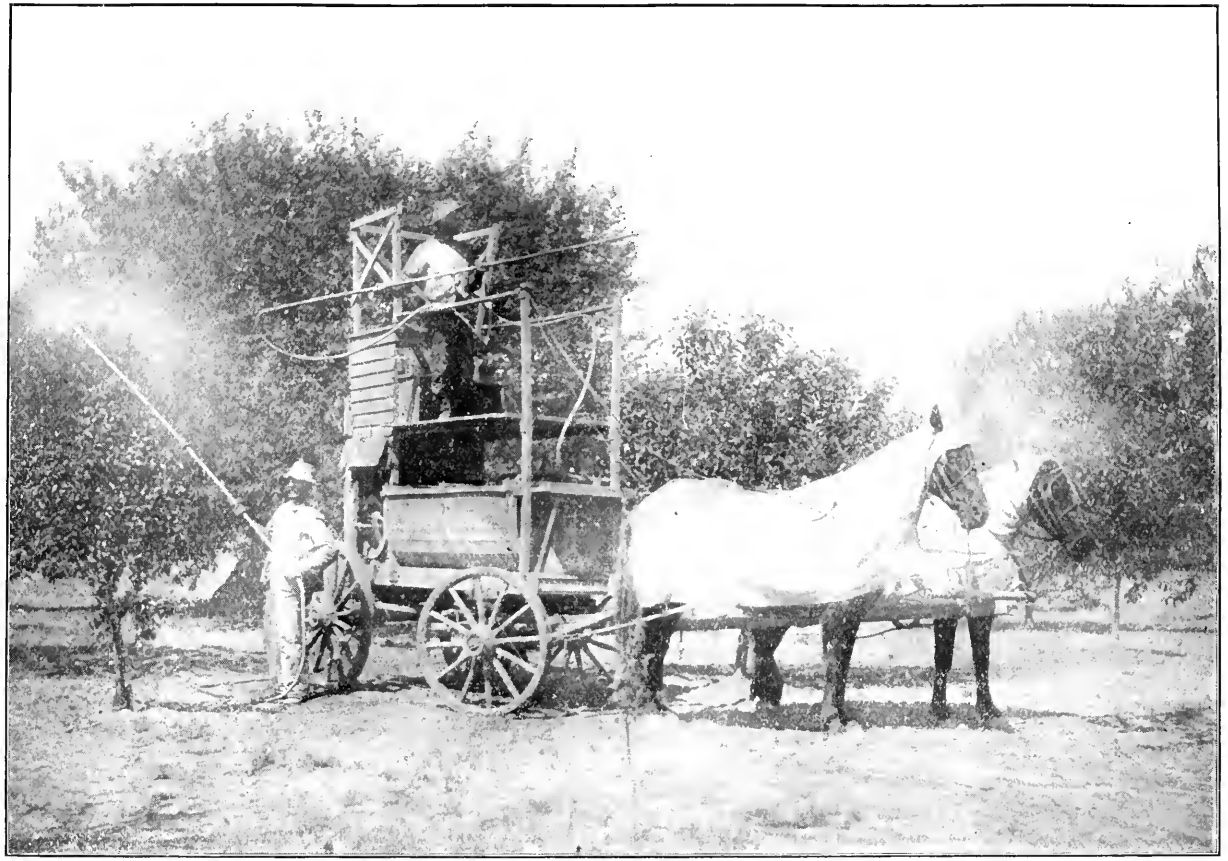
Above is shown a new type of strainer for lime sulphur or other spray materials (designed by Prof. J. P. Stewart, Experimental Horticulture, State College, Pa.) The liquid enters at "A," passes upward through the screen and is carried where desired through a hose attached to the spigot. The coarse particles thus fall away from the screen instead of accumulating on it. Any solution remaining with the sediment may be secured by running through it the water used in the next boiling.



One of the large Peach orchards of Friday Bros., Coloma.]



This Alexander apple tree on farm of Frank Smith, near Traverse City, produced a $60 crop at the rate of $2,400 per acre.



Power sprayer used on farm of S. B. Hartman, Athens, showing a convenient, detachable, double platform tower, with engine entirely enclosed.

Horticultural department in making their lime-sulphur sprays for their orchard work. So it was made up under normal conditions. The solutions were made up according to two formulas—one was 60 lbs. of lime to 125 lbs. of sulphur and 50 gallons of water. That is the one designated A in the table. The one designated B was made up according to the formula 50 lbs. of lime, 100 lbs. sulphur and 50 gallons of water.

TABLE II.

Sample.	Total Sulfur.	Sulfide Sulfur.	Calcium Oxide.	Density, degrees Baume.
	%	%	%	
1A	18.00	11.40	8.22	18.2
1B	17.58	14.04	7.97	17.8
2A	24.61	20.00	11.96	25.7
2B	21.08	17.17	10.50	22.6
3A	19.96	16.22	9.07	20.4
3B	20.55	16.34	9.63	21.2
4A	17.65	14.03	8.16	17.7
5A	13.65	10.98	6.36	13.3
5B	15.54	12.68	7.24	15.4
6A	20.93	15.93	8.30	21.8

If you examine the figures here in this table you will find that the amount of sulphur which has gone into solution depends on the amount of the calcium oxide in the lime used; that is, the lime containing the largest amount of calcium oxide gave us the largest amount of sulphur in solution. We have only given the results for total sulphur in solution and sulphur in sulphide form. Now the sulphide sulphur is the amount of sulphur which is chemically combined with the lime and is known as calcium sulphide. The lime also combines with the sulphur, to form calcium thio-sulphate and calcium-sulphate. But the amount which goes into solution in these forms is comparatively small so that the largest amount of the lime and sulphur are combined as calcium sulphide. If we examine the results in table No. II in connection with the figures given in table No. I we will find that the sample made from the lime containing the greatest amount of calcium oxide, has the largest amount of sulphur in solution. For instance the lime sample No. 5 containing 57.66% of calcium oxide gave 13.68% of sulphur in solu-

tion made up according to the formula A and 15.54% according to the formula B while lime sample No. 2 containing 96.4% calcium oxide gave 24.61% according to formula A and 24.08% according to formula B. Also the sample made from the lime containing the greatest amount of magnesium oxide has the smallest amount of sulphur in solution. In other words the greater the amount of magnesium oxide in the lime used the smaller will be the per cent of sulphur in solution.

Now in order to show just how the magnesium oxide in the lime affects the strength of the solution we took three samples of lime shown in the table immediately below where the magnesium oxide varied from 1 up to 23.5%.

TABLE III.

Brand.	Calcium Oxide.	Magnesium Oxide.
	%	%
1. Kelly Island Lime	74.1	22.5
2. Bay Shore Superior	86.8	10.2
3. J. T. Baker Chemical Co. (from marble)	99.0	1.0

Solutions were made up using these limes according to the formula, 100 grams lime 200 grams sulphur and 800 grams water. This gives the same proportions as the 50-100-50 formula and is designated by the letter A in table IV. In the solutions designated by the letter B the amount of lime was increased sufficiently so that there should be exactly 100 grams of calcium oxide in each case. The solutions were made in small quantities in the laboratory and the amount of water was kept constant during the boiling. If you will compare 1B and 2B and 3B where we used exactly the same amount of calcium oxide, the same amount of sulphur and the same amount of water you will see that the amount of sulphur in solution varies only from 18.40 to 18.60%. So when we can control the conditions and we have exactly the same amount of calcium oxide and sulphur we can get very closely the same result.

TABLE IV.

Sample.	Total Sulfur.	Sulfide Sulfur.	Calcium Oxide.	Density, degrees Baume.
1A	17.34	14.06	8.02	20.7
1B	18.40	14.82	9.00	23.4
2A	17.75	14.28	8.30	21.8
2B	18.42	15.63	8.44	22.1
3B	18.60	15.28	8.85	23.4

When we buy lime promiscuously upon the market we have no idea of what we are getting. It may be good lime or it may be poor lime. We have no way of telling unless we make the manufacturer of the lime guarantee what it contains and then from that guarantee we can determine the amount which we must use in order to furnish the proper amount of calcium oxide.

When we make a solution of lime and sulphur whether we use a good grade of lime, one containing a high percentage of calcium oxide or not, we will get more or less of sludge or sediment. Now the question comes up, is it necessary to separate the solution from the sludge when we wish to store it for a period of a few weeks or months before using. It is often very much more convenient to make up this lime sulphur solution in the winter because when the time comes to use it we want to spray and do it quickly. There are so many other things on hand in the spring that we do not have as much time to spend in making this solution as we would like and for this reason many orchards do not get the benefit of spraying that they should or would if the solution could have been put on the trees at just the right time. If we can make this up during the winter and set it aside you see we have that work out of the way before we begin to spray. The question arose whether this solution could be stored over the sludge without impairing its quality so we took this up in our studies last summer. For this purpose samples of lime sulphur solution containing sediment were set away for periods varying from 4 to 6 weeks and as a check filtered samples of the same solution were stored under the same conditions. The results are given in table V. The analyses designated by the letter A were made on the solution when it was first prepared, those designated by the letter B represent the solution stored over the sediment and those designated by the letter C represent the stored, filtered solutions.

TABLE V.

Sample.	Time allowed to stand.	Total sulfur, %	Sulfide Sulfur. %	Calcium Oxide. %	Density, degrees Baumé.
1 A	0 weeks	18.00	14.32	8.22	18.2
1 B	6 weeks	17.36	14.00	8.12	17.9
1 C	7 weeks	16.40	14.73	8.13	18.4
2 A	0 weeks	17.58	14.04	7.95	17.8
2 B	6 weeks	16.83	13.63	7.84	17.6
2 C	7 weeks	16.62	12.54	8.12	18.1
3 A	0 weeks	24.61	20.00	11.96	25.7
3 B	6 weeks	21.05	17.53	10.64	23.1
3 C	7 weeks	24.34	19.39	11.62	25.8
4 A	0 weeks	21.08	17.17	10.50	22.6
4 B	5 weeks	20.30	16.26	10.20	21.8
4 C	6 weeks	21.02	16.71	10.30	22.8
5 A	0 weeks	19.96	16.22	9.07	20.4
5 B	5 weeks	19.33	15.58	9.25	20.2
6 A	0 weeks	20.55	16.35	9.63	21.2
6 B	4 weeks	20.59	16.61	9.46	21.1
7 A	0 weeks	13.65	10.98	6.36	13.3
7 B	4 weeks	13.31	10.68	6.22	13.0
7 C	5 weeks	13.43	10.45	6.40	13.6
8 A	0 weeks	15.51	12.68	7.24	14.4
8 B	4 weeks	15.44	12.65	6.90	15.4
8 C	5 weeks	15.53	12.62	7.08	15.7

With two or three exceptions, which are easily explained, there is very little difference between the filtered and unfilterd solutions after standing for several weeks, neither do they vary much from the original solutions. In the first sample, the filtered solution 1C, was found to be much weaker than the unfiltered, and this is explained by the fact that the stopper of the bottle containing the solution did not fit tightly, thus allowing it to be more or less exposed to the air. Samples 3B and 4B were found to contain less soluble sulfur than the corresponding filtered solutions, and this is explained by the fact that from each of the barrels in which these solutions were stored portions were removed for use by the Horticultural department thus leaving a large air space over the solutions. These results confirm the conclusions of other experiments, viz: that if the lime-sulphur is to be stored for any length of time the containers should be filled completely full and stoppered tightly to exclude all air.

We may conclude then, from the above experiment, that when the lime-sulphur solutions are made according to the formula recommended there is practically no deterioration in the solution when kept in contact with the sediment providing it is stored properly.

Later results have demonstrated that when the lime-sulphur solution

is made according to a formula calling for an excess of lime there is liable to be a very considerable deterioration in the solution when kept in contact with the sediment for any length of time, even when stored properly.

The sediment possesses no insecticidal or fungicidal value although it is sometimes beneficial in serving as a marker during the spraying operation. In purchasing commercial solutions it would be poor economy therefore, to buy a solution containing sediment and pay lime-sulphur prices for the comparatively worthless sludge.

It has been recommended that lime-sulphur solutions which have been allowed to cool should be re-heated before using. In order to determine whether or not there is a distinct advantage in doing this samples 3, 4 and 8 of the above experiment were used. In sample 3 and 8 the excess of sulphur in the sediment was large; in sample 4 the excess of sulphur was small.

The analyses corresponding to the numbers 3B, 4B and 8B represent the samples that have stood for several weeks in contact with the sediment. The analyses corresponding to the numbers 3D, 4D and 8D represent portions of the same samples that have been re-heated nearly to boiling in contact with the sediment.

TABLE V.

Sample.	Total sulfur.	Sulfide Sulfur.	Calcium Oxide.	Density, degrees Baumé.
	%	%	%	
3 B	21.05	17.55	10.61	23.1
3 D	21.35	17.77	10.61	23.4
4 B	20.30	16.26	10.20	21.8
4 D	20.63	16.59	10.07	22.2
8 B	15.41	12.65	6.90	15.4
8 D	15.42	12.32	6.93	15.3

In the first two samples there is a slight increase in total sulphur and also in sulfide sulphur in the samples that have been re-heated but the increase is so small that we may safely conclude that there is no advantage to be gained by re-heating the solutions before using. The increase in soluble sulphur will not pay for the labor and fuel used.

Now these are some of the practical points which we took up in our studies of the lime-sulphur solutions this summer and as there are perhaps some questions in the minds of some that have not been touched upon, I would like for the remainder of the time to be given to the asking and answering of questions.

I want to say, however, that you can probably ask many questions which I cannot answer. A man can work over this problem for years without learning everything there is to be known about it. Everybody who has attempted to work on the lime-sulphur solution and the chemistry of it is still in the dark in regard to a great many points. I will say, however, before going on, that the results of our experiments

will be published in Bulletin form and will be sent free to anyone so those who wish it can have a full discussion of all these tables and figures.

DISCUSSION.

Q. I would like to ask the correct pronunciation Baumé and define it.

Mr. Patten—I am not responsible for the spelling on these sheets. The word is pronounced as thought it was spelled bo-may. The word Baumé has reference to the gravity of the solution. Now instead of using the term specific gravity which shows the ratio between the weight of a given volume of the solution to an equal volume of water, we use the term Baumé which expresses this ratio in degrees. Thus a solution that tests 30° Baumé is 30° heavier than water.

Q. What influence has a very low temperature on polysulphides of lime?

Prof. Patten—I do not think that it has any influence.

Q. Do you think that lime sulphur solution which is made in the fall will be as good in the spring as freshly made.

Prof. Patten—There will no doubt be some amount of oxidization taking place and this of course you cannot prevent, but I think it would be just about as good. I know I have seen the statement that freezing does not damage lime sulphur solution although I do not think it a good practice.

Q. Would it freeze?

Prof. Patten—I do not think in this climate it would as it is too concentrated.

Q. When a barrel leaks and shows exudation on the outside, is that lime sulphate?

Prof. Patten—I cannot answer that question because I have never seen it. I should rather imagine that it was lime sulphate.

Q. The average farmer has no hydrometer. What assurance have we of the commercial lime-sulphur preparation that we buy? Are they tested as they should be?

A. In answering that I would say that my experience is not very extensive with commercial sulphur samples although I have analyzed samples from the Blanchard Company the Rex and the Graselli Companies and there has been very little difference in all of these. They vary a few per cent in total sulphur in solution. I have never found one that was much below 24%.

Q. Most of them suggest that they are over 30%.

Prof. Patten—That is the Baumé reading.

Q. Some firms say there is more sulphur in theirs than others. Is that true? That argument was made to me the other day by an agent.

Prof. Patten—So far as my experience goes, 26% is about the average. There is not a very great difference in the amount of sulphur in solution.

Q. Do you think it would be profitable to buy a hydrometer? They cost about $1.50 I believe.

Prof. Patten—To the man who makes his own lime-sulphur solution, an hydrometer is almost indispensable for it is the only way we have of telling how much sulphur there is in a solution. Circular No. 10 of

the Experiment Station contains a table showing the relation between the Baumé reading and per cent of sulphur in solution. Also in obtaining the strength of a solution for determining the amount of dilution, the hydrometer is almost necessary.

Q. Is that sediment of any value?

Prof. Patten—I think where you use a good grade of lime one containing a very low per cent of magnesia that sediment could be used a second time to make a second boiling of lime-sulphur. Otherwise it would be of no practical benefit to the farmer.

Q. Don't you believe that we have reasons to think that the companies use the Baumé instead of giving the chemical tests?

Prof. Patten—I do not know. We have not been able to make very many analyses of samples of these so that I would not want to say.

Q. Are we to understand that sample No. 2 is a Michigan lime or a Maryland lime?

Prof. Patten—That lime sample No. 2 is a Michigan lime put up by the Michigan Lime Co. We got hold of it at the college; when we tried to get some more they told us that they were not burning that lime anymore; that they burned just for chemical purposes. Whether they burn this in any great quantities or not I am unable to say. If they have a stratum of lime there which will give that analysis right through, they will have a very great demand for it.

Q. Is that the reason why it was necessary to send to Maryland to get calcium which compares with that sample No. 2?

Prof. Patten—There are deposits of lime stone in this state which are very low in magnesia. The Alpena Lime Co. puts up a grade of lime which runs less than 1% in magnesia. One sample which we had showed that.

Q. Is hydrated lime equal to the barrel lime?

Prof. Patten—I think the hydrated lime is just as good as the fresh burned lime for when you use burned lime you do hydrate it. When you put the water on it, you hydrate it. If you have to ship that lime you save some freight as 56 lbs. of burned lime are equal to 74 lbs. of hydrated lime.

Q. Will an excess of lime added to dilution of commercially boiled sulphur, let stand any time, deplete its influence for the work assigned.

Prof. Patten—That brings us a point which we have been working on in the laboratory and it puzzles us. It has been puzzling us for a week or so. There are points in connection with it which we are unable to understand. If you take a sample of the clear lime-sulphur solution and dilute that up with ordinary well water or tap water, it immediately becomes cloudy, milkish and the sulphur begins to separate. There is enough carbonic acid gas in that water and other dissolved gases to bring about oxidization and precipitation of some of the sulphur in that solution. If we take some lime and make a very thin whitewash and then dilute the lime-sulphur with that whitewash, then filter that out so that we have a clear solution, that remains clear and will remain so for a long time and it does not seem to injure its value for spraying purposes in the least. In fact I am rather inclined to believe it is a benefit.

Q. Would it not be all right to take up this matter of burned lime

for this purpose to furnish it to the different farmers? I think it would be a good idea for the Board to consider.

Prof. Patten—I have had in mind to get hold of all the samples of lime that are burned and also samples of all the lime that is sold in the state in any great quantities in order to make an analysis of them. However, up to the present time we have been unable to take up this work. I think I shall try to do it before very long so we may be able to publish the analyses of all the lime samples that are sold in the state.

Q. How long should the concentrated home made article be cooked and will too long cooking cause more sludge?

Prof. Patten—Forty to forty-five minutes in our experience seemed to bring as much sulphur in the solution as you can get by boiling it for an hour or even for two hours. The longer cooking will not make any more sludge. It will change the composition of the lime solution which is already in solution and give you more of the sulphur which is of no practical value for spraying purposes. It will reduce the amount of sulphur in the form of sulphide and give you a higher amount of sulphur in the form of sulphite or sulphate.

Q. Then you do think that excessive cooking is detrimental?

Prof. Patten—Yes, after 45 minutes it is simply a change in the forms of sulphur which are already in solution.

Q. Did you ever use distilled water and would it make any difference?

Prof. Patten—No sir.

COMMERCIAL INSECTICIDES AND THEIR CONTROL.

(BY PROF. L. R. TAFT.)

During the last day or two you have been discussing the matter of spraying for the control of various insects and diseases, and although the results have as a whole been satisfactory, some have reported that however thoroughly they sprayed they could not protect their fruit from attack. In many cases the trouble was undoubtedly due to lack of thoroughness in spraying, or perhaps to the use of unsuitable spraying materials, or to doing the spraying at the wrong time, but many of you have probably come to the conclusion that a part of the difficulty at least has come from the fact that the chemicals used had been adulterated, or were not up to the proper standard.

In the early days of spraying when but one of two materials such as Paris green and London purple were used, this was often the case, as the manufacturers taking advantage of the lack of control of legislation, and the fact that no one was watching them, perpetrated the most bare-faced frauds, and sold to unsuspecting farmers and fruit growers Paris green which contained only the merest trace of arsenic oxide, which resulted in enormous losses to the crops.

Later on, Bordeaux mixture came into use and soon this was on the market in a ready prepared form and at a price which made the cost if

it were diluted as directed but little more than the cost of the bare chemicals for the making of a home-mixed spray. Analysis showed, however, that the reason for the low price was that, although it purported to be of standard strength, it in some cases only had about one-fourth the amount of copper sulphate required for its effective use, which of course made it a profitable article for the manufacturer, but a very expensive one for the fruit grower whose crop might be destroyed, and who would naturally be convinced that there was no virtue in spraying.

From the very first, most fruit growers have seemed to be averse to mixing their own spray materials and as a result hundreds of proprietary articles for the destruction of dangerous insects and diseases have been placed upon the market during the last five years. Many of them have much merit and are sold at a comparatively narrow margin so that the grower who only needs a small quantity will often find it cheaper and more satisfactory to use the prepared articles.

To protect the fruit grower and farmer from fraudulent and worthless articles, several of the states have passed laws to control the manufacture and sale of spraying materials, and recognizing the need of such a law in this state the last legislature passed what is known as the "Insecticide law," and, although this covered the whole matter, a second law, worded in almost exactly the same way, for controling the manufacture and sale of Paris green was passed.

These laws require all manufacturers and dealers in spraying compounds, or in materials that are used for the home-mixing of spraying materials, to file a statement with the Director of the State Experiment Station, setting forth the name of the brands to be manufactured or sold, together with the percentages of the essential ingredients therein contained, with their chemical combinations, which shall be a guarantee to the purchasers of the strength of the articles. The statement must also contain the net weights or measures of the contents of each package, and the name and address of the manufacturer. A sample label must also be filed with and approved by the Director of the Experiment Station, which sets forth the above facts, and a copy of this label must be placed upon every package sold.

If the statement and label are satisfactory a permit for the manufacture and sale of the article within the state will be granted without charge. Provided such a permit is taken out by a manufacturer it is not necessary for the dealers to have a permit.

The law also makes it the duty of the State Inspector of Orchards and Nurseries to collect samples of the different brands of insecticides and fungicides sold in the state and submit them to the Director of the Experiment Station, who shall have analyses made and the results are to be published.

Unfortunately the laws were put through the legislature and went to the Governor for his signature without being very carefully scrutinized and when too late to have them corrected it was found that no appropriation had been made for carrying out the provisions regarding collecting and analyzing the samples and publishing the results. While the work was in the hands of the State Experiment Station its funds came to it from the general government and all expenditures are carefully scrutinized by officials from Washington. The same is

true of the funds of the Agricultural college, and in neither case can they be used for control work such as this would be.

However, it was felt that it was too important a matter to put over for two years and as soon as the law went into effect the manufacturers were called upon to comply with its requirements so far as filing the statements and sample labels were concerned, and the purchasers of spraying materials sold since January first, 1910, have been protected by the labels upon each package, which guarantee the character and weight or measure of the contents, also by the statement and guaranty filed with the Director of the State Experiment Station.

So far as is known all manufacturers of spraying materials in Michigan have complied with the law by filing the statement and sample label and only one case is known to the speaker where changes were made in the labels so that they did not correspond with the one on file.

There have been taken out already permits for the sale of eighty-eight different brands of insecticides or fungicides. Many of these brands are in the hands of hundreds of dealers scattered over the state and some of them do not hesitate to order a carload of some article like lime-sulphur solution at one time. In fact the use of this article has become so extensive that some individual growers have purchased it for their own use in carload lots. When we consider the vast quantities of some of the other brands that are used it will be seen that it is a very important matter if the fruit growers and farmers can be assured of obtaining brands that are up to the standard in every respect. The law, however, cannot protect the purchasers to the full extent, unless they find out just what is guaranteed by the label on the packages, as this is all that the manufacturer can be required to furnish. The manufacturer can be held responsible if the contents of the packages are not up to the guarantee, but this can be made one-quarter or less of the standard strength, and the purchaser cannot secure redress if the quality of the essential ingredients stated on the label is present.

The only exception is in the case of Paris green, the standard for which is fixed by our state law at fifty per cent arsenic oxide, of which not more than four per cent shall be soluble. The National "Insecticide law of 1910," which is to go into effect on January first, 1911, also fixes the standard for arsenate of lead at not less than twelve and one-half per cent of which not more than seventy-five one-hundredths of one per cent shall be soluble.

The material which is likely to have by far the most extensive use as an insecticide as well as a fungicide is lime sulphur solution. Some ten brands will be on sale in Michigan during the coming season and while the intelligent purchaser will be in a measure protected by the present law, which requires the amount of soluble sulphur to show on the label, the manufacture of this article has progressed sufficiently far to warrant the fixing of a standard to which all brands must conform. The statement is often made that a first class article should not contain less than 24 and some say 25 per cent of sulphur in solution. With one exception all of the brands which received permits in Michigan last year guaranteed at least 24 per cent, while several have fixed the per cent of sulphur at 25 and two will actually guarantee 25½ per cent of sulphur in solution in their goods.

Several firms have put in applications to be allowed a sort of sliding guarantee, in one case fixing it at 15 to 25 per cent. This of course would actually guarantee only 15 per cent, and if the use of such a guarantee and label were allowed, the fact that 25 per cent appeared on the label, might make it possible for unscrupulous dealers to give unsuspecting purchasers the impression that they could really expect to obtain 25 per cent of sulphur in solution, while the guarantee on the label, "15 to 25 per cent," would only assure them the minimum amount mentioned. Not only does it insure to the purchaser that he is getting the worth of his money if a definite guarantee is given, but the results are far more likely to be satisfactory.

The manufacture of lime-sulphur solution has reached such a stage that there should not be a variation of more than one per cent in the amount of sulphur in solution in the different lots as they are barreled, and by endeavoring to keep the per cent of sulphur one per cent above the guarantee, it should be a safe thing for the manufacturer.

The analyses made during the year indicate that fully 90 per cent of the sulphur in solution is in the form of a sulphide, which is believed to be the most effectual portion of the solution. It can then be stated that the value of a given brand will be almost in exact proportion to the per cent of sulphur it contains, so that a brand containing 26.66 per cent of sulphur is really worth one-third more than a brand which has but 20.00 per cent of sulphur.

While it was not possible to do very much in the way of making analyses of the many brands of insecticides on the market, as is desirable if the full benefit of the law is to be secured, the use of lime-sulphur solution has become so general and extensive that arrangements were made to make at least one analysis of each brand sold in Michigan, and in every case they were found to be above the guarantee.

There are more than a dozen brands of arsenate of lead which have received permits in Michigan, and practically all of them show more than 15 per cent of arsenate oxide, with only about one-half per cent in a soluble form. As this insectitude does not burn the most tender foliage even when used at the rate of two pounds in fifty gallons of water, which provides about twice as much arsenic oxide as can be used with safety in the form of Paris green, the increased efficiency of this material as an insecticide can be readily seen. Then, too, its superior adhesive properties, render its effects much more lasting, and for this reason alone it should be used rather than Paris green.

There are also some ten brands of Bordeaux mixture which have received permits, but their use is not likely to be very extensive, as lime-sulphur solution seems likely to take the place of Bordeaux mixture as a summer spray for most classes of fruit. While each package bears a label which shows the amount of copper sulphate contained in the mixture, it does not guarantee that it will give the full strength Bordeaux when diluted as directed. One of the brands submitted, but which has not received a permit, would provide less than one pound of copper suphate in 50 gallons if used as directed.

The tendency of fruit growers to purchase ready prepared spray mixtures has led to the placing on the market of a number of brands which on their very face are frauds, or which are sold at a price ten to fifty times the cost of the materials. One firm has asked for a permit

for the sale of an article which is claimed to be "six times as strong as Paris green as ordinarily used," but the label and statement submitted only claimed that it contained one per cent of Paris green, the remainder being air-slacked lime and land plaster. Cost of materials and labor not over one dollar per hundred; the price at which it is sold is ten dollars per one hundred pounds.

In the early spring information was furnished to the papers of the state of an attempt to place upon the market a brand known as "Bordeaux mixture and Paris Green Compound." The very name "compound" was enough to make one suspicious of it, but when the guarantee was filed it merely stated that it contained "the standard amount of Bordeaux Mixture and Paris green." This statement did not comply with the law which requires the "percentage of the leading ingredients" and the manufacturers were informed that if it was Bordeaux mixture they would have to guarantee the amount of copper sulphate and lime, as well as of arsenic oxide. They then furnished the following:

BORDEAUX MIXTURE AND PARIS GREEN COMPOUND.

GUARANTEED ANALYSIS.

Copper sulphate	None	
Hydrated Lime	85	per cent
Ultramarine Blue	7½	per cent
White Arsenic	7½	per cent

The material was in a powder form and was of a light blue color not unlike that of Bordeaux powder. As can be seen from the analysis this would have no value as a fungicide, although the accompanying circulars made high claims for its fungicidal qualities, and were apparently supported by the very strongest testimonials from parties who claimed to have used it.

As it was not Bordeaux mixture in any sense of the word a permit was refused under that name and several shipments which had been made to retailers were rejected by the consignees.

While it is not likely that very much Paris green will be used upon fruit trees, there is still a large demand for it for use upon potatoes. There has been a marked improvement in the different brands on the market, since insecticide control work was taken up by some of the eastern states. Formerly it was sometimes found that samples did not contain more than 10 per cent of arsenic oxide, but out of 500 analyses recently made by the Pennsylvania State Board of Agriculture, of a dozen or more brands, and including practically all that are on the market, only one sample fell below the requirement of 50 per cent of arsenic oxide, and most of them ran from three to five per cent above the requirement. As practically all of the Paris green used in the country is manufactured by seven or eight firms, this would indicate that at the present time there is little fear of its adulteration.

Our present insecticide law seems to cover the ground very well but in order to have it made effectual some provision should be made for carrying on the work of collecting the samples and of making the analyses. This should be brought to the attention of the next legislature.

From this year's experience it would seem that the manufacturers of the spraying materials that are in most common use have tried to live up to the requirements of the law and that the brands now on the market are kept fairly well up to the guarantee. To make the law of real value, however, every one should inform himself regarding the nature of the materials he is likely to use and then carefully examine the labels and find out just what he may expect to get. By doing this one can not only make a considerable saving in the first cost of the materials, but will be able to secure much better protection of his crops from the attacks of the dangerous insects and diseases.

DISCUSSION.

A Member—I would like to know if a permit has been granted to anyone to go around selling the sample packages that they call "Blood Medicine," to be inserted in the body of a tree at $1.00 per bottle. Personally I don't think it is worth anything.

Mr. Taft—When was it done? I have never heard of it.

A. All during fair time.

Mr. Taft—I merely know that they had no permit for its sale.

Q. If the stuff is all right, do you think it would be any good?

A. Some three or four years ago a similar scheme took thousands of dollars from the pockets of some of the best posted fruit growers of Michigan, but no benefit to the trees was observed.

A Member—Nearly all of the limes that we have had run from 15 to 35 and 40% of magnesia. I would like to know if we cannot get some that are less than this, and I would be glad if you would name what you consider the best.

Professor Taft—I do not want to advertise the limes of any manufacturer, but the two best that we have been able to find in Michigan are the Sibley and Alpena limes.

A Member—Do you know where the Michigan Lime Company is situated? I have understood that their lime contains only 1% of magnesia.

Professor Taft—I never heard of the Michigan Lime Company. I have with me a number of analyses of different limes, including the Petoskey, Bay Shore and other brands, and they run from 15 to 19%. The Ohio limes run from 35 to 40%.

Q. What did I understand you to say in regard to the Sibley lime?

Professor Taft—The Sibley Lime, made at Sibley near Detroit, is a good lime, as it has only 1% of magnesia. I understand that some samples have shown only ¼ of 1%.

Q. Does the magnesia form a combination with the sulphur, and if so, what is it?

Professor Taft—I am not a chemist, but presume the sulphur combines with the magnesia either as a sulphide or as a sulphate.

Q. I would like to have question No. 43 answered. "What legal protection have we when a neighbor refuses to spray his scale infested orchards?"

Professor Taft—I would say regarding it that our law requires the township boards in sections where this disease is known to exist to appoint a commission of three who should examine the orchards and if they find any dangerous insects or diseases, they are to mark the trees and notify the owners in case of insects to spray them and to cut them down in case of the Yellows. The inspectors have the authority to decide what is best in any particular case. If the owner does not do as ordered, the inspector can procure help and the work can be done and charged up to him. During the last year I have been in quite a large number of townships where troubles of this kind were reported, and I have had little or no difficulty in securing the co-operation of the local inspectors to look after infested orchards. Of course, public sentiment must be back of this effort or it will not amount to very much. The law is broad enough to cover all cases. Thus far we have applied it only to insects and diseases dangerous to the life of the trees. The fruit-growers have in their own hands a safe and sure remedy from the ordinary insects and diseases that infect trees; and what we want to strive for is to have sentiment so thoroughly worked up, on the necessity for the proper care of the orchards, that every fruit-grower will only be too glad to follow any suggestions that may be offered within reason. So far as the codling moth and curculio is concerned we have not thought it wise as yet to require general spraying, but I think the law is broad enough, if sentiment is back of it, to insist on every tree being sprayed. We have over the state 99 persons who are not fruit-growers in the strict sense of the word to one who is. While they have a few trees many of them have not felt that they could afford to go to the expense and trouble of spraying their trees especially for the codling moths and other insects of that character. We have not thought it wise to require a strict enforcement of the law, which might, in some cases at least, work a hardship to the growers.

Q. Can the board refuse to appoint these inspectors when the proper petition is represented or refuse to pay bills for their services?

Professor Taft—The law says that if they do not carry out the requirements and appoint competent inspectors, they can be prosecuted.

Q. Can you enforce a town board to appoint a commission?

A. I think so. Of course the point is to get sentiment back of the law, for it is a very difficult thing to get law enforced without sentiment back of it. Where we have complaints we have gone to the township boards and I do not have in mind a place where I have asked that inspectors be appointed that it has not been done. Our practice has been where we have appointed inspectors particularly in sections where the Yellows is just beginning to show and have some one of the state deputies go there and spend a day with them and show them the appearance of the disease and tell them of its dangerous character, what to do, etc.

Q. Can the law compel a man to pull out the stumps?

Professor Taft—The real method of carrying out the requirement is left with the inspectors. They can have them removed at once or later on as they think best. However, it ordinarily suffices if we can get the branches and growing parts lopped down and the stump pulled in the spring or fall.

Q. When does the disease spread, and may it not spread from the branches cut off and left lying on the ground?

Professor Taft—We do not know. It is thought by many to spread in the spring. If the trees are cut down in the summer time I do not think it is necessary to have them burned at once. We do not know but it is the safest way, and I have always urged that, as soon as possible, they have those trees burned. No one knows anything about this disease and hence it is not possible to make any definite statement. One thing is sure, they should be destroyed as soon as possible, but we can hold the disease in check if we lop the branches and then later burn them and then remove the stump.

Q. I would like to ask if, when the township board fails to appoint a commissioner, or when the inspector on account of public sentiment fails to qualify or act, is there any state official that will look this matter up?

Professor Taft—Yes, the state inspector of nurseries can then be called upon.

Q. Where is the expense paid from?

Professor Taft—Do you mean when the township inspectors refuse to act?

A. Yes, and you are obliged to make the trip on that account, who pays your expense, the state or the township?

Professor Taft—The state pays the expense I am to and then it is assessed against the property by the township board.

Q. Do you use arsenate of lead in paste or powdered form?

Professor Taft—I have used paste. I have had some complaints about brands that were first used as they did not work up very well. I think, however, that as now made there is very little trouble about stirring it up in water.

Q. What pay does a commissioner get?

Prof. Taft—$2.00 a day.

Q. Suppose the township board refuses to pay it?

Prof. Taft—The law says they shall.

A Member—Up in my township I have been Yellows commissioner for the last fifteen years and my township board has authorized me to examine every tree and where they were covered with scale to destroy them. When I go into an orchard I never stop until that tree is cut down. How bad have we gone against the law in this regard?

Prof. Taft—This is the best way to do, but I think it is always desirable to impress the owner with the need of it and get his consent and co-operation in the first place. Of course, if nothing is said about it this is the thing to do. It is best for the owner, and any man who has trees that are diseased with the Yellows ought to thank the inspectors for cutting off the branches, as this would save him much work.

Q. What should be the time that these inspectors should give to the owners in which to remove and care for diseased trees?

Prof. Taft—A reasonable time should be given. If the number of the trees is not too large five days would be long enough, and they should be cut down just as soon as possible.

BEE-KEEPING AND HORTICULTURE.

(GEORGE E. HILTON, FREMONT.)

I think I have before written something upon this subject, but the interests of the bee-keeper and the horticulturist are so mutual that I feel a few more thoughts from myself and others will not be burdensome.

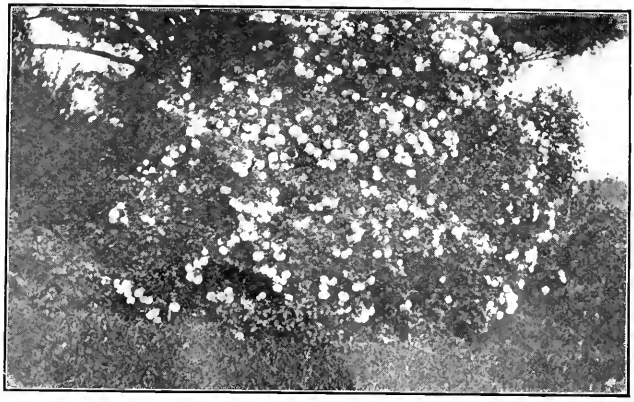
If we are both successful, we are both enthusiastic. I need not remind any one who plants trees and grows fruits, of the genuine pleasure that thrills the soul when nature responds to his intelligence, thought, and careful direction. He builds a world in which he himself lives. He desires no other intoxicant to insure his happiness.

Horticulture is one of the fine arts, and requires the skill of a master. It is just as impossible for the thoughtless, brainless man or woman to reach the highest round in the ladder in propagating fruit or carrying on a successful apiary, as it is to appreciate success if achieved. But, after all man's skill in planting, after searching the world over for improved varieties, after propagating, grafting and hybridizing, he must rely mainly upon nature's methods of fructification. The balmy winds of spring and industrious bees are needed to fertilize the bloom to insure a harvest of fruit.

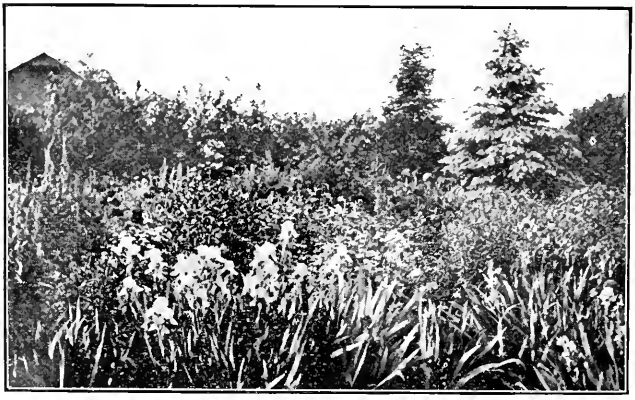
For this purpose, there is no question but that the bee is of great service to the grower of fruits. No other insect appears in such vast numbers at this very important time in the spring when their agency is so much needed to fertilize the orchard and small fruits. If the winds and other insects aside from the bee, were the only means of carrying the pollen from flower to flower, how often would perfect fertilization fail from too much or too little wind during the brief opportunity when the bursting buds are sighing for the life giving dust from the neighboring flowers. Not only has nature provided the honey to entice the bee, but the pollen, so essential to the plant (and just as essential to the bee in furnishing the proper food for its young), is placed in close proximity to the nectar, so that in getting either, the bee is unwittingly carrying the dust from flower to flower, or working out the wise plans of providence as relates to plants, and catering to man's taste at the same time.

The Creator did not place the drop of nectar in the flower because it is needed to perfect either the flower or fruit, but for no other purpose than to tempt the bee to brush its hairy legs against the anthers, and carry the golden dust from one flower to another. So the horticulturist cannot but look upon the bee-keeper as his friend, and certainly the horticulturist is a friend to the bee and the bee-keeper, and their interests should be mutual.

What then is there to hinder these two vocations from going hand in hand, since each is helpful to the other? They should at least be on the very best of terms, as each furnishes inducements for the other to live and profit thereby. In the past much has been said about bees injuring fruit, some fruit growers claiming that bees punctured the ripe

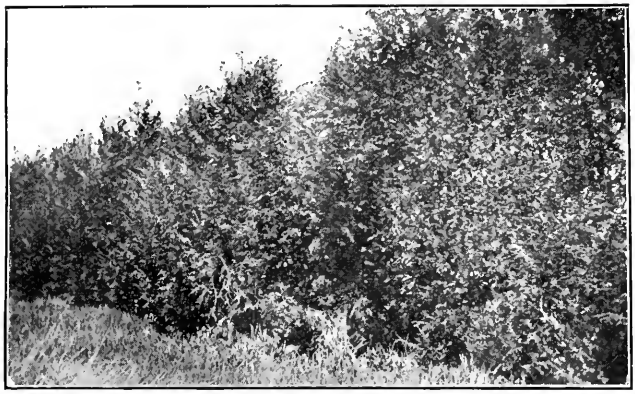


Snow ball under the boughs of a large white pine.



A garden of perennial plants.

Making waste places attractive. Snap shots on the farm of Mr. and Mrs. Charles W. Wilde, northwest of Grand Rapids. These beauty spots are fully as satisfactory as are their profitable apple orchards.



Hemlock Hedge on farm of Chas. W. Wilde.

Common Sweet Elder on north side of barn.

Norway Spruce as a protection to an apple orchard from strong west winds, but far enough apart to give good air circulation.

Colorado Blue Spruce, Norway Spruce, Scotch Pine and White Cedars.

grapes, suck the juice and destroy the crop. But from the physical structure of the bee this is said to be impossible by the scientific entomologists. It has no jaws like the hornet; it is made to suck, not to bite, and on close observation and after repeated experiments, it has been found that where bees were found helping themselves to the ripe fruits, the skin had been ruptured by the weather or over ripeness, or that hornets, wasps or birds, had been the first infringers.

But after the skin had been broken from any cause, if there is a scarcity of honey, the bees, always anxious to be doing something, will endeavor to get their share of the plunder. Therefore, as regards bees injuring fruit, I, as their attorney, shall claim to the jury that the charge is not proven, and I believe that today, the more intelligent class of horticulturists agree with me.

I feel I cannot dismiss this subject, which to the lover of fruits, flowers and bees, is a genuine source of delight, without quoting a few lines from "The Planting of the Apple Tree" by that venerable sylvan poet, our own Bryant, who saw so much of future hope and promise as he sifted the soft mould about its tiny rootlets:

What plant we in this apple tree?
Sweets for a hundred flowery springs
To load the May wind's restless wings.
When from the orchard row he pours
Its fragrance at our open doors,
A world of blossoms for the bee.

GEO. E. HILTON,
Pres. National Bee-Keeper's Ass'n.

THE BEAUTY CROP.

(CHARLES W. WILDE, GRAND RAPIDS.)

There is one crop that the majority of farmers and fruit-growers have sadly neglected. It is a crop that can be grown with equal profit on every farm in this State. It will increase the market value of any farm; and often gives more real satisfaction and contentment to the farmer and his family than any other crop. It is a crop that needs but little room. Oh! 'tis a wonderful crop; for the farmer and his family can feast upon it every day of the year, and his neighbors and friends can partake of it as much as they please and the crop will remain undiminished. I refer to the Beauty crop or the crop for beauty. When we bought our farm 23 years ago it was like the majority of the farms in this section. Although we were heavily in debt we managed to get some evergreen seedlings and other trees and shrubs, with which to start our beauty crop. In this climate where the deciduous trees are bare about six months in the year, I believe it is wise to plant plenty of evergreens. They are not only beautiful during the winter and early spring; but some of the varieties are very beautiful in the summer af-

ter they have made a new growth of a few inches. Plant evergreens if you want the song birds to visit you early in the spring.

The group of evergreens in view No. 1, we planted for three purposes. First, beauty. Second, to hide from our view certain objects that we did not want in sight. Third, to protect our trough or tank where we water our stock; from the northwest winds. View No. 2, shows a row of Norway Spruce which I planted because I like to see them grow; and to protect an apple orchard from the west winds; and as it is a single row planted 20 feet apart it does not check the motion of the air enough to cause the frost to settle. View No. 3, shows a hemlock hedge; which makes a background for a part of the front yard and screens the house and yard from the west winds. It also hides the vegetable garden from view. View No. 4, shows snow on some evergreens in our yard. No. 5, is a view of our garden of perennial plants such as German Iris, Foxgloves, Oriental poppies and other hardy plants, View No. 6, shows a Snowball under the boughs of a large White Pine. View No. 7, shows a common Sweet Elder in blossom. It came up on the north side of the barn, and most of farmers would have pulled it out as soon as they saw it, but I let it grow, and I believe it is more beautiful either in blossom or when loaded with fruit, than many of the shrubs sold by nurserymen at high prices. What little we have done has not cost very much money; but I believe it has increased the market value of our farm more than one thousand dollars.

SOME PHASES OF NURSERY INSPECTION.

(BY PROF. J. G. SANDERS, UNIV. OF WISCONSIN.)

It is my pleasure as a delegate to bring to you the greetings of the Wisconsin State Horticultural Society. It has been my privilege to attend recently three horticultural meetings, one in Wisconsin, and one last Tuesday in Minnesota, and I now have been with you since eleven o'clock yesterday. I demurred on being appointed the official delegate from the Wisconsin Society to this place, but the authorities said to me, "You are the man we want to act in this capacity. You have the ideas that we want to present not only to our own people but to the people of Michigan."

The subject which appears on the program was the one which was uppermost in my mind at the time of receiving the communication from your secretary, Mr. Bassett. I am an entomologist by profession and a horticulturist in a broader sense by instict and love. I have charge in Wisconsin of the State Nursery and Orchard Inspection; and have had charge of the work since the first of July. Previous to that time I had been partially engaged in this line of work in Ohio for three years, 1902-4, and was then called to Washington to take up in part similar work with the United States Department of Agriculture. The government work at Washington is not in certain ways as satisfactory to my make-up as state work, so I was pleased when I had an opportunity to come to Wisconsin and take up the state work.

The majority of the states in the union now have laws which provide for Nursery and Orchard Inspection, especially for the former. The passing of these laws dates back to the importation of the San Jose Scale into the Eastern part of this country. It was early recognized that this dangerous pest is carried principally on nursery stock; that is the pest is transferred from state to state or from section to section, on nursery stock although we know that it may be transported for short distances by wind, human agency or by being carried on birds or other insects while the scale is in its larval condition. On this account it was certain that if the San Jose scale was controlled in our nurseries, its spread over the country would be materially checked. It has been the experience with most insect pests on their introduction into a new country that where they became established, providing conditions were favorable, multiplication was much more rapid than in their native country. This phenomena is due to various causes, principally the absence of natural parasites and enemies.

Unfortunately, the laws passed in the various states controlling nursery inspection vary remarkably, both as to their requirements and as to the machinery designated for carrying out the requirements. In some states the nursery inspection is placed in charge of the Economic Entomologist, in other states with the Horticultural Department, in other states with the State Entomologist who is not connected with the State Experiment Station, and finally in some states the work is carried out at the direction of the State Experiment Station or Agricultural College Officials. It is easy to see that under these varying conditions we are certain to have extremely variable quality in the work as carried out. I personally hesitate to accept as perfectly safe the nursery stock inspected in some of our states on account of the lax methods in vogue, and likewise on account of the incompetence and carelessness of the inspectors. Too frequently, inexperienced inspectors are sent out to do this most important work,—young men who have had but little training in Entomology or Plant Pathology, and who still worse, do not have the work at heart and do not realize the extreme importance of careful and conscientious inspection.

There are now restrictions in some state laws which prevent the entry of nursery stock within its bounds which has not been fumigated. Other states require no fumigation of stock except where they have reason to believe that it is infested. While in other states, I am sorry to say, we have no inspection at all. The United States Bureau of Entomology rather recently published a resume of the various requirements to be complied with by shippers of nursery stock in the various states. In glancing over these requirements one is astonished by their variety and variance.

What is the remedy for this condition of affairs? We hear much in this day regarding "State's Rights" in various methods. To a certain extent it is possible that states have certain rights which should not be violated or curtailed by the Federal Government, but I believe that the solution of the Nursery Inspection problem for the United States is in the obtaining of as nearly uniform inspection laws in the various states as is possible. I believe that the inspection work in the states should be under the control of the Secretary of Agriculture, who should grant certificates to the various nurseries in the various states after thorough

and effective inspection has been carried out. The character and grade of the inspection in the various states under this method could be made more nearly uniform and certainly more satisfactory. By this method a certificate granted to a certain nursery would be accepted in all other states without the necessity of resorting to various methods for complying with the law of that particular state, in which a nursery wishes to ship its stock. No little confusion and trouble results at the present time in the attempt made by various nurseries to comply with the State Laws, where the nursery has a business ranging through a large number of states.

As an instance I would mention the requirement of the Wisconsin Nursery Inspection Law which demands that nurseries outside the state doing a retail business within the state of Wisconsin, shall obtain a nursery license by furnishing a duplicate copy of their own state license and a ten dollar license fee. This plan seems to me to be a poor arrangement but when you consider that we require the same fee from our local Wisconsin nurserymen, and that they must comply with the requirements of the law and strict inspection, it seems no more than right that outside nurseries shall obtain the same privileges of the sale by complying with the same requirements.

This idea is not a new one by any means but it has been proposed and discussed by various bodies—Economic Entomologists and Nurserymen, but so far nothing has been done to make our nursery inspection laws more uniform and it is only by constant and general agitation of this subject, that we can hope to obtain this final result.

Another phase of nursery inspection which to me under the present arrangements seems very unwieldy and expensive, is the method now used in inspecting shipments of foreign stock to this country. Under the present arrangement the various State Inspectors are notified through the Department of Agriculture by the Customs Officers of the receipt of shipments of stock consigned to their states. These shipments arrive in all portions of the state and at almost any season of the year, thus requiring many trips to inspect a comparatively small amount of stock. You will understand this inspection work is generally carried on to prevent the possible introduction into any territory of those terrible pests, the "Gypsy Moth" and the "Brown-tail Moth" and other dangerous insects and fungus diseases.

It has been proposed and a bill was drafted to the effect that the Federal Government should assume the responsibility of inspecting these importations at the port of entry, which seems the most reasonable measure to carry out, and also the most certain method to prevent the introduction of these pests. This bill was drawn up and presented to the Committees in the National Congress a couple of years ago but like many other bills proposed it was ignominiously shelved. It is generally recognized that the majority of our economic insects of prime importance in this country are of foreign origin; therefore, it only seems reasonable that the easiest method to prevent large loss in this country by insects which are dangerous in their native country and may be introduced here, is to prevent such introduction by thorough inspection methods. The great importance of such work is scarcely realized by the average layman, nor is the danger of importing these serious pests properly appreciated until he has had some ample ex-

perience with one of them. For instance, it is reported that when entomologists proposed legislation in the Texas State Legislature to prevent the growing of cotton for a year or two in that region of Texas where the cotton-ball weevil had obtained a foot-hold in order that the progress of the insect might be checked, the Entomologist and those proposing such a plan were ridiculed and laughed at, but we feel certain that had such measures been adopted millions of dollars would have been saved to this country in the cotton crop. Had the Federal Government the power and the money available at that time to immediately take steps for controlling the pests, it is possible that several of our insects which are now recognized as of prime importance could have been stamped out in their incipiency. Dangerous insects are unrestricted by state lines in their forward-march and distribution and on this account it seems that laws and control measures should likewise be unrestricted by state lines and that the Federal Government should be empowered to take up immediately the control of any threatening and dangerous insect pest. Especially should this be true when the insect is one which is likely to become a national menace.

As a friend and believer in horticulture, may I state that in my opinion, there is no greater pest to horticulture than a dishonest nurseryman, that will put out stock untrue to name or misrepresents his goods.

I might interpolate here very frankly some experiences which I have had during the past summer since taking up the Nursery Inspection work in Wisconsin. Our law requires that all nurseries whether located within or without our state shall secure a license for the conduct of their business in our state. In answer to a large number of complaints received at the office from fruit growers and farmers in sections of our state, I took it upon myself to personally investigate the charges made by these people against a certain nursery firm located in Illinois. The result of this investigation showed a condition somewhat as follows:

A man accompanied by three assistants, purporting to be agents of the Home Nursery Company of Bloomington, Illinois, took large numbers of orders in the northeastern part of Wisconsin for two varieties of cherries known as the "Northwest" and the "Ostheim." These cherries which we know as inferior sorts, were misrepresented by these agents in various ways. First, they were claimed to be superior in every way to the old recognized varieties, the "Montmorency" and the "Early Richmond." Again, they in places guaranteed the people that these were the varieties of cherries which were returning such large and valuable yields in our well known Sturgeon Bay cherry section. Thirdly: In some places they represented that their company had handled the entire cherry output of the Sturgeon Bay region, all of which statements are distinctly false and misleading.

The plan of sale was something like this: The agent after representing these two varieties of cherries to be the most valuable which money could purchase and representing that the trees were all grafted on Russian roots, asked the prospective buyer $1.10 per tree. If the buyer demurred on this price and refused to buy, an agreement was offered whereby the farmer might secure these valuable trees at the extreme low rate of $55.00 per hundred, providing he would give to the nursery company one-half of his 1915 crop. In a great number of cases the buy-

er jumped at this bait and swallowed it hook and all, including the barb, for there was a barb connected with the hook. A printed agreement or contract form was produced, which reads as follows:—

"AGREEMENT."

"We desire to show our patrons the profits of growing a five acre cherry orchard; by the latest and most approved method of pollenizing. In order to grow perfect formation of fruit, we find by experience the only safe way is to grow fruit by pollenizing. Therefore, the grower has perfect fruit to place on the market at the highest prices and no trouble is found to sell all he can grow. (This method is endorsed by preserving and canning companies).

The trimming of young trees is a most important element in their care and future development, and in order to insure perfect trees to our patrons at bearing age, are to be trimmed and cared for by the Home Nursery Company at such time and in such manner as said company may deem best, and if said trees are not as represented and should any of said trees die from any fault of said company within five years after planting of said orchard, said trees will be replaced, free of charge, by the Home Nursery Company.

At the expiration of said term of years, the purchaser will have an orchard of bearing trees. The purchaser is to set the trees in accordance with the book of instructions given him for that purpose by our representative. It is further agreed that the Home Nursery Company is to buy and pick all fruit of the varieties mentioned on back of this agreement at market prices. I being the purchaser of this commercial orchard agree to haul this fruit to the preserving and canning companies, or the nearest railroad station. Upon these conditions we guarantee prefect success.

"THE HOME NURSERY COMPANY."

The agreement which must be signed by the fruit grower or farmer and his wife, reads further that he promises to pay to the agent for order specified a number of dollars in cash on day of delivery. No countermanding. Notice to be sent day after delivery.

The above agreement means nothing, represents nothing, and guarantees nothing, if you will examine it carefully. A curious part of these transactions as determined by my investigations, was the fact that in but few cases had the purchasers read over the agreement, but took for granted that the agreement contained all of the promises and representations of the agent.

Now comes the most curious and interesting part in this whole transaction. "The Home Nursery Company, Bloomington, Illinois," does not appear in the 1910 Directory of Florists, Nurserymen and Seedmen, which is issued by the American Florist Company and is the most complete list of its kind in America. A letter written to President Graham of the Illinois Horticultural Society by Secretary Cranefield of the Wisconsin Society asking for information concerning this "Home Nursery Company" received the reply the "Home Nursery Company" does not appear in the City or Telephone Directory of Bloomington, Illinois. Mr. Graham who lives at Bloomington also stated that he knew of no such company at Bloomington.

On further investigation my curiosity was still more aroused, and I wrote two or three letters addressed to the "Home Nursery Co." at Bloomington, inquiring as to the organization of their company, location of their nursery, etc., from which I received rather evasive replies, some letters remaining unanswered. In a later letter I demanded to know whether the parties which had been representing their company in our state were bona fide agents, to which they replied in the negative. Again when the copy of the contract used by these agents bearing

the name of the "Home Nursery Company of Bloomington, Illinois" in large type was sent to them, asking whether they had authorized this contract, they replied in the negative.

You will note that this company when told that they were responsible under law for the actions and transactions of their agents, denied that these parties were their agents, although in letters earlier in the year the company applied to my office for agents' licenses for these parties representing at that time that they were agents.

In the face of all these facts, it seems to me that the entire business of this nursery company and its agents or representatives, is carrying out a policy of misrepresentation which seems to be nothing more or less than premeditated swindling.

This is a concrete example,—one of several with which we have had to contend in Wisconsin, and I learn from correspondence that similar operations are being carried on in other states. What methods of control can be promulgated for restraining and preventing such nefarious business in our midst? To my mind no more serious detriment and harm is thrust upon the Horticultural interests of any state than is perpetrated by just such dishonest and swindling dealing.

Another class of dishonesty with which we must contend, is the nurserymen within our borders who continually persist in substituting varieties other than those ordered by customers. In my own state there are nurserymen who have no scruples in this regard, but carry out methods of intentional substitution by taking orders for varieties which they know they have not in stock, intending on delivery to substitute other varieties without notifying the purchaser. Is there any reason why a nurseryman should substitute for good varieties in orders which are adapted to the particular conditions where the trees are intended to be planted without notifying the customer of his inability to furnish the ordered varieties any more than there is excuse for a lumberman to furnish you with pine or hemlock lumber when you had ordered oak; or for a painter to furnish you blue when you had ordered red paint; or for a miller to furnish you with cornmeal when you had ordered flour? I hold that it is within the scope of proper laws to demand that nurserymen furnish the varieties which have been ordered and if they are not able to furnish the variety ordered, they should notify the customer so that he may either cancel the order or make his own substitution of varieties.

Substitution may be all right in the case of small orders. But if you are in the fruit business and intend to plant large blocks you want one kind in one block or row. Instead you may have a lot of seedlings or crab apples mixed among your trees which can not be distinguished. It is very easy to swindle the farmer and grower, for he cannot distinguish the varieties until they come into bearing and then he finds to his sorrow that he doesn't have what he expected and disappointment and loss is the result.

Now what is the remedy? That is not an easy question to answer. I know what we propose to do in my state. First I want to say that there are many dealers both in Wisconsin, Michigan and Minnesota, to whom we furnish a license for the sale of nursery stock and we cannot tell where they get that nursery stock. What method of control shall we adopt for these people? I propose to publish a list of the nursery-

men of the state of Wisconsin, their location, the proprietors of the nursery, the acreage of stock which they grow. This circular will be valuable in the state where our people wish to buy of local nurseymen. I advise the people of my state against the purchase of nursery stock from agents who come into their territory asking an enormous price for new varieties which are claimed to be far superior to anything grown by nurseries in the state, but which in fact may be practically worthless; where they represent themselves to be the only people who handle them and say that they are grafted on Russian roots, etc.—such statements as these tend to impress the unwary farmer with the wonderful stock he is getting, when in fact it may have been grown in some obscure place in Arkansas and would not at all be fitted for our northern climate.

There is another point, I am very certain that trees grown in the far south are not suitable for the north, I would much prefer to take trees grown in our immediate locality for then we know they will be suited to our latitude.

For the control of these dishonest dealers I will publish broadcast the statement warning our people against nursery agents except where they know the parties. And I cannot understand why it is that farmers will take the word of these unknown irresponsible agents in preference to the word of horticulturists in the neighborhood and especially when they are warned that the stock being offered is not good.

When in doubt about Agricultural matters consult your Experiment Station.

DISCUSSION.

A Member—What spray would you use for this last pest which you have discovered?

Prof. Sanders—I have always felt that some tree salesmen and lightning-rod men—especially a certain class of them—should have some kind of spray.

A Member—I would suggest that you give them chloroform. I believe that is Dr. Osler's method.

Q. Do you think that these fraud nurseries are injurious to the reliable nurseries?

Prof. Sanders—Yes, I think so. The man who is carrying on a straight-forward business is affected in the public mind, by fraudulent, dishonest parties. If a man has been swindled once he is fearful about indulging in other deals, and that is the thought I had in view in publishing at large a special note regarding these fraudulent nurserymen.

A Member—That is what I want you to acknowledge; I have always been a straight nurseryman. I think that no man should be permitted to sell any kind of fruit without the name and address on the basket. The fact that we are allowed to do this is the reason why we have swindlers among the fruit growers. I have had men tell me that they bought a basket of fancy peaches or plums and on the top everything looked all right while in the bottom there would be fruit of an entire different character. I don't know why any grower of fruit should pack his fruit up in anything he sees fit, any more than a manufacturer would put up an article that did not comply with the Pure Food Law. You know the Pure Food Law will not allow the putting up of baking pow-

der and placing it upon the market for sale without it contains on the label or wrapper the name of the manufacturer, the constituent ingredients of the compound, also where the goods are put up; and I will be glad when we have a law which will say that we cannot sell anything in the fruit line on the market without it contains the name and address of the packer or raiser.

Prof. Sanders—The general trend of legislation is toward branding everything sold, not only of food, but of spray materials, textiles, all kinds of clothing. If it is wool you want to know it. The same with silks. If you only knew how little real silk there is then you would appreciate this. I doubt if there is ten per cent of the silk on the market that is actually spun by the silk worm.

Q. Would not the advertising, and the area and extent of the nursery have a bad effect on a new nursery? I have been planting stock from a large nursery with very unsatisfactory results. I have lost all of these trees. This year I have purchased my trees from an agent who is growing his own nursery stock and heeling in his stock that is left. I believe that a great many of the trees are fumigated in the root cellars and we have no way of telling whether they are good or not. Our trees come from all over the country. Is there no way that we can have any assurance as to whether the trees have been killed by over-fumigation?

Prof. Sanders—I think there is no way that we can definitely detect whether trees have been hurt by over-fumigation. As a matter of fact there are very few trees killed by fumigation. I will give you a pointer:—I have seen so many trees prepared for fumigation that were dug up and allowed to lay in the sun for hours, or even for a day or two, before they were fumigated that the chances are ten to one that damage does not come from over-fumigation. Fumigation at the normal cyanide strength, one ounce of potassium cyanide to each one hundred cubic feet of space is not liable to do any damage to dormant fruit stock. I tried four times the normal strength on apple trees in a dormant condition without injury, but I protected the roots from drying after digging. There is where the injury is done to most of our nursery stock. We find in tiny little rootlets that are allowed to dry out, the cells become dry and never regain their normal condition even when put in a damp cellar.

A Member—I have a question on which I would like the Professor's opinion. He mentioned the scale as passing the winter in a semi-dormant condition. What damage is the scale supposed to do during the winter months?

In answer to that question I will say that the San Jose scale does very little damage through the winter because it is in a dormant condition, taking but little, if any, nourishment, but as soon as the warm weather opens up in the spring, and the sap begins to flow, then it begins to feed. Most of our native scales differ from San Jose in that there is but one brood annually. The San Jose scale has several generations a year, perhaps three in this climate, or four or five or even six generations further south, and it brings forth living young. That is where the essential difference lies between the San Jose sale and the native scale.

Q. Is the damage due to the sucking of the sap or to the putting of the poison back into the tree?

Prof Sanders—They do not put any poison into the tree. They have a slight peculiar reddening effect upon the bark of the tree, but where they get in their work is by pushing their probosis into the bark and sucking out the sap.

Q. Will the same fumigation for scale destroy root-aphis with which many roots are affected?

Prof. Sanders—A proportion of the root aphis will be killed but some may not be killed. Nor will the eggs of many of our butterfles and moths be killed by the same fumigation. That has been brought out very clearly with experiments made for the control of the Gypsy moth This was introduced into our country on foreign stock in the egg stage. Nicotine Solution, kerosene emulsion, whale oil soap are good remedies for plant lice.

Q. Will dormant spraying kill scurvy bark louse as well as the San Jose scale?

Prof. Sanders—It will do this to a larger extent than with the oyster scale louse. It is best to spray late in the spring for both. You can spray immediately before the leaves unfold, when the buds are swelling. But you can eradicate oyster scale on trees with the kerosene emulsion which is effective against any scale insects.

Q. Is the crown gall any sufficient reason for rejection of nursery stock?

Prof. Sanders—That is another question that is unsettled. That question was largely discussed through the afternoon in the Minnesota meeting and a representative of the Jewel nursery claimed that he had conducted some extensive experiments in which he found that he was in position to declare that the crown gall was not dangerous to a tree. I still am on the doubting side and shall not accept the statement as conclusive proof to that effect. If the tree is diseased in any way, and that is a disease, I would prefer not to have it in my nursery or orchard.

Q. Must we accept it from the nursery?

Prof. Sanders—I do not believe you have to accept it, at least not under the Wisconsin laws and I think that most of the state legislatures have enacted similar laws.

Q. Do you favor the fall or the spring in which to spray for the scale?

Prof. Sanders—I would prefer the spring, because you kill the scale and you kill many of your fungus diseases at the same time if you use lime-sulphur solution.

Q. Recently I had to look up the crown gall and found the statement in the bulletins which came from the department of agriculture and also state bulletins as well that the crown gall would not only kill the tree but it would inoculate the ground so that it would be impossible to make another grow where that crown gall tree had stood.

Prof. Sanders—Statements have been made and repeated in bulletins to that effect and also to the contrary so there seems to be quite a divergence of opinion on the subject. I do not, however, think the crown gall of quite the same nature as the peach yellows. We do not know the cause of the latter disease although Dr. Erwin Smith and many others have been working for years and as yet they are unable to tell just what the cause is.

Prof. Taft—I think we should distinguish between the galls. Many have had the gall on their peach trees and we have on apple trees two or three kinds of galls. In some cases the gall, as we call it, is developed where the grafting was done. In that case I would not care to use the trees. The instructions we give to our nurserymen is that trees having galls upon them should be destroyed, and certainly anyone that purchases trees would be justified in throwing them out and not paying for them if they had the gall. The peach gall particularly should be feared and I would not plant peach trees where you have raspberries. I have taken trees which had small gall on the roots and cutting them off we would not suffer anything from them. We cannot, however, tell just how serious the damage would be and I would rather discard the tree than use it. So far as Michigan nurseries go, we publish every year a list of licensed nurseries growing trees in Michigan. We make a distinct list saying who are dealers and who are purchasers either from Michigan nurseries or from other states. We have a third list giving the various nurseries so that one can from these lists decide just where he can go to buy his trees. I personally prefer to purchase from nurserymen but it seems to me that there are many cases where we have careful dealers who visit the nurseries from whom they get the nursery stock, making careful and true-to-names selections and in that case I would be just as sure of getting what I wanted as if I bought direct from a regular nurseryman. Even nurseries do not always raise or grow all the trees they sell, so in that case you would not always be sure of getting strictly home grown stock from that particular nurseryman. I will say that so far as the nurserymen go, where we do not feel that we have any actual control over the honesty of their claims or the validity of their statements we have not given the matter very serious attention. Where nurserymen are deceiving the public, is sending out letters and letting papers publish it telling what wonderful virtues are wrapped up in their trees—same as insecticides. I might say of the San Jose scale, that although we have published at the experimental station bulletins which are free for the asking, and which we have sent to the newspapers, and many descriptions and notes have been published, yet there are today places in Michigan where they never heard of the scale, and in many cases where orchards are dying with it, yet they do not know what it is; they do not suspect it to be the scale. However, while this is true in some parts of Michigan I am glad to say that the scale has been kept pretty well in the southern part of the state. It is working north slowly but it is not more than one-half way up the lower peninsula and does not seem to thrive much above that line. In two cases we have found the scale in one of the central northern counties, so far north as Cadillac, but I found that the scale was introduced there by stock that was infested when it arrived. These trees were destroyed and although we have been going there two or three years we have failed to find upon examination, any of the surrounding trees infested, so it seems to me that in the northern part of the state one can expect to escape any serious injury from insects.

Q. Would it be advisable to get nursery stock from the northern part of the state rather than at home?

Prof. Taft—This year there has been 50,000 trees shipped from the

territory north of Grand Rapids. That would not be if only the three nurseries north of Grand Rapids were growing trees, and they have nearly all peach trees. For myself, I like to have trees grown near home because if they are injured or anything of the kind I don't hesitate to go to their home. It is largely a matter from the time of digging until the trees are put in. There is no chance of injury from fumigation. I might say right here that some prefer to dip their trees into an insecticide solution rather than to fumigate, but some times this is not as good as the other, but proper fumigation will kill the scale and will not injure the trees.

THE SITE AND SOIL FOR AN ORCHARD.

(O. K. WHITE, FIELD AGENT IN HORTICULTURE FOR M. A. C.)

The success and profitableness of an orchard depends so largely upon the site and soil that it behooves the prospective fruit grower to give these features careful consideration before he ventures into the business.

The site for an orchard should not be low or level, but should be more or less rolling and have an elevation somewhat higher than is common to the vicinity or section. Such a site supplies good air drainage. Cold air is heavier than warm air and always sinks to lower levels, hence low grounds are more subject to frosts and severe winter freezing. Such disastrous results as occurred at the time of the last February freeze of 1899 and the October freeze 1906, are still fresh in the minds of many Michigan fruit growers who had orchards on low, level lands. Many of the orchards, which had until these times been very successful, were practically destroyed. Even on higher lands, pockets must be avoided because cold air settles in them and cannot get out. It is not necessary that a site be extremely hilly or that the orchard be located upon high hill tops. In many cases it would be better to avoid hill tops on account of their exposure to winds and their tendency to severe soil washing. Abrupt hillsides should also be avoided because of the difficulties encountered in spraying, tillage and harvesting.

The slope and exposure of a site has some bearing upon its desirability for the planting of an orchard. Generally south slope has a lighter soil and warms earlier in the spring than a northern or eastern exposure. This induces earliness in blossoming and ripening of fruit, which is sometimes desirable. On the other hand, trees on a southern exposure are more subject to winter killing and sun scald. Generally, northern or eastern exposures are preferred by fruit growers because they usually have strong soils, are more retentive of moisture and are not so susceptible to winter injury or late spring frosts.

It must be understood that some fruits are hardier than others. The apricot is so tender that it seldom does well in Michigan. As long as winters are mild it may do fairly well, but it is almost certain to be killed by the first severe winter, even though planted on the most favorable location. The peach is nearly as tender, while the plum follows

very closely. Apples, pears and quinces are not as tender or as sensitive to extremes of cold as peaches and plums, hence it is not as imperative that they be given such careful consideration in the location of a site for an orchard. Their blossoming later in the spring is also another point in their favor.

The different fruits require different types of soil, but all do their best on a strong, deep, well drained soil. Trees cannot thrive upon soils that are depleted, shallow, or poor in texture, where an impervious hardpan is near the surface or where they have "wet feet." Examples of failures due to these conditions are not uncommon. Stunted trees or blank spaces in the low spots of an orchard usually indicate poor soil or poor air drainage or both.

Artificial drainage may sometimes be resorted to in order to make a location suitable for an orchard but ordinarily such a procedure is not satisfactory, especially in a commercial orchard. For a home orchard, which it is highly desirable to have near the house, artificial drainage is frequently used to take advantage of a desirable location.

A soil can be too dry for fruit trees. Such is the condition of some of Michigan's soil, which is so porous and devoid of humus that it cannot retain moisture. Trees on such soil invariably lack in vigor, productivity and hardiness. In the case of peaches. "Either extreme of moisture—excessive wetness or excessive dryness—gives favorable conditions for winter killing. The wet soil is conducive to sappiness in a tree and also freezes deeply. Severe cold, especially if alternating with warm weather, or accompanied with dry winds, causes evaporation of water from the trees, and if the soil be so dry as not to furnish moisture to replace the evaporated water, harmful results ensue."

The soil that is shallow, devoid of plant food, cannot be expected to produce an orchard and keep it in vigorous health and productivity. While plant food can be added to the soil it is a factor which the orchardists must not overlook or underestimate, because it is just as necessary that an orchard produce a good strong growth in the first few years of its existence as after it comes into bearing. Scores of orchards in Michigan, today, are unhealthy and unproductive simply because they were planted upon soils deficient in plant food.

Soils best adapted to apples may vary from a rich, sandy loam to a clay loam, while pears prefer a clay loam or a pure clay, provided it is of a good texture. Plums and cherries usually do best on a medium loam, and peaches on a soil ranging from a sandy nature to a medium clay loam. While it is conceded that the nature of a soil may be influenced greatly and its adaptability to different fruits made possible to a greater or less extent by the use of lime, manures and commercial fertilizers, yet it is important to emphasize the wisdom of selecting a soil best suited to the fruit that is expected to be raised or to plant only those fruits best suited to the soil one already has.

PRIVATE COLD STORAGE HOUSE FOR FRUIT.

Many feel the need of a cold storage on the farm for storing their fruit, especially apples, so that they can handle the fruit at their leisure and market it when the prices are right. This is especially desirable where the grower is located near by a large home market.

Mr. Charles W. Wilde of Kent county is only a few miles from the large city of Grand Rapids and he has erected such a storage house on his farm. A full page picture of this building is to be found in this report. The building is 44 by 102 feet outside measure. The apple storage rooms, four in number are 16 by 24 feet and 20 by 24 feet. An ice room 20 by 24 feet and 20 feet high, is located at the north end. There are no windows in the apple rooms and lanterns are used for light. At the south end is a sorting room 12 by 24 feet. Along side of the storage rooms are long rooms, each 10 by 102 feet which are used for temporary storage and, during the winter for storing spray rigs, wagons, etc. The apple storage rooms are connected by doors four feet wide for a truck which will carry 18 crates. The apple storage rooms have 18 feet studding, packed with shavings. The construction of this building is further described by Mr. Wilde as follows: —

I built the south three rooms of the storage about ten years ago, using 2x4 studding, 18 feet long, boarding up with 6-inch hemlock flooring and the best 2 ply P. B. building paper and packing the spaces with shavings, and then set up another set of studding using 60 spikes to fasten them to the wall, until I had four spaces packed and a wall about 2 feet thick, composed of eight layers of boards and twelve of paper and four spaces packed with shavings. The floor of the ice rooms overhead are covered with galvanized iron roofing with a slight pitch towards the center, where a trough catches the drippage. We use to put about 40 tons of ice overhead of each room in the winter without any packing around the ice, and it would last until the next winter; but such a large weight of ice overhead is hard on a building; so we later built an ice room at the north end 20x24 feet and 20 feet high, also built a road way for the truck through the ice rooms, so we now store the ice in that room and truck it overhead the apple rooms as we need it. In the rooms we built later we used 2x10 studding 18 feet long and packed with shavings and double boarded inside and out which answers very well where there is a common storage room all around the cold storage rooms, as far as we have in our building. The foundation walls of the cold storage rooms are made of cement and stone and built high enough so that the 2x12 joice will bring the floor which is 2 inch hemlock plank on a level with the platform of our low orchard wagon. Under the floor there is from one to two feet of cobble stone covered with gravel and cement to keep out the rats and mice and cut off the ground heat. There is about two foot air space between the cement floor and the plank floor. We lay the plank about one inch apart, so the air will circulate and the joists will not rot. The ice rooms are sealed overhead with 6 inch hemlock flooring and covered with building paper and galvanized iron and the sides are covered in

the same way. The spaces between the joists overhead are packed with shavings and floor laid and two to three feet of shavings are placed on the attic floor and this attic is ventilated with windows at ends and seven ventilators 4x4 feet and 6 feet high. It has never frozen in the apple rooms in winter and when there is ice overhead the temperature in the rooms in warm weather is about 40° which will keep apples until spring if they are in good condition when put in. We store all our apples in crates and our rooms will hold about five thousand crates. There are no windows in the apple rooms and we use lanterns for light. We use a truck that will carry 18 crates. For size and arrangement of rooms see diagram. This building cost us about $6,000.00. It has given good results; but on account of using such a large amount of lumber it has cost too much. Where gravel is handy I believe cement blocks or hollow cement walls might be cheaper.

Yours truly,

CHAS. W. WILDE.

GROWING OF CANTALOUPES.

(PAUL ROSE, SOUTH FRANKFORT.)

Mr. President,—Ladies and Gentlemen: I believe this subject is of great interest to the people of Benton Harbor because it is something that can re-enforce and support a man who is trying to start something new as a side line. I may go farther and say that I think it is the very best thing that one can engage in in a section where the cantaloupe will grow and flourish and right here I want to say also that I can see no reason why cantaloupes should not be raised around Benton Harbor as well as anywhere else and so I hope to hear of a large number of farmers in this section who will take this up and make a success of it. Of course there are a good many things to learn as there is of any new thing but by your own experience and that of those who have made a success of the work you can succeed all right.

I have had some experience in raising cantaloupes; indeed it has been a part of my life work in a large and small way and in acreages varying from a few acres to a large tract and also in different parts of the United States. California, Texas, Arizona, Tennessee and other states and as my experience has been varied I am glad to pass it on to those who are interested.

I have never raised cantaloupes from field planting. I first start them under glass. I began in this work along back in 1870 and have enlarged and improved and added new features until now it seems to me that the limit has been reached in regard to the methods, etc., of growing this product.

All you want to know is how you can grow cantaloupes so as to make a success. The first consideration is the soil. You want a level, warm dry soil, very loose and rich, a good productive land. There are hard clay lands that will grow good cantaloupes but it is not advisable to

use it here. In Tennessee, it is used on which to grow cantaloupes and I have seen them there of a most excellent quality.

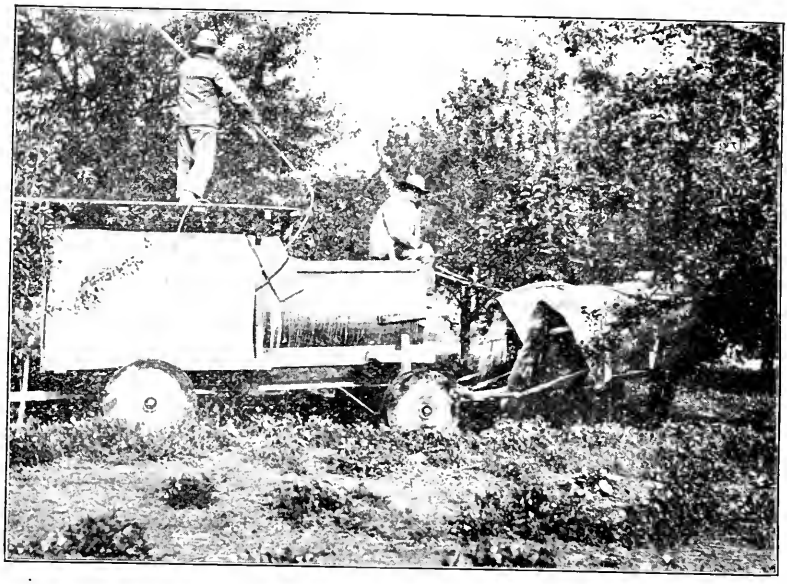
I am very particular in the selection of my compost for the seed bed. All my plants are grown in five inch square boxes. We tried larger boxes but have gone back to the small ones.

We get our stable manure wherever we can, free from sawdust. It don't make any difference how green it is if you can compost it. It is thoroughly handled over, all sticks and cobs are thrown out. When we fill the boxes we take this stable manure or rotted compost, and run it over sieves. We have large sieves 12 ft. long and 2½ ft. wide. These are put on saw horses and the meshes are from one inch to one and one-half inches, made of telephone wire. You may ask, why do you go to all that trouble. The reason for it is that we want every plant to look like every other plant and you cannot get them all alike unless your compost is all alike.

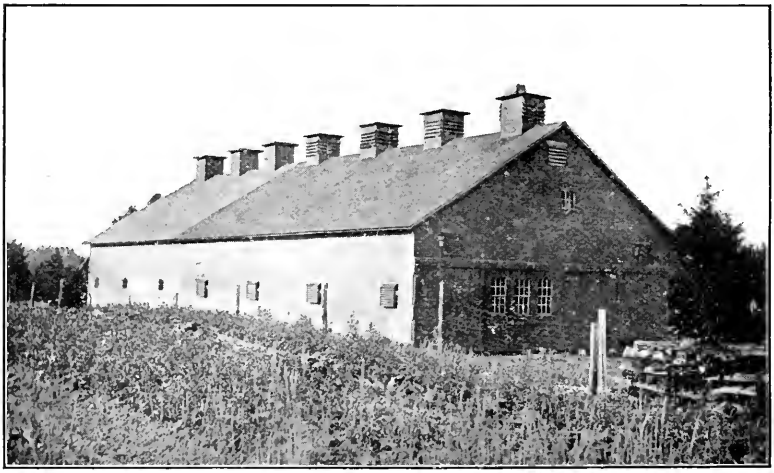
These boxes can be filled weeks before the time needed to plant them. If weeds come up so much the better. Make a little depression in the box, say two and one-half or three inches around and cover that over with sand—not sand really— but wood soil, which should also be run through the sieve. Cover that over and then plant the seeds in the center not over ¾ of an inch deep. You can plant a dozen seeds if you want to but if your seed is good, two or three will be sufficient. There are times when we want a better plant than another and by having several you can plant a good selection. Sometimes, we put in two layers of compost and a light layer of well rotted chicken manure. This has lots of nitrogen in it and there is a liability that your plants will be burned so look out for it. The temperature may be 100 to 135 degrees during the time until the plant comes up. After they are up then we hoe them over with crooked knives and cut out all the plants but one. You may think this is a dangerous practice and you may lose some hills but what is all this for. It is that you may supply the best trade of the best people and while you may leave two plants and get a fairly good melon if you will grow but one plant you will get a better melon, and in that way one plant will produce you just as much as two plants and of a much better quality.

In transplanting the land is first laid out. I use stable manure quite largely and think that it is the best for raising cantaloupes. We open up rows both ways and throw the manure so that it nearly touches one way. Then cover it over with a plow that throws a furrow both ways. That leaves a ridge and you can tell just where your center is to set your plants. We open it with horse and an 8 in. lister, though where there are only a few, this work can be done with a hoe. We cut the corners of the boxes and set the plant in its place without disturbing it. These plants are four to five weeks old and sometimes six weeks old before put in. Each plant coming into the field should have a runner six inches long before setting.

We spray these plants in the hot beds with Bordeaux mixture, common solution. We do that for two reasons, to head off the fungus that gets on the plant oftentimes, ruining the quality of the cantaloupe; and for another reason it has a tendency to check the aphis. Then again, we spray just as soon as the plants are set out and begin growing. I want to impress upon you the necessity of spraying to kill the fungus.



One of the power spraying outfits on the Chas. W. Wilde fruit farm, northwest of Grand Rapids, working in the pear orchard.



Fruit storage house on the farm of Chas. W. Wilde, northwest of Grand Rapids.

Four-year-old Peach Orchard of H. M. & F. H. Hemstreet, Bellaire, Antrim County.

Oceana County Fruit Exhibit at Michigan State Fair, Detroit, 1910.

Paul Rose Picking Cherries.

South Frankfort, Benzie County, is becoming famous as a cherry producing region. Probably no person has done more towards securing a favorable reputation for the region than Paul Rose whose two hundred acre farm is on the high ground a few miles back from the village.

This is why many of you get so poor prices for your melons while others get so much better price. The spraying of plants and trees for fungus is based upon the principle that it is a good thing to get there before the fungus does. You will not have any fungus or any aphis if the copper solution is put on. That is one reason why I have been so successful while others have met with failure—I have always been a persistent sprayer.

I have a spraying outfit which is a sort of self acting affair so arranged that we can spray three rows at once. We straddle the rows and are able to spray as much as twenty acres a day. It is a paying proposition to get a good outfit especially if you are in the business for profit: My outfit cost me $120.00.

I spray my cantaloupes from three to five times and I consider the most important spraying of all to be the last one just before we are ready to pick ripe melons. Cantaloupes begin to depreciate in quality very rapidly after they come to maturity because in many cases the fungus begins to work but this spraying keeps off that fungus and they do all right.

I use commercial fertilizers when I cannot get stable manure. The way I do, I have a party who gathers this up for me in the city whenever he gets a carload of it he ships it in to me and it costs me $40 per carload there. I consider this the best money I invest as it yields very profitable returns. With it I am able to keep my soil in good shape all the time and we are enabled to grow a high grade of cantaloupe which bring the very top prices in the market. For seventeen years, I have been conducting my work along this line and every year has been a better year for me and last season I grew more cantaloupes and better ones, to the acre, than ever before but I want to say quite emphatically that they were sprayed.

You must put something back into the soil if you expect to get returns from it so as soon as my cantaloupes are picked we seed to rye. Rye I consider is the best thing to plow under, barley and wheat are very good, but wheat winter kills and I prefer rye as it will stand the winds and when it gets about eight or twelve inches high I can roll it under. If you fertilize these lands you will be surprised at the returns which they will give you back.

Now as to varieties; as you know I have been experimenting and have given several new varieties to the public that are regarded as good. In Indiana my work was along this line. I consider the best early melon next to the Netted Gem variety to be what is called the Rose Gem. This I can heartily recommend to you as one of the very best early melons.

We have two types of Netted Gems—one I claim to be the originator of. I found it first down in the hills of Tennessee and have developed it until they are now a very beautiful looking melon, and while it is a little late perhaps a week later than the other, it is a week better. It is a little thin meated and the hollow is a trifle too large. This has not been bred out but it stands up and I think it is the best Netted Gem melon for long distance shipping such as New York and Buffalo. There is another Netted Gem type which is rust proof. They have started a variety down at the Indiana experiment station although they did not originate it. That melon will stand up against rust better than any

variety I have ever seen, but the difficulty is that it grows too large and in order to ship it you would have to use Jumbo crates.

And that brings me to the matter of packages. Whenever you have a good fruit, a large share of the looks of it is detracted when it is put up in poor packages. So the question of packages is one of importance. When you have nice melons, you are certainly out of date with a bunty crate. Get the Rockyford crate. That has three slats, 2 in. wide and ¼ of an inch thick. Do not get it so thick that it will not bulge and thus save your melons from getting bruised in transit. The crates should be stripped when making shipment, i. e., put slats in between the tiers. I advise my friends at Benton Harbor that if you want something nice take up this melon business and produce some first class fruit and get it on to a good market and you will find it a very pleasant and profitable employment. Just now the trade is going to the red flesh colored melon in cantaloupes and I would advise you to get in line. There are several varieties of these. I have given to the public three of them myself. The Osage Gem, Ordway, and Petoskey are all right. The latter bears my name but I did not give it the name myself—Vaughn did it. However, it does not stand up so well as some others and is not so good for long distance shipments although it is all right for short hauls. Cincinnati is a splendid market for melons. They are bare of stuff when you want to ship your melons. Do not dump everything on Chicago.

I like the Hoodoo melon because it is good. I brought that out. I find that this is the best variety for us up in the north land. I was amused last summer to see on the markets this melon under the new name of Hearts of Gold. That is a better name than Hoodoo but I want to tell you that it almost hoodooed itself before it was gotten where it amounted to anything. I lost nearly all of the seed and I thought for a time that it would not amount to anything.

I don't know but what I have given you enough pointers on raising cantaloupes and don't think that I had better say anymore and so if there are any questions that you would like to ask I will be pleased to answer them to the best of my ability.

DISCUSSION.

A Member—I would like to know what size you make your crates.

Mr. Rose—11x12 and 11x12x24.

Q. The last melon you mentioned—tell us a little more about it.

Mr. Rose—I suppose you refer to the Hoodoo. Well that is rust proof in name as well as nature. We have no name for the melon as yet and don't know whether we will change it or not. As I said it is a good melon for northern growth as it is hardy and very productive.

Q. Do you raise rye in the place of vetch in your melons? We sow vetch and think very well of it.

Mr. Rose—I tried vetch. It would not get in until after the melon crop was off and I could not get sufficient growth of it to plow under so that the plant could take hold of it. What ever you put into the soil, you want it to be in such a shape that the plant can get hold of it and it must be in a soluble form. If the vetch grows at all it is so woody that the crop will not get it. As I said, we tried these vetches but found it was not any good for us.

Q. Where can the seed of the Rose Gem be secured?

Mr. Rose—I don't know. I have some but I am not in the seed business. I could furnish a limited amount of seed. I sold it on my cantaloupe deal and left the gentlemen with some of these varieties on hand. Perhaps you can get some of it from the experiment station in Indiana. There is a man by the name of Richard Ready at Decker, Ind., from whom I think seed can be had. We worked together and he has quite a quantity of it I think.

Q. Did you ever have any trouble with plants damping off in the hot bed?

Mr. Rose—That is all caused by growing your plants too wet—having too much dampness and not giving your flat frames enough ventilation. Another thing, if the fungus gets in that will do some damage but we spray with Bordeaux Mixture which relieves the situation from that standpoint.

Q. What strength of Bordeaux do you use?

Mr. Rose—The standard 4-6-40.

Q. Have you ever transplanted melons from seed beds into boxes?

Mr. Rose—We do that. You need not have one vacant box in one of your beds. I have my fellows scatter out some seed and cover them up and they come up and when we find a vacant box we set them out and puddle them in and they will grow.

Q. Do you find that plants thus transplanted once are stronger or weaker than the plant that grows in a box?

Mr. Rose—We have transplanted whole beds and we could see no difference in the end.

Q. Do you think it improves the melon to plant different varieties?

Mr. Rose—We don't want to mix varieties. I have never allowed different varieties to grow together. A cantaloupe has to be fertilized and you will fail to get this fertilization unless the insect works. I keep bees. I don't work them for honey. I like to have them around my cantaloupe field.

Q. How do you handle the striped beetle?

Mr. Rose—We kill him whenever we can. They are a peculiar bug. We see no signs of them today and tomorrow we are full of them. We had 130 acres—70 acres in one block—south of us was a lot of growers. The bugs got in on them. Their fields were fairly alive with them. I stopped every man working and sent to the drug store and got every bit of sulphur that he had. I got all the turpentine and carbolic acid that could be had and this mixture was put on a large quantity of dust that we collected. Then we got shakers and went over the fields and shook this stuff over the vines. There was air slacked lime on hand and we found that when we used this in connection with the other that the bugs would not stay on the vines. You cannot drive them against the wind, but this prompt action on our part had the effect of driving them away and we had no further trouble while the parties who had the bugs south of us had to plant all their seed over.

Q. I have heard that moth balls would drive them out.

Mr. Rose—I do not think they will.

Q. We are troubled with the vines dying off when they get about one-third grown; when the little melons are about as big as hen's eggs. We thought it was due to the ravages of the squash bug.

Mr. Rose—If you have no melon bugs, you will have no melon wilt. Your melons will appear all right at night but in the morning they are

wilted down. I planted thirty acres of cantaloupes once and up to that time had never had any blighting and then these bugs came on and where they came from I did not know. They stayed with us. I lost nearly all of these melons. It is the poison of the larvae of the striped beetle that kills these vines and it is done by depositing it in and around the vine stems. This is what causes the wilting. Then I believe that the borers and late fungus get into the sap and they account for some of the trouble.

Q. Have you tried poisoning the bugs?

Mr. Rose—Yes, but it is not a success, although once my brother saved his by Paris Green and water, I think that lime water would have been as good. It is however pretty hard to do and you are quite apt to burn the vines.

Q. Have you used arsenate of lead?

Mr. Rose—No sir.

Q. Have you ever tried bug death?

Mr. Rose—Yes in Tennessee, but it is like anything else, they will leave it. You never kill any bugs with it. We used a powder in Tennessee to head off the lice. The only sure way to head off the melon aphis is to watch your fields and head them off by Bordeaux spraying. Then every man in your neighborhood ought to do the same thing. The aphis must start somewhere and if they don't have a chance to start in your neighborhood why you will not be bothered with them. One of the bumps that Rose got once was the loss of 113 acres with only $500 yield.

Q. Have you ever had any trouble with cut worms?

Mr. Rose—We grow plants so large and so strong that the stalk is so thrifty that the worms do not seem to bother it much.

Q. Have you ever tried bran?

Mr. Rose—No sir I have never tried it but some of my neighbors have.

Q. Have you ever tried Lime sulphur?

A member—I don't lose one plant in a thousand with yellow bugs, and I think the caution or suggestion rather, made that you grow strong plants will be an effectual remedy for cut worms and many other such pests.

Q. I would like to ask the gentleman if he uses the bran with poison and what success has he had with it.

A. Yes we have used it and found it fairly successful.

Q. What proportion do you use?

A. I use about a half a dollar's worth of sugar. Melt it up until it is a perfect liquid then put it on the stove and perhaps add more water and stir it up until I have a real syrup of sweet water. Then take a bushel of the bran and half a pound of Paris Green and go over my plants with this mixture about three o'clock in the afternoon. I take perhaps one-third of the bran in the entire bushel basket and pour enough of that syrup over it until it is damp—until the bran is a little wet. Then I work that with my hands right up until it is mixed all through the bran. Then take the Paris Green and sprinkle it over until it is of a light green color. A good job should be done. Take this and drop next to the hill and I have been very successful.

A voice—Will you please repeat that formula.

Answer—One-half pound of Paris Green to a bushel of bran and one-half dollar's worth of cheap brown sugar.

Mr. Smythe—Mr. Dustin told me that he did that once and it proved to be a very good treatment.

Mr. Dustin—I have always made a practice of broadcasting and in the place of sugar I use molasses—about the same amount and proportion just as the other gentleman mentioned, just so as to have it a light green.

A member—I plowed 200 lbs. of salt in to the acre and I did not have any trouble with the cut worms.

Mr. Smythe—I heard some time ago that in England they use a calcium chemical which they put into the soil as a fine powder either by plowing and some other way and when it became damp it generated a gas that killed them in a short time, and the gas did no injury to the soil. I don't know whether it is worth repeating but I give it as I have heard it. The cut worm is becoming a troublesome pest in this community and especially on the lighter soils.

Q. What kind of hot beds would you advise—the old fashioned or the roof shaped?

Mr. Rose—It is owing to what you want to use this for. I have always used the other kind. My brother uses the greenhouse system. Personally I think we can handle them the other way a little better. That of course is something for every one to work out for himself. You must have a good bed and have it tight and in good shape.

Q. I would like to have Mr. Rose give his method of destroying the aphis.

Mr. Rose—I think I covered that ground. So far as we can we dig them up and destroy them. These little aphis will work on the roots. There is a difference in the aphis. You cannot pull up the plant without leaving some aphis but there are hundreds of ants that will do their part in destroying them.

Q. Did you ever use any of the poison called ophine?

A. No sir. I may say further that I have been so successful in heading off the aphis and by destroying the few hills and by always being on guard that I do not consider the aphis any more as a special trouble.

Q. Have you any definite rule for watering plants?

Mr. Rose—I said not to have them too wet. Melon vines are more often over watered than otherwise.

Q. Is there any difference in the time of day when you do this?

Mr. Rose—We have to water whenever they need it, and I don't think it makes any difference what time of day it is done. If we find that the plants are dry at noon why we put water on them.

Q. Would you use perfectly cold water?

Mr. Rose—We use water right out of the reservoir.

Q. Would you sprinkle the plant?

Mr. Rose—Yes, a common nozzle can be used, good large size. Punch it full of holes so as to get a long spray.

Q. Have you ever tried cutting the vines?

Mr. Rose—Yes, but it don't pay. You must have a vine if you want the fruit and you must have a vine sufficiently long to bear that fruit, and if you get these vines too short you will find that it will not pay.

Q. What do you consider a good average crop per acre?

Mr. Rose—That depends as to where you are growing your melons. In Michigan you should get 500 or 600 baskets to the acre. We have gone away above that.

Q. Do you water your hot beds right after seeding?

Mr. Rose—Yes sir.

Q. Do you use the double glass hot beds?

Mr. Rose—No sir. They get too hot with a double glass and we do not think they need it. It is all right but unnecessary and too expensive.

Q. Do you use the bottomless boxes?

Mr. Rose—No sir.

Q. Have you any trouble with the drouth after the vines have covered the ground?

Mr. Rose—I had rather see the vines wilt down than to have the rain come.

Q. How far apart would you have them?

Mr. Rose—From five to eight feet gives the best success.

CHERRIES AND PEACHES FOR PROFIT.

(PAUL ROSE, SOUTH FRANKFORT.)

Ladies and gentlemen: It looks to me to be a little superfluous to be called upon to address this intelligent audience upon this subject, and it seems to me that there has been as much said upon the subject as is necessary; but as you have asked me to give a little talk on the subject I will do the best I can.

In talking with some of my friends as to what course they wished me to pursue, they said, "Just tell us what you have done and how you have managed to make the success that we know you have had."

I dislike to refer to myself in a personal way but I will almost be obliged to do so in order to bring out the points that I wish to emphasize. I want to speak a moment upon two topics before beginning —I would like to say a word about the russeting of apples when sprayed by Bordeaux mixture. If you have ever noticed you will see that the russeting takes place when the days are warm. It is at such a time that the skin of the apple is very susceptible to the corrosive nature of this spray. The other point I wish to speak of is the killing of the scale with lime sulphur and to do this I believe in fall spraying for the reason that you will kill the most of this scale at that time and those that overlap will get an extra dose in the spring and in this way the pest will be gotten rid of. I have been quite successful in operating in this manner and just throw out this hint by way of suggestion.

It is true that I have been quite successful in my line of work and I am glad to give any points or suggestions that will be helpful to my friends. I chose that northern country in preference to the Benton Harbor section because they have been very successful in that end of the state. I bought a piece of land, high, rolling, hard maple and beech land and I would like to take you over it to let you see what it looks like. It is a beauty. I find the location is ideal and it seems peculiarly adapted to the growing of cherries.

I shall doubtless speak a little at random in this talk but I will try

to give you the thoughts as they come to me. As to varieties, the best early black cherry I think is the Purple Guine. It ripens about the 15th of June—about the first of June with you. There are trees on my father's place of this variety that were planted in 1868 and also trees of the early Richmond that are fully as old that are still bearing crops. So you see this country is adapted to cherry growing.

I plant these trees about 30 feet apart each way. Some of you may say that this is too far apart but I would like to know what you are growing cherries for—just for the fun of it? Certainly not. You are growing cherries—if you are growing them at all, for profit and I want, to say that it will pay you to get the very best trees and take proper care of them so that when they come into bearing you can get the reputation of having the best fruit, and this means the best price.

After your trees are set out they must be fed. There are hundreds of acres of fruit land that are farmed to death before ever the owner has put on it a bit of fertilizers. You can't grow crops continually and not put something back into the soil. In Michigan you must fertilize and the better and more intelligently you do this, the better the returns will be. I would like to know what is the use of raising 25 cent potatoes at the expense of $3.00 peaches. I would advise every young man to plant an orchard. You want an orchard so that you have something on which to depend in later years.

I have planted the early Purple Guine. It is a quick growing tree yields quite abundantly and is a good, early cherry. For a sweet cherry I like the Rockport. One tree of this is standing on my father's farm that was planted more than forty years ago and it is still a healthy tree and for all I know it will be bearing for 100 years. This cherry, while very early, and a good one is liable to crack in rainy weather and I am not planting any more of them. The next cherry that comes in line is the Black Tartarian. It is soft and the skin is a little tender, and has to be packed pretty carefully, in order to reach distant markets in good shape. Then we have the Royal Ann and the Napoleon. They are a yellow cherry. We have others in our orchard which I would not advise planting, among them being the Governor Wood. We have the Yellow Spanish, but while this has some good qualities, it is apt to rot and cracks badly, having a hard skin. The best black cherry is the Schmidt's Biggareau. This is a late cherry and the largest I have ever grown. We came within one-sixteenth of an inch of having the highest record report at Washington.

We pack our cherries in 10 lb. California boxes and employ girls for this purpose. These girls many of them have been with us right along for years and they know just how to do the work. We use from fifty to seventy-five and sometimes as high as eighty in the packing house packing these cherries and we have been complimented upon our fine packing. We can pack these cherries just as well as the western people, if we only take pains. A man said to me not long ago, concerning some fine California cherries, "Mr. Rose, do you know that these cherries are all packed by Chinamen?" Well I would like to see any of those almond eyed pig-tailed fellows pack cherries any better than our girls can. These girls will pack a box in 20 minutes. We pay them by the day and then require them to do first class conscientious work. We have found that they do much better work when working by the day rather than by the piece.

Cherries must be packed right. Mrs. Rose has charge of our packing and she sees that things are on the square everywhere and right here I would like to remark that the most successful horticulturists are those who have good wives. (Applause.) Mrs. Rose won't let me do anything in connection with the packing because I would talk with the girls and so if anything goes wrong she gets the blame for it but I want to tell you that there isn't much goes wrong. That is her business, and we are right out among the pickers and the packers and see that everything is done as it should be. In our picking, we take little girls and boys and put them with some older gentlemen who keep them together and instructs them just how to pick the cherries and in this way we are able to get very satisfactory results.

There are some that cannot tell a good cherry from a bad nor a small one from a big one, but after our pickers have been under the direction of experienced people for a time, we can see who it is that does good work and if we find careless and inattentive ones, we let them go.

These cherries are picked in baskets, with a metal strip around the bottom which keeps them from coming apart. When the cherries are brought into the packing house they are emptied on the table before these girls who are sitting on benches. We try to make it as comfortable for our girls as we can. The boxes are 9½ in. wide by 20 in. long. The stems are all packed up until you get to the bottom. Then press them down carefully and nail the cover on.

The western people use tight boxes, we are discarding the western tight box and are using the ventilated boxes. It admits the air and the cherries are shown off to better advantage. Our cherries layer about ten side by side, and six quarts in a box. Our cherries were at St. Louis and Buffalo in competition against the western fellows and we won out with our Schmidt's Biggareau.

We put our yellow cherries in boxes but not many of them, as they are not a fancy fruit.

We are very particular about this packing. After rains the cherries are apt to get little water cracks in them. You might not notice them at all unless you looked carefully, these should not go into the boxes at all. You may say that it is a very small crack and will do no damage but what you say and what will happen are two different things. Don't put those cherries in. You will fare better in the end. Of course all this care makes slow work, and we pay the same price for this that we do if they work faster. We have orders for checked cherries and can sell them at a good price. Two or three checked cherries in a box may not be noticed but it will amount to more than you think for, when it comes to your reputation as a first class fruit dealer. More than once I have taken a whole box of cherries and put them in the dump because I knew it was unsafe to send them out on account of the mold that will form on a cracked cherry.

Some years ago I had a great deal of trouble in getting cherries to any market in good order but after I took to packing them in ventilated boxes and thoroughly spraying the orchard I did not have so much difficulty. I have sprayed the brown rot out of my cherries. I use the Bordeau mixture to do it with but you must get at it early in the spring.

Chicago takes the most of our best cherries and here we outsold California side by side 25 cents on a box. A great many of our cherries

go to Pittsburg. Detroit is our best market for sour cherries. Cincinnati is a good market.

For sour cherries we grow the Montmorency. It is the best sour cherry we have ever gotten hold of. We are growing two later varieties the Bing and the Lambert. These come in after all the other sweet cherries are gone.

You cannot raise good cherries unless you give the trees plenty of room. Why do you plant so close and then have to prune and prune and prune? That will hold true on every thing in the fruit line.

We grow the early Richmond but that is pretty soft and is without sufficient color to meet the demands of many. However it is a good bearer and there are many people who will have no other cherry. You must give life and vitality to the trees, if you want them to grow and develop as they should. We like the red May Duke. It is a sub-acid cherry, a good bearer and the fruit is of an excellent quality. We grow the Louis Phillips which is one of the best cherries but is a shy bearer. It must be ten or twelve years old before it bears. Then there is the English Morello cherry. It is sour, dark and takes well on the markets and brings good prices.

I advise keeping the fruit off the trees until it has size and strength enough to bear.

Just a word about protection from fungus. You should spray these cherries after the little cherry is about the size of a green pea or about half grown and by spraying at this time, you catch the little spores just before the fungus starts; for this purpose we use Bordeaux.

We have gotten rid of the curculio. We went around under the trees and picked up the worthless fruit and put them on the hard gravel road where they are tramped upon and the worms are crushed. We have no more worms in our orchard.

It has been advocated that we should plow in our orchards. You can do no plowing in my orchard. I believe in clean cultivation. We begin with a spring tooth harrow and the ground works up nicely. Follow this with commercial fertilizers. We use 1,000 pounds of high grade fertilizers to the acre the first time over. We work that land until the middle of the summer, then we go in with gang harrows—one man and three horse team will cover 30 acres a day. They go over the ground one way and the next week they go back over it the other way. That keeps a fine dust mulch. We have clean culture. Then in the summer about the middle of July we sow a cover crop and for this we use the Canada field pea. We also use oats; we do not sow rye. The root system of bearing fruit trees is right at the top of the ground so I do not think a plow should ever go into an orchard.

We usually get $1.75 a crate for our sour cherries—sometimes 75 cents more than the general market. You see there is a profit right there. Our sweet cherries, we calculate $1.00 for a 10 pound box of cherries. One season we got $2.00 a box for 10 pound boxes. During the last year my wife kept track of how many Montmorency cherries were picked from one tree, (one of the largest) and we found that they had picked 550 pounds, these were contracted at 4 cents a pound. Our orchard is planted 50 trees to the acre. We have sweet cherry trees from which we pick 50 boxes. These cherries are the Schmidt's Biggareau.

This has been a somewhat rambling talk on the subject of cherries but

I hope that some suggestions have been offered that will be of help to those who are interested.

Now in regard to peaches. I think I have made a greater success of my peaches than of anything else and it is because I have tried to deal with them in the same intelligent way that I have with other things I have raised.

First, I want to say that we have no scale neither have we the yellows and we have never had any, and more we hope we never will.

As to varieties, we have practically all of the standard varieties, you have, but I am partial to the Elbertas because it is the product of the Elberta orchards that the public wants.

I planted my trees from eighteen to twenty feet apart, and the result we had to climb up to the moon in order to harvest them. We spray the peaches for the curl leaf in the spring and we handle the peaches much the same as we do cherries. We fertilize a little later. I just said that I planted my peaches first eighteen or twenty feet apart, but now I put them at least 25 feet apart and they would be better 30 feet apart. I do this so that they can take up food from the soil. It is better to let nature furnish it than to buy it from the commercial factories. It is cheaper and better. You can never grow good fruit without plenty of sunshine. You cannot spray the peach as you do the apple. If you do there is liability to be a ruination of your trees. Keep your peaches from among your apples. My observation and our experience teach us that it is better for both fruits. In caring for our orchard, which is located on a rolling tract of land, it often happens that on the little knolls the wind blowing over them will remove the dirt from around the roots of the trees and the trees will be liable to freeze out during the winter. To guard against this, we haul in a good deal of stable manure, and place around the trees for two or three feet and they are thus protected.

The trees of this particular orchard are very low down and nearly all of the fruit can be picked from the ground. We cut them back every spring and do most of our thinning with the pruning shears. In fertilizing we use 1,000 pounds of 4-8-5 goods; i. e. 4% nitrogen, 8% phosphoric acid and 5% potash. We really do not need the nitrogen as we have too much nitrogen in that soil already.

In packing, we tried the Colorado methods of putting our peaches in 20 pound boxes and wrapping them but we found that it did not pay and we have quit using that method. We now pack our peaches in carriers which hold ⅔ of a bushel and we got at an average of $2.00 per carrier this year, which means $3.00 a bushel for peaches in Chicago. In Pittsburg, however, we fell down for there they brought only $1.15 net, per carrier.

We have Crawfords, and this year we had a large crop, but we find they do not meet the demand as well as some others. The Gold Mine is an excellent peach. They are nearly as large as Elbertas and grow evenly and are well liked by the trade. The New Prolific of the Greening Bros. & Co. is a good peach although it has a very tender skin and grows all sizes and a still worse feature is that it is all the season in ripening. I like a peach that ripens evenly. Two or three pickings is enough to go over an orchard.

I believe in plenty of fertilization for the peach orchard. I buy stable manure all I can get and I use it especially in exposed places and on

thin land where it needs building up. We should take care of our land and build it up and when this is done the fertility will be given out to the fruit trees and you will be amply repaid for your effort and expense. I think perhaps this is enough on this subject and now I will be glad to answer any questions that I can.

DISCUSSION.

A member—I would like to know if Mr. Rose has any trouble in his orchard with trees dying out by rot either cherry or peach?

Mr. Rose—Yes we lose some cherries from this cause. You can't tell by looking at them just what it is that causes it and an examination does not reveal anything wrong, yet they die. When the tree dies we just put in another one. We have never lost any peach trees from this cause.

Q. Do you have any disease among your peach trees?

Mr. Rose—I don't believe there is a diseased tree in the county and there are peach trees there that have borne continuously for 31 years.

A member—My idea in saying anything at all about this matter was prompted by the fact that we have in Van Buren Co. a lot of trouble along these lines and I wondered if it was elsewhere as well as with us.

Mr. Rose—We have no trouble of this kind with us.

A member—A few miles from you whole orchards rotted out. How do you account for it?

Mr. Rose—My brother-in-law had a few King apples that are rotting at the base, which is a characteristic of the King.

A member—It seems to be all prosperity up there with you and no adversity whatever.

Mr. Rose—Yes sir.

A member—How about the borers?

Mr. Rose—When we first went up in that country, there were some orchards that were troubled with borers. We have had no trouble with the peach borer, but we never let the trees get infected with them.

Q. When do you hunt the borers?

Mr. Rose—In the fall and spring. We mound up our peach trees for eighteen inches or two feet and this dirt keeps the moth from getting into the trees. You know they lay their eggs in the soft wood around the roots and these mounds prevent them from getting in there.

A member. I have understood that once in a while you will find a borer in the trunk of a tree if he cannot get to lay his egg at the root.

Mr. Rose—Yes that could be so but it is not usual.

A member—A man is planting 320 acres of an orchard. He was advised to plant these 18x60 feet and he planted them. I would like to ask what age of trees you would plant.

Mr. Rose—Do not plant one year old trees if you can get two year old. Buy your sweet cherry trees in the fall and heal them in.

The member—This man put his trees in in the spring and they were one year old.

Mr. Rose—That orchard will never amount to anything. Take up those one year old trees and set them on other ground.

Q. What do you think of the Windsor cherry?

Mr. Rose—The trouble with the Windsor is that it is an over-bearer and is liable to crack in the summer time. It has a hard firm skin. It

is liable to check worse than almost any other variety and it grows rather too small for 10 pound boxes.

Q. Are you troubled with aphis on cherry trees?

Mr. Rose—No sir not to any extent. It is a matter that can be handled very easily without any spraying.

Q. How do you do it?

Mr. Rose—Every time you find an aphis you will see that it starts right at the base of a large limb in new growth in the spring. If you will go in there early and watch for it, you can break that twig off and in this way you can head it off.

Q. What do you do with your crops when you don't plow?

Mr. Rose—We don't plant anything but what rots in the winter. It holds the leaves where they are in the winter. The secret of plant food is bacteria in the soil and anything that will produce that bacteria, even though it is not of the best in the world, it will give plant food with the mineral elements necessary to supply the want of the tree.

Q. Do you clip your cherries?

Mr. Rose—No sir. Because you are liable to injure them. Every little while that sharp point will puncture the cherries and the public don't want punctured cherries.

Q. Do you advise, on a soil of average fertility, 4-8-5—will this be sufficient?

Mr. Rose—Understand me, this formula is what I have used myself. I use a lot of bone meal and so the nitrogen is equalized. When the peaches are about the size of butternuts we put 1,000 pounds of this which costs $30 a ton on the land and I get results from that last application of commercial fertilizer than from any other. The fruit was so large this year that we could hardly nail the covers down on the carriers. Word came from Chicago that they wanted five car loads a day of them. This shows that we can sell these Elbertas and as long as the trade wants them I am going to furnish them. I have never received a wire or a letter from any source asking me for any other variety of peaches than Elbertas. I never hear from them again when I tell them that I cannot furnish Elbertas.

Q. Mr. Hale; tell us what success you have had in fertilizing your peach orchard.

Mr. Hale—Several years ago, Prof. Waite with several other gentlemen, fruit growers, from Hart and Shelby visited my orchard looking for disease. Prof. Waite was advocating fertilizing with some of the commercial fertilizers and said that the effect was such that it could be detected in the growth of the tree. His theory was not believed by some and it was not thought that an orchard using commercial fertilizers and one on which the commercial fertilizers were not used, furnished sufficient difference so that it could be detected. One of the gentlemen, thinking that he knew my business, as we had often exchanged views, told Mr. Waite that I did not use any of the commercial fertilizers on that orchard. When Prof. Waite made an examination he contended that I did. He looked at the foliage and then said, "You can't fool me. I know that commercial fertilizers have been used on this orchard. Then they ran across my foreman and asked him if that orchard was fertilized. The foreman replied "Yes," whereupon the other gentleman asked "What did he use?" but the foreman not being

sure of the matter said, "You can easily find out if you go to the barn and inquire. Prof. Waite was so positive about the matter that he said, "I can nearly tell just what ingredients and what per cent of phosphoric acid, etc., was used on this orchard and then he made a memorandum of the percentage. When they got to the barn and examined it was found that it was ground bone meal. Then Prof. Waite asked, "Where is your potash?" It could not be found. "Then he uses ashes." They then came down to the packing house and told me the story thinking that there was a laugh on somebody. I said nothing and then the question was put to me, "Honestly, what did you use on that land." I said, "Let me see your guess first. What do you say about this?" He showed me his figures and then I stepped into my office and took down the card and brand that I used and it was found that the Professor had "guessed" it within three per cent. Then he said, "Don't tell me that I cannot pick out a fertilized orchard." Mr. Sessions, who was one of the gentlemen has an orchard at Shelby and he commenced from that date fertilizing and it has been a success. I relate this incident to show you that a commercially fertilized orchard, if properly done will certainly yield results commensurate with the expense.

Q. What about the two varieties of Elbertas? I remembered something being said about this last year?

Mr. Rose—That is a point of great help to you people here. Mr. Morrill advised planting early Elbertas.

Q. Do you prune in the summer or when?

Mr. Rose—We prune in the winter some, but in the spring mostly. We have also pruned in the fall and I cannot see any particular difference. We prune every year thoroughly.

SPRAY AND PRACTICE OUTLINE FOR FRUIT GROWERS FOR 1911.

BY PROFS. H. J. EUSTACE AND R. H. PETTIT.

FOREWORD.

All fruit trees, bushes and vines are attacked by many insects and diseases that may destroy the crop entirely or very seriously lessen its value. *Fruit buyers and dealers do not care to buy or handle fruit from orchards that have not been well sprayed.*

Proper, thorough and systematic spraying will protect the tree or bush and may cause the difference between success and failure in the production of a profitable crop.

This outline aims to give methods of control for the more common insects and diseases only. For pests not included, write to the Department of Entomology or the Department of Horticulture, East Lansing, Mich., as the case may be. Or consult special bulletin 24, "Insects Injurious to Fruits in Michigan," and regular bulletin 233, "Insects of the Garden."

GENERAL TREATMENT FOR APPLES.

When to Spray.	*What to Use and What For.*
As late as possible before buds start.	Strong lime-sulphur wash, if San Jose scale is present. This scale must be destroyed or it will ruin the trees. For scurfy-scale use lime-sulphur wash as late as possible before buds swell.
Just before the blossoms open. Fig. 2.	Bordeaux mixture or dilute lime-sulphur solution for scab, leaf-spot diseases and canker, with poison for canker-worm and bud-moth. The experience of some growers indicates that this spraying may be omitted if one has been made with lime-sulphur for San Jose scale, unless canker-worm is present.
Just after the blossoms fall and stamens wither. Fig. 1.	Bordeaux mixture or dilute lime-sulphur solution for the diseases mentioned before with a poison for bud-moth, tussock-moth, codling-moth and other insects. This and the last are the most important single sprayings. Do not neglect them.
Ten days to 2 weeks after the previous spraying.	Same mixture for diseases and insects mentioned above.
First week in August.	Bordeaux mixture, not full strength, or dilute lime-sulphur solution, and poison, full strength, for the second generation of codling-moths, except on summer varieties. This is an important spraying, especially for late fall and winter varieties. See "When the Coddling-Moth Flies" on later page. The lesser apple-worm, when present, requires a spray of poison when standard winter varieties are from 1 to 1½ inches in diameter. A diluted solution of the boiled lime-sulphur wash has come into considerable use during the past few years as a substitute for the bordeaux mixture for spraying apples. See later page.

Fig. 1.

Too early. **Just right.**

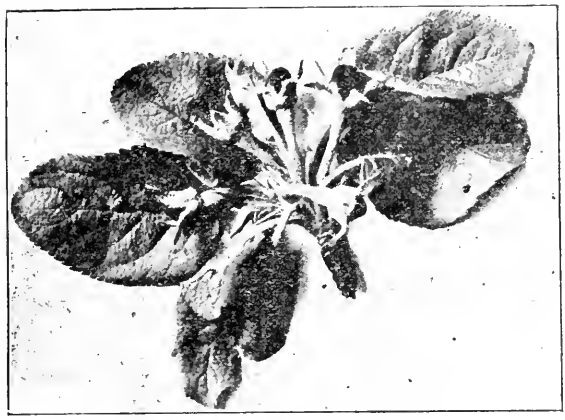


Fig. 2.

GENERAL TREATMENT FOR PEACHES.*

When to Spray.	*What to Use and What For.*
Early in the spring, surely before the buds swell.	Strong lime-sulphur wash for San Jose scale, if present. This spraying will also answer for the leaf-curl. If San Jose scale is not present, bordeaux mixture for the leaf curl.

FOR ORCHARDS AFFECTED WITH THE BROWN ROT, SCAB, AND CURCULIO.

When to Spray.	*What to Use and What For.*
1st time.	About the time the shucks are shedding, spray with arsenate of lead at rate of 2 pounds to 50 gallons of water.
2nd time.	Two to three weeks later or about one month after the petals drop, spray with 8-8-50 self-boiled lime-sulphur and 2 pounds arsenate of lead.
3rd time.	About one month before the fruit ripens, repeat the above spraying, omitting the poison.
	For early varieties the first two sprayings will probably be sufficient, unless the season is very wet and the varieties very susceptible to rot.

*This line of treatment and the preparation of the self-boiled lime-sulphur mixture are based upon the recent successful experiments of the Bureau of Plant Industry of the Department of Agriculture.

FOR BROWN ROT AND SCAB, WHERE THE CURCULIO IS NOT TROUBLESOME.

When to Spray.	*What to Use and What For.*
1st time.	Two or three weeks after the petals fall, with 8-8-50 self-boiled lime-sulphur.
2nd time.	About three weeks later, repeat previous spraying.
3rd time.	About one month before fruit is expected to ripen, repeat previous spraying.

FOR SCAB ONLY.

When to Spray.	*What to Use and What For.*
	About one month after petals fall, spray with 8-8-50 self-boiled lime-sulphur and again three or four weeks later.

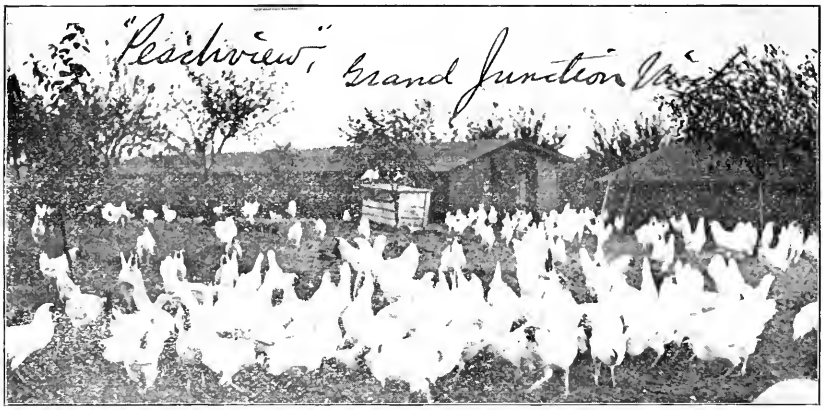
In applying the self-boiled lime-sulphur mixture, special care must be taken to keep it well agitated. The mixture settles rapidly and unless well agitated it will not be evenly sprayed. With the last spraying use fine nozzles and give the trees a uniform coating of a mist-like spray

GENERAL TREATMENT FOR PEARS.

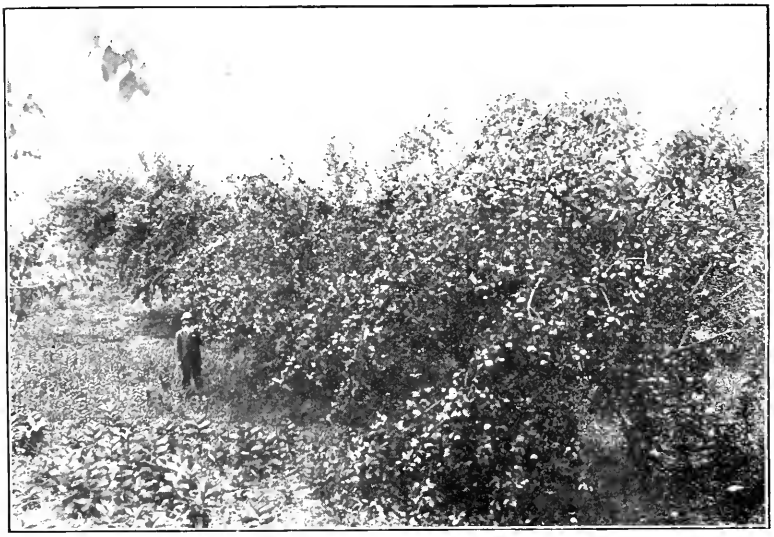
When to Spray.	*What to Use and What For.*
Same as for apple.	Strong lime-sulphur for San Jose scale, blister-mite and pear-psylla, if present. For scurfy-scale use lime-sulphur as late as possible before buds open. Bordeaux mixture with poison as directed for the apple.
Pear blight.	Whenever a blighted branch is found, cut back to sound wood and burn. Systematic inspections made during fall, winter, and early spring, a short time before blossoms open, to remove all "winter hold-over" cases, is very beneficial. After each branch is cut, disinfect tool by wiping with a cloth or sponge moistened with 5% carbolic acid.
	If "slugs" appear, spray with an arsenical, if not too near ripening of fruit to be dangerous. In case of early pears, dust with fresh hydrated lime.

GENERAL TREATMENT FOR PLUMS.

When to Spray.	*What to Use and What For.*
Early in the spring before growth starts.	Strong lime-sulphur wash for San Jose scale or European fruit-scale, if present, the same as for apple.
Just before buds swell.	Bordeaux mixture or self-boiled lime-sulphur mixture for fruit-rot, leaf-spot, and black-knot, with arsenate of lead for curculio.



E. E. Shaw, Grand Junction, finds a few hundred White Leghorn chickens a good combination with his fruit growing.



Thinning such a load would make better fruit and lengthen the life of the trees.

Profitable Apple Orchard of J. C. Johnson, Casco Township, Allegan County.

Immediately after the blossoms fall.	Bordeaux mixture or self-boiled lime-sulphur mixture for fruit-rot and leaf-spot with arsenate of lead for curculio. (For the Japanese varieties, dilute the bordeaux about one-half, or use self-boiled lime-sulphur mixture.)
Ten days or two weeks later.	Repeating the previous sprayings will tend to check the fruit-rot and curculio. This spraying should be repeated every 10 days or 2 weeks until there is danger of staining the fruit; stopping at least a month before picking time. On varieties especially susceptible to rot, an application of weak copper sulphate may be made about 2 weeks before ripening. No poison should be added. One pound copper sulphate to 150-200 gallons of water.
	Black knot.—At the annual pruning, cut out all knots. A careful inspection should be made in the early spring, and all knots cut out and burned. Cut back several inches below the knot. Wild cherry trees harbor the trouble and if near plum or cherry orchards, should be removed, if possible.

GENERAL TREATMENT FOR CHERRIES.

When to Spray.	*What to Use and What For.*
Early in the spring before growth starts.	Strong lime-sulphur wash, if San Jose scale is present. The same as for apple trees.
Just before the blossoms open.	Bordeaux mixture or self-boiled lime-sulphur mixture for fruit rot and leaf-spot. This is especially valuable on English Morellos for leaf-spot.
Just after the blossoms fall.	Bordeaux mixture or self-boiled lime-sulphur mixture for fruit-rot and leaf-spot, with arsenate of lead for curculio and slug.
Ten days to 2 weeks later.	Bordeaux mixture or self-boiled lime-sulphur mixture for fruit-rot and leaf-spot. This spraying may not be necessary, depending upon the susceptibility of the variety to fruit-rot and the weather conditions of the season.
	The large, black lice may be killed with tobacco water, if it is applied before the leaves curl too tightly.
	If slugs appear after picking, spray with arsenate of lead.

GENERAL TREATMENT FOR GRAPES.

When to Spray.	*What to Use and What For.*
When the shoots are about 8 to 10 inches long.	Bordeaux mixture for black-rot.
Just before blooming.	Bordeaux mixture for black-rot, with poison for the grape-berry moth and rose-chafer.
Just as the blossoms fall.	Same as before.
About 10 days or 2 weeks later.	Bordeaux mixture and poison for black-rot and berry-moth. The need for this spraying depends upon the weather conditions and the amount of rot prevalent in the vineyard. If it is thought advisable to make later sprayings, some material should be used that will not stain the fruit. In vineyards where flea-beetles appear, bordeaux and a strong arsenical poison just before the buds burst. In vineyards where the grape-berry moth is serious, spray with bordeaux and an arsenical poison during the middle of July, before the 20th. For leaf-hoppers (sometimes, but incorrectly, called "thrip") tobacco-water or kerosene-emulsion while the insects are young. (Burning rubbish late in the fall will destroy many hibernating leaf-hoppers.)

GENERAL TREATMENT FOR CURRANTS AND GOOSEBERRIES.

When to Spray.	*What to Use and What For.*
Before growth starts.	Lime-sulphur wash for San Jose scale or European fruit scale, if present. Cut out and burn wilted and hollow canes containing borers.
Just as the leaves are expanding, if worms appear.	Bordeaux mixture and poison, ¼ pound of Paris green or 2 pounds of arsenate of lead, to 50 gallons. Repeat if worms reappear before fruit is ¼ grown, if later, then use pyrethrum or hellebore. If leaf-bugs or aphids appear, spray with tobacco-water or kerosene-emulsion while the bugs are red and wingless, and before leaves become curled. Gooseberry-mildew. Where this disease is known to be serious, begin from the time the buds start and spray with potassium-sulphide, 1 oz. to 2 gallons of water, and repeat about every 10 days.

GENERAL TREATMENT FOR RASPBERRIES, BLACKBERRIES AND DEWBERRIES.

When to Spray.	*What to Use and What For.*
Orange rust, determined by the bright, orange color on the under side of the leaves.	No method of preventing. Dig the plant as soon as discovered and burn.
Anthracnose, grayish spots on the canes and leaves.	Cut out and burn all canes after fruiting. Spraying may check the disease, but may not be profitable. If desirable, make first spraying when new canes are 6 to 8 inches high, and repeat twice about 2 weeks apart. Do not set diseased young plants.
	Cut cut and burn borers in stem, gouty galls, and tree-cricket eggs.
"Worms" or "slugs."	Spray with an arsenical if fruit is just set, later use hellebore or pyrethrum.

GENERAL TREATMENT FOR STRAWBERRIES.

When to Spray.	*What to Use and What For.*
Young plantations.	Before setting the young plants, pick off all diseased leaves and if root-lice are suspected, dip in strong tobacco-water. After growth starts spray with bordeaux, for leaf-spot and poison for leaf-curler, if present.
Fruiting plantations.	Spray with bordeaux before blossoming and repeat 10 days or 2 weeks later. After fruiting, mow and burn over, if plantation is to be fruited again. If leaf-rollers have been present, spray with an arsenical after growth has started again, but before leaves curl. For strawberry root-lice, see bulletin 244, page 88.

GENERAL TREATMENT FOR POTATOES.

When to Spray.	*What to Use and What For.*
For scab.	Soak the uncut tubers for two hours in 30 gallons of water and one pint of formalin (can be secured of any druggist). This solution can be used several times. Do not put treated tubers back into crates or bags that held scabby potatoes. Make the treatment only a few days before planting if possible. Do not plant upon land that has recently grown crops of scabby potatoes or beets.

When large quantities of potatoes are to be treated, formaldehyde gas may be used to advantage as follows: * "Place seed tubers in bushel crates or shallow slat-work bins in a tight room. For each 1,000 cu. ft. of air space in the room, spread 23 ounces of potassium permanganate evenly over the bottom of a large, flaring pan or pail placed in the middle of the room. Pour over this three pints of formalin. Close room at once and do not open for 24 or 48 hours."

For blight and "bugs."

Begin spraying with bordeaux mixture and poison when the "bugs" first appear, or when the plants are about 8 inches high, and repeat about every 2 weeks as long as the plants are growing. Spray often in warm, muggy weather; it is not as necessary in dry weather.

Use Bordeaux mixture (6 pounds copper sulphate and 4 or 5 pounds of lime to 50 gallons of water, and put in the poison, about ½ pound of Paris green or 2 pounds of arsenate of lead, or 1 quart of the stock solution of Kedzie mixture.

PREPARATIONS OF SPRAY MIXTURES.

FUNGICIDES.

DILUTE BOILED LIME SULPHUR SOLUTIONS FOR SUMMER SPRAYING OF APPLES.

During the past seasons, tests have been made to determine the comparative value of dilute solutions of boiled lime-sulphur and bordeaux mixtures for spraying apple orchards.

The advantages of the dilute lime-sulphur solutions over bordeaux mixture were found to be:

(a) That the fruit was not russetted as badly. This was especially so with Wagener, R. I. Greening, Baldwin, Ben Davis and Hubbardston.

(b) Ease with which the solution was prepared—where a commercial concentrated brand was used.

(c) Very slight wear on the pump and packing and no trouble with nozzle clogging, since the solution did not contain any grit, as bordeaux mixture does.

(d) Appeared to lessen the number of San Jose scales.

Encouraging as the results have been from the use of the diluted lime-sulphur solution, it must be remembered that it has not been compared with bordeaux mixture in Michigan in a season when the apple scab fungus has been serious, and until this has been done, its use must be considered in the experimental stage and bordeaux not entirely abandoned.

The diluted lime-sulphur solution can be prepared for use in several ways.

1st. Commercial concentrated lime-sulphur solution can be diluted

*From Bul. 149, Maine Exp. Sta.

and used. Test with a Baumé hydrometer (see later page) and dilute as follows:[1]

If test is
- 33°, 32°, 31° — Baumé dilute 1½ gallons to 50 of water.
- 30°, 29°, 28° — Baumé dilute 1¾ gallons to 50 of water.
- 27°, 26°, 25° — Baumé dilute 2 gallons to 50 of water.
- 24°, 23°, 22° — Baumé dilute 2¼ gallons to 50 of water.

2nd. Use home-made concentrated lime-sulphur solution (See later page). Test each lot with the Baumé hydrometer and for use, dilute as directed for the commercial concentrated solution.

3rd. To make the dilute solution at any time and in any quantity: Boil in a few gallons of water for one hour, *twice* as many pounds of sulphur as of lime, strain and dilute with water so there will be 8 pounds of sulphur to every 100 gallons.

Example: To make 100 gallons of spray solution, boil 8 pounds of sulphur and 4 pounds of lime as directed.

Poison to Use in Lime-Sulphur Sprays.

The only poison that should be used in the lime-sulphur sprays is arsenate of lead. Work this into a thin paste and *do not add to the lime-sulphur solution until just before ready to begin spraying.*

SELF-BOILED LIME-SULPHUR MIXTURE.

This mixture has come into prominence in the past few years and its chief value is that it does not (when properly made) injure peach or plum foliage.

The formula is:

Lump lime	8 pounds
Sulphur	8 pounds.
Water	50 gallons.

The mixture can be prepared better by using thirty-two pounds of lime, thirty-two pounds of sulphur, and eight or ten gallons of water, and then diluting to 200 gallons.

Place the lime in a barrel and add enough water to almost cover it, as soon as the slaking begins, add the sulphur, which should be run through a sieve to break up the lumps.

Stir constantly and add enough water to make a thick paste and then, gradually, a thin paste. As soon as the lime is well slaked, cold water should be added to cool the mixture and prevent further cooking. It is then ready to be strained into the spray tank, diluted up to the full formula, and used.

Care must be taken not to allow the boiling to proceed too far, if the

[1]Circular 10 Mich. Agr. Exp. Station.

mixture remains hot for fifteen or twenty minutes after the slaking is completed, some sulphur will go into solution and injury to the foliage may result.

The time of adding the cold water to stop the boiling depends upon the lime. With a sluggish lime all the heat in it may be needed, while with limes that become intensely hot, care must be taken not to allow the boiling to proceed too far.

BORDEAUX MIXTURE.

Bordeaux mixture is the standard spraying mixture used to protect plants from such fungous diseases as apple and pear scab, grape-rot, leaf spots, mildews, potato blight, etc. There are but three things used in its preparation,—water, lime and copper sulphate. The water acts as a carrier, the lime neutralizes the caustic action of the copper sulphate and also makes the mixture stick to whatever it is sprayed upon, and the copper sulphate is the chemical that prevents the growth of the spore of the disease.

These three substances are combined in various proportions, depending upon the kind of plant to be treated. For apples, pears, cherries and plums (except the Japanese varieties) the preparation is usually four pounds of copper sulphate, with about the same amount of lime, to fifty gallons of water. Poison is added as needed. The copper sulphate will readily dissolve in two gallons of hot water, to which should be added enough water to make twenty-five gallons or one-half barrel. Do not use an iron or tin vessel to dissolve this in, as the copper sulphate will destroy it, and besides the iron will spoil the bordeaux. A wooden pail is good. Slake the lime into a thin paste and add water to make twenty-five gallons. Pour, or let these run together into a third barrel, and the bordeaux is made. When it is emptied into the spray barrel or tank, it should be strained through a brass wire strainer to catch any of the coarse particles.

Whenever it is necessary to use a quantity of the mixture, it is desirable to have the lime and the copper sulphate in "stock solutions." A quantity of lime is slaked to a paste and held so by being covered with water. The copper sulphate, say fifty pounds, is placed in a clean gunny sack and suspended in a barrel (one with wood hoops is much to be preferred) containing twenty-five gallons of water. This will dissolve in about a day. One gallon of this "stock solution"* is equal to two pounds of copper sulphate.

A good quick way to combine these three substances is as follows: Put the amount of the "stock solution" of copper sulphate required in a barrel, and add enough water to make 25 gallons, or one-half barrel. Put about 7 pounds of the lime paste in a barrel and add 25 gallons of water, making a thin whitewash. Pour, or let these two run together into a third barrel, or directly into the spray barrel or tank, being sure to strain. When partly run in, test with ferro-cyanide of potash† to

*Always stir this "stock solution" before dipping any out, in order that what is used may be full strength.

†This chemical can be secured of any druggist. Ten cents worth dissolved in a pint of water will be enough for a season. Drop a very little in the bordeaux, if a reddish brown color appears more lime must be added. If there is no discoloration, there is enough lime.

make sure enough lime has been used. If Paris Green, arsenate of lead, or any other poison is to be used, make it into a thin paste with a little water and add it to the bordeaux mixture, which is now ready to be used.

INSECTICIDES.

POISONS, FOR INSECTS THAT CHEW.

PARIS GREEN AND LIME.

Always use lime with paris green, it makes the poison stick better, beside greatly reducing the danger of burning the foliage.

For spraying from a barrel, the writer has found the following method very useful,—Place from one-quarter to one-half pound of good lump lime, or unslaked lime, in each of three or four tin pails which will hold about three quarts or less. Old cans or crocks will answer just as well. Add enough hot water to slake it into a thin cream or paste. Now add to each lot, one-quarter pound of Paris green, previously weighed out, and placed in paper bags, stir while the lime is hot and allow to stand for some time. Now measure out about forty-four gallons of water in your spraying barrel, and make a mark that will show how high it comes in the barrel, add the contents of one tin pail (viz., one-quarter of a pound of paris-green and one-half pound of quick-lime slaked) into the forty-four gallons of water in the barrel. Stir well and spray. The pails or crocks can be used one at a time and refilled occasionally so that the stock is always on hand ready for use.

KEDZIE MIXTURE (ARSENICAL).

This mixture, originated by the late Dr. R. C. Kedzie, of this station, is cheap, but it has the disadvantage of lacking a warning color. It is a good substitute for Paris green, but must be made with care, and stored in well labeled jugs.

Dr. Kedzie in giving directions for its preparation says: "Dissolve the arsenic by boiling with carbonate of soda, and thus insure complete solution; which solution can be kept ready to make a spraying solution whenever needed. To make the material for eight hundred gallons (800) of spraying mixture, boil two pounds of white arsenic with eight (8) pounds of sal soda (crystals of carbonate of soda—'washing soda'—found in every grocery and drug shop) in two gallons of water. Boil these materials in any iron pot not used for other purposes. Boil for fifteen minutes or until the arsenic dissolves, leaving only a small muddy sediment. Put this solution into a two-gallon jug, cork tightly, and label 'Poison,' stock material for spraying mixture."

"The spraying mixture can be prepared whenever required, and in the quantity needed at the time by slaking two pounds of lime, adding this to forty gallons of water; pour into this a pint of the stock arsenic solution. Mix by stiring thoroughly and the spraying mixture is ready

for use. The arsenic in this mixture is equivalent to four ounces of paris-green."

"The pot, jug, etc., must never be used for any other purpose after using it for making this mixture."

"If an additional pound or two of lime be added to the mixture, it will help to make the application permanent and conspicuous without in any way interfering with its effects. In using it the extra lime should be added."

ARSENATE OF LEAD.

This poison is coming into general use throughout the country, and has several advantages; it shows where it has been applied; and it does not easily burn the foliage.

Its action is slower than that of paris-green, but the fact that it does not readily burn the foliage is an advantage when spraying various kinds of delicate trees with one mixture. It is used at the rate of from one to five pounds to fifty gallons of water or bordeaux—or the lime sulphur sprays.

CONTACT INSECTICIDES, FOR INSECTS THAT SUCK.

KEROSENE EMULSION.

Place two gallons of ordinary kerosene in a warm place, either in a warm room or in the sun, and allow to become as warm as possible without danger from fire. Boil one pound of laundry soap or whale-oil soap in a gallon of soft water until completely dissolved. Remove the soap solution from the fire, and while still boiling hot, add the kerosene and agitate vigorously for ten minutes, or until the oil is emulsified, with a spraying pump by forcing the liquid back into the vessel from which it was pumped. When the liquid is perfectly emulsified it will appear creamy in color and will flow evenly down the side of the vessel when allowed to do so. Care should be taken to completely emulsify the oil and this is accomplished much more easily when the mixture is hot. This strong emulsion may now be readily diluted with water and used, or it may be stored away for future use. When cold it becomes like sour milk in appearance and should be dissolved in three or four times its bulk of hot water before diluting with cold water. If the water is at all hard, "break" it by adding a little sal-soda before putting in the soap.

Small amounts of this emulsion may be made by using the ingredients in small quantities but in the same relative proportion. It is used at the rate of eight or ten parts of water to one part of emulsion.

STRONG LIME-SULPHUR FOR DORMANT TREES AND SHRUBS.

This is a contact insecticide which should be used preferably just before growth starts, in any case, before the buds swell in the spring. If used when foilage is on the trees, the foliage will be killed. It is made in several ways, one of which is as follows:

Lump lime	20 pounds.
Sulphur (flour)	15 pounds.
Water (hot) to make	50 gallons.

The lime is slaked with a small amount of hot water and the sulphur is sifted in, fifteen or twenty gallons of hot water is then added, and the mixture boiled. (It should take three-quarters of an hour or an hour of good boiling with frequent stirring.) When done the liquid should be amber colored and fairly clear. Strain, dilute with hot water to make (up to) 50 gallons, and apply warm, through a coarse nozzle.

If small quantities are required, use an iron kettle to boil it in. If larger quantities are to be used, live steam is preferable for boiling purposes, either in a tank or in barrels.

Applied just before the buds swell, it coats the branches in such a way as partially to hinder from settling down, such pests as the oyster-shell, scurfy scale, some aphids, and others.

HOME-MADE CONCENTRATED LIME-SULPHUR WASH.

The advantages in using the home-made concentrated lime-sulphur wash, are that a quantity of it can be cooked in advance and often at times when the actual work of spraying is not pressing. The great disadvantage about it is that every lot cooked has to be tested with a hydrometer, to determine its strength, and then diluted accordingly. Several Experiment Stations, especially Pennsylvania[1] and New York,[2] have made experiments with various ways of preparing this concentrated wash but as yet no definite way has been found to make it of uniform strength, or composition. Investigations have been made by the Chemical Division of the Michigan Experiment Station in regard to the manufacture and storage of the lime-sulphur wash and will be published in circular No. 10. The difficulty of getting a wash of uniform strength, apparently lies with the lime, which varies in composition and strength. Lime that contains more than five per cent of magnesium oxide and less than 90 per cent of calcium oxide does not combine in the cooking with the sulphur in a way to make a good mixture.

Lump lime	60 pounds.
Sulphur	125 pounds.
Water	50 gallons.

The lime is slaked to a thin paste and the sulphur is sifted in. Boil for one hour and stir frequently. Water enough should be added so that there will be fifty gallons at the end of the boiling.

After it is cooked, if not to be used at once, it should be strained into a barrel which should be air tight, as exposure to the air causes the sulphur compounds to lose their value for spraying purposes. Each lot that is cooked should be tested with a hydrometer when cooled and diluted according to the following table when applied:

[1]Stewart, J. P., Penn. Station, Bulletin 92.
[2]Parrott, P. J., New York Station, Bulletin 320.

Concentrated Lime Sulphur Solution Diluted to Spray for San Jose Scale.

If Baumé test is 33°	dilute	6-¼	gallons to 50 gallons.
If Baumé test is 32°	dilute	6-½	gallons to 50 gallons.
If Baumé test is 31°	dilute	6-¾	gallons to 50 gallons.
If Baumé test is 30°	dilute	7	gallons to 50 gallons.
If Baumé test is 29°	dilute	7-½	gallons to 50 gallons.
If Baumé test is 28°	dilute	7-¾	gallons to 50 gallons.
If Baumé test is 27°	dilute	8-¼	gallons to 50 gallons.
If Baumé test is 26°	dilute	8-¾	gallons to 50 gallons.
If Baumé test is 25°	dilute	9	gallons to 50 gallons.
If Baumé test is 24°	dilute	9-½	gallons to 50 gallons.
If Baumé test is 23°	dilute	9-¾	gallons to 50 gallons.
If Baumé test is 22°	dilute	10	gallons to 50 gallons.
If Baumé test is 21°	dilute	10-½	gallons to 50 gallons.
If Baumé test is 20°	dilute	10-¾	gallons to 50 gallons.
If Baumé test is 19°	dilute	11-¼	gallons to 50 gallons.
If Baumé test is 18°	dilute	11-½	gallons to 50 gallons.
If Baumé test is 17°	dilute	12	gallons to 50 gallons.

THE BAUME HYDROMETER.

The hydrometer is an instrument used to determine the weight and density of liquids. It is made of glass, is about one foot long, with a graduated scale on the side. It can be purchased from wholesale dealers in druggists' supplies, from Bausch & Lomb Optical Co., of Rochester, N. Y., or Whitall Tatum Co., Philadelphia, Pa. Directions for use should come with the instrument.

COMMERCIAL CONCENTRATED LIME-SULPHUR WASH.

There are several brands of commercial, concentrated preparations of lime-sulphur wash on the market. They are now reasonable in price and when a limited amount of spraying is to be done it may be desirable to purchase one rather than to go to the trouble of preparing a small quanty at home.

HELLEBORE.

White hellebore is the powdered root of a plant. It kills both by contact and as an internal poison. It may be applied either dry or in the form of a liquid. When used dry it should be mixed with three or four times its weight of flour or of plaster and then dusted on the insects. Applied wet, one pound should be mixed with twenty-five gallons of water and this liquid applied as a spray.

INSECT POWDER, BUHACH, PYRETHRUM.

This valuable remedy has one drawback, its cost. It is too expensive for use on a large scale. It kills insects through their breathing pores,

but is harmless to man and beast. It will kill many of the insects of the garden if dusted on or applied as a spray at the rate of one ounce to two gallons of water.

Use the powder when it is undesirable to use poison, but never buy any unless it comes in tightly sealed packages. It loses its strength on short exposure to the air. An hour will suffice to weaken it. It must be applied from time to time, as it quickly loses its strength.

TOBACCO.

Tobacco in the form of dust may be obtained of the large manufacturers at a few cents a pound.

It is useful in destroying root-lice, especially woolly-aphis, in young trees, and in keeping insects from garden truck. For root-aphis, incorporate four to six handfulls of tobacco dust into the soil about the roots and induce a thrifty, healthy growth by using liberal quantities of nitrate of soda or barnyard manure early in the spring.

A strong infusion or tea made of waste will kill plant lice if sprayed when they first appear.

HYDRATED LIME.

Finely slaked lime is often useful because of its slight caustic properties. Against such larvae of saw-flies and beetles as are sticky, for instance those of the cherry-slug and asparagus-beetle, it may be used as a substitute for poison, if the latter, for some reason is undesirable.

Stone lime may be slaked with a small amount of hot water, using just enough to turn it to a dry powder. Such slaked lime is as fine as flour and very soft to the touch, having very little grit. Use a metal pail or kettle to slake in, as the heat may set fire to wood. Do not use too much water, and where possible, use freshly burned lime.

Hydrated lime may be used in making bordeaux-mixture, but it is not as reliable as good, fresh, lump lime. It is less adhesive, not as strong (so more should be used) and more expensive. The one advantage is that it is a little easier to use.

Ground lime for making bordeaux-mixture acts exactly like lump lime, if fresh, but this is difficult to determine as it is already in a powder.

CAUTIONS.

Do not spray while plants are in bloom. It is prohibited by law, except when canker-worm is present, and may destroy bees and other beneficial insects.

Do not dissolve copper sulphate in an iron or tin vessel. It will ruin the vessel and spoil the spraying solution.

For all spraying solutions containing copper sulphate, the pump must be brass or porcelain lined.

Wash out pump and entire outfit each time after using.

Use arsenate of lead on stone fruits in preference to other forms of arsenical poisons. It is less liable to burn the foliage.

Do not spray fruits or plants with poison within a month or more of the time when they are to be picked.

Keep all "stock solutions" covered to prevent evaporation.

WHEN THE CODLING-MOTH FLIES.

While the first week in August is a good average time for applying an arsenical spray for the second generation of the Codling-moth in Michigan, it is well to remember that seasons vary, and that the time set aims merely at an average. To determine exactly each year just when to get the highest efficiency out of a spray, for a particular locality, requires only a few hours of work, providing one can find some neglected apple trees near at hand.

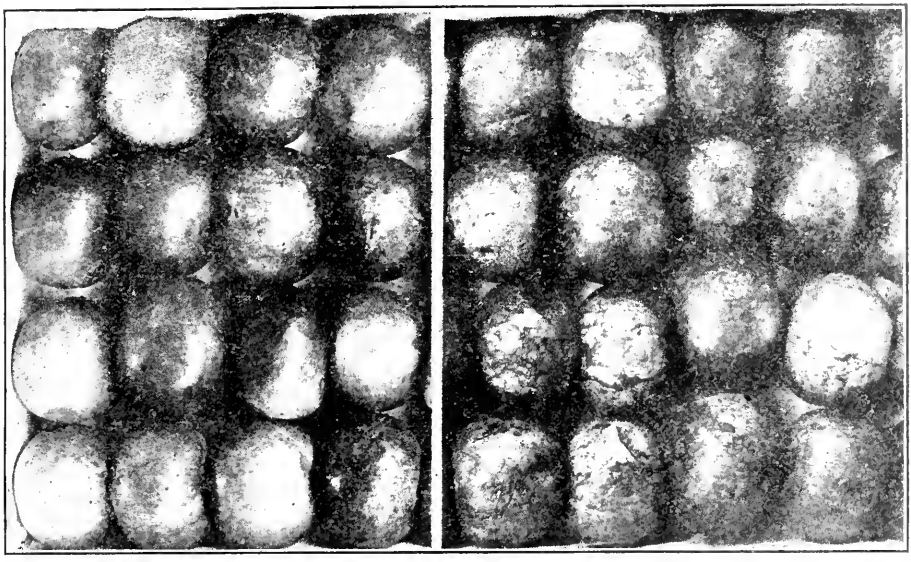
First of all scrape off all loose bark-flakes from the trunk and limbs of several trees, thus destroying all the natural places for the hiding away of the cocoons. The scraping is most easily done while the bark is soft after a prolonged rain.

Next, make some bands of burlaps six or eight inches broad and three or four layers thick; place one around the trunk of each prepared tree and fasten with a headless wire nail driven into the tree so that the band can easily be removed. Do this in June so that the cloth may become weathered before the time for spinning up. The larvae in searching for a good place to spin cocoons will find the bands, in the absence of other protection, and spin cocoons there.

Occasionally examinations during July will reveal these cocoons which should be carefully removed by cutting out a small bit of the cloth to which each is fastened.

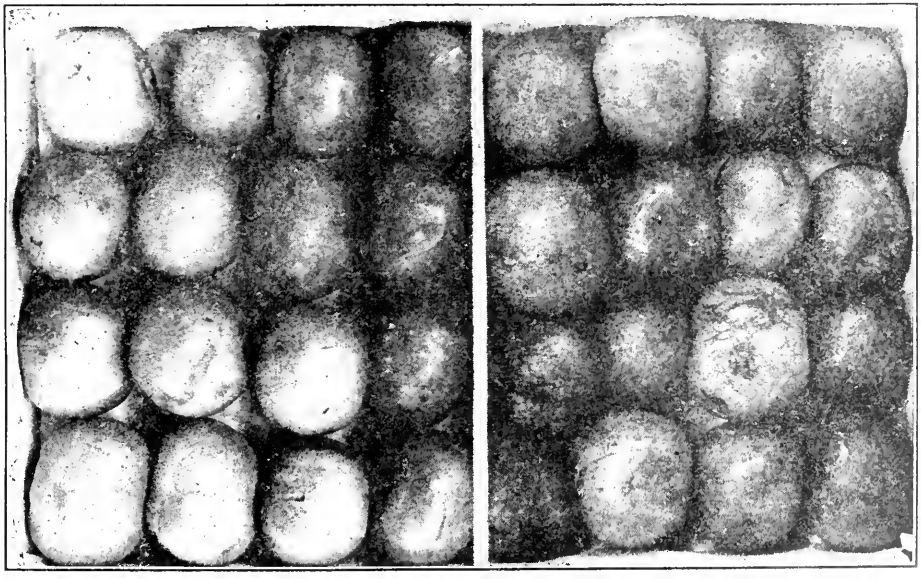
Place all these bits of cloth with the cocoons attached in a cage made of a lantern globe or some other glass cylinder open at top and bottom, and then tie a bit of mosquito netting over the top to confine the insects when they come out of the cocoons. If the lantern globe is set on a little soil in a flower pot and the soil is kept just slightly moist, the chances of getting the moths out are increased.

Now put the cage thus prepared in a shady place where the sun cannot strike it to sweat it, and where the rain cannot penetrate. Outside of protection from rain and sun the conditions should be as near those of the outside as possible. Keep the soil in the pot just moist and look for the moths often during late July for they will hide down under the layers of burlaps and may be overlooked. When you see them in the cage, then you know that they are laying eggs in the orchard and the time to spray is just before the young hatch and go into the fruit, not afterward. Of course they do not come out all together but string along over quite a period.



VARIETY WAGENER.

Sprayed with Lime-Sulphur. Sprayed with Bordeaux Mixture.



VARIETY R. I. GREENING.

Sprayed with Lime-Sulphur. Sprayed with Bordeaux Mixture.

MY METHOD OF GROWING PEACHES.

(OSCAR W. BRAMAN, GRAND RAPIDS.)

The time is at hand when it is no longer possible to grow fruit with success without giving it our best attention. This is particularly true of the peach.

The apple has been exalted to its rightful position as "King of all fruits," which position none would dare take from; along side by side the apple, wherever you travel up and down this broad land of ours, east or west, north and south, we find King Apples help mate, his blushing bride, the delicate yet beautiful luscious peach, fulfilling her mission in the horticultural world of providing for her growers the necessities and luxuries of life and gladdening the hearts of every home of which she is a guest in our cities.

Therefore let us study her wants and needs, let us give her all the protection she requires, let us study her habits of life, let us diagnose her disease so that we may be better able to nourish and protect her, thus enable her to return to her husbandmen the best she has in store for those who care for her.

My methods of caring for the peach are along six different distinct lines. They are as follows: Location, Pruning, Spraying, Tillage, Fertilization, Thining, Control of Contagious Disease. Let me say right here, that entire success cannot be secured if any one of them are neglected or overlooked.

LOCATION OF ORCHARD.

The ideal location must be a high elevation of gradual slope either west, north, or east, rolling enough to allow the water to run off and yet sufficiently level to avoid washing of the soil, as I want to keep this orchard well cultivated and well fed.

I like a soil varying from a sandy to a clay loam, underlaid with an open red clay subsoil. Such soil usually has been covered with white oak and a sprinkling of hickory timber.

PRUNING.

In pruning the young peach orchard start right. Grow the trees with low heads. Form the head with from three to five branches from twenty-four to thirty-six inches, usually about thirty inches angle. Care should be taken that no crotches are formed when shaping young trees.

For the first three or four years the pruning should consist in keeping the head fairly open and in a symmetrical form, cutting back the branches that are making too strong a growth. When the trees are ready to bear, the heads should be thinned out so as to admit the sunshine and provide a free circulation of air; this helping the fruit to color and lessening the injury from fungus diseases. All limbs that are likely to cross or rub against each other should be cut out. If this rule is adhered to annually, it will lessen very much severe pruning in after years.

SPRAYING.

Owing to the fact that dangerous insects and destructive fungus diseases are on the increase, no orchard operation is more important or will do more to keep the trees in health than intelligent and systematic spraying. Our peach orchards from the youngest to the oldest are annually given a thorough spraying of home made fire cooked "Sulphur and Lime" before the buds open, made as follows: Sixty pounds Sulphur, 40 pounds of lime cooked in 60 gallons of water for thirty to forty minutes, afterwards diluted to 200 gallons.

After the fruit sets and the calyx drops off the fruit we spray again with what is known as the Self-Boiled Sulphur and Lime to which we add 8 pounds of Arsenate of Lead to 200 gallons of mixture. We add the Arsenate of Lead to control the curculio. I have found the self-boiled sulphur and lime to be the best and safest fungicide that has yet been discovered for the peach in controlling the Brown spot and scab, and also the Brown rot. Have used for three years.

For the Brown rot we make a third spraying about four to six weeks before the fruit ripens.

Since I commenced using the self-boiled sulphur and lime my orchards have been practically free from any fungus diseases and causing no injury to foliage.

Practical results from use of self-cooked Sulphur and Lime: No scale, curl leaf, no Brown rot, no spots or any scab or any blemishes of any kind, no injury to leaves. Perfect fruit, larger and higher and better fruit buds, and better crop prospects for succeeding year.

TILLAGE.

I know of no fruit which responds so quickly to thorough and careful cultivation as the peach. In fact it is absolutely essential to the growing of this luscious fruit.

Usually the first two years, some hoed or cultivated crop may be grown in between the trees, but after the second year it is better to give the young orchard the entire ground. Cultivation of the bearing orchard should be commenced by gang plowing, plowing not over three inches deep. I like to have this work done at least by the middle of May. We then follow the plow with spring tooth harrow and level down and also cultivate around the trees both ways with a grape hoe with a harrow attachment in the place of the hoe, which fits orchard up in elegant condition and eliminates most of the hoeing. We then follow with a ninety tooth spike harrow going over the orchard every week until the first to the fifteenth of August, keeping as near as possible a dust mulch, this preventing evaporation of moisture as much as possible.

If weather conditions are favorable, we usually conclude our cultivation by sowing some cover and catch crops as clover, oats, sand vetch, etc.

ORCHARD FERTILITY.

The problem of providing and maintaining orchard fertility is one which should be provided for, and occupy our first attention. In plowing my orchard I like to turn under a good clover sod if possible. The young peach trees seem to get a much better start if given this ad-

vantage. One of the best orchards I ever grew was grown on a grass sod fall-plowed and then given good application of commercial fertilizer made up of phosphoric acid and nitrogen. As the trees reach a bearing age I like to occasionally seed down to clover and turn under the following May. This providing a supply of humus and some nitrogen.

The soil of the orchard must be kept fat with all of the three essential elements of plant food, viz: Nitrogen, potash, phosphoric acid. Humus must first be provided for and then maintained throughout the life of the orchard. This can best be done by the use of cover crops such as clover, oats, peas, sand vetch, etc., and an occasional light application of stable manure. After the trees reach a bearing age, we figure to feed them the following ration annually: Potash and bone meal, then we expect the following results annually: Large crops of high grade colored fruit together with a good hardy wood growth with plenty of matured, hardy fruit buds for the succeeding year's crops.

THINNING.

The thinning of the fruit is another very important factor in growing of choice fruits. The peach often sets many times too much fruit, which necessitates a great deal of labor in the thinning. This work should begin soon as possible after the husk or calyx drops; commencing with the earlier varieties first and continuing to thin according as the varieties ripen.

I know of no other labor in connection with the growing of the peach which requires so much exercise of our nerve as this work. We are all inclined to leave too much fruit on our trees, especially during the seasons when the orchards are bearing heavily.

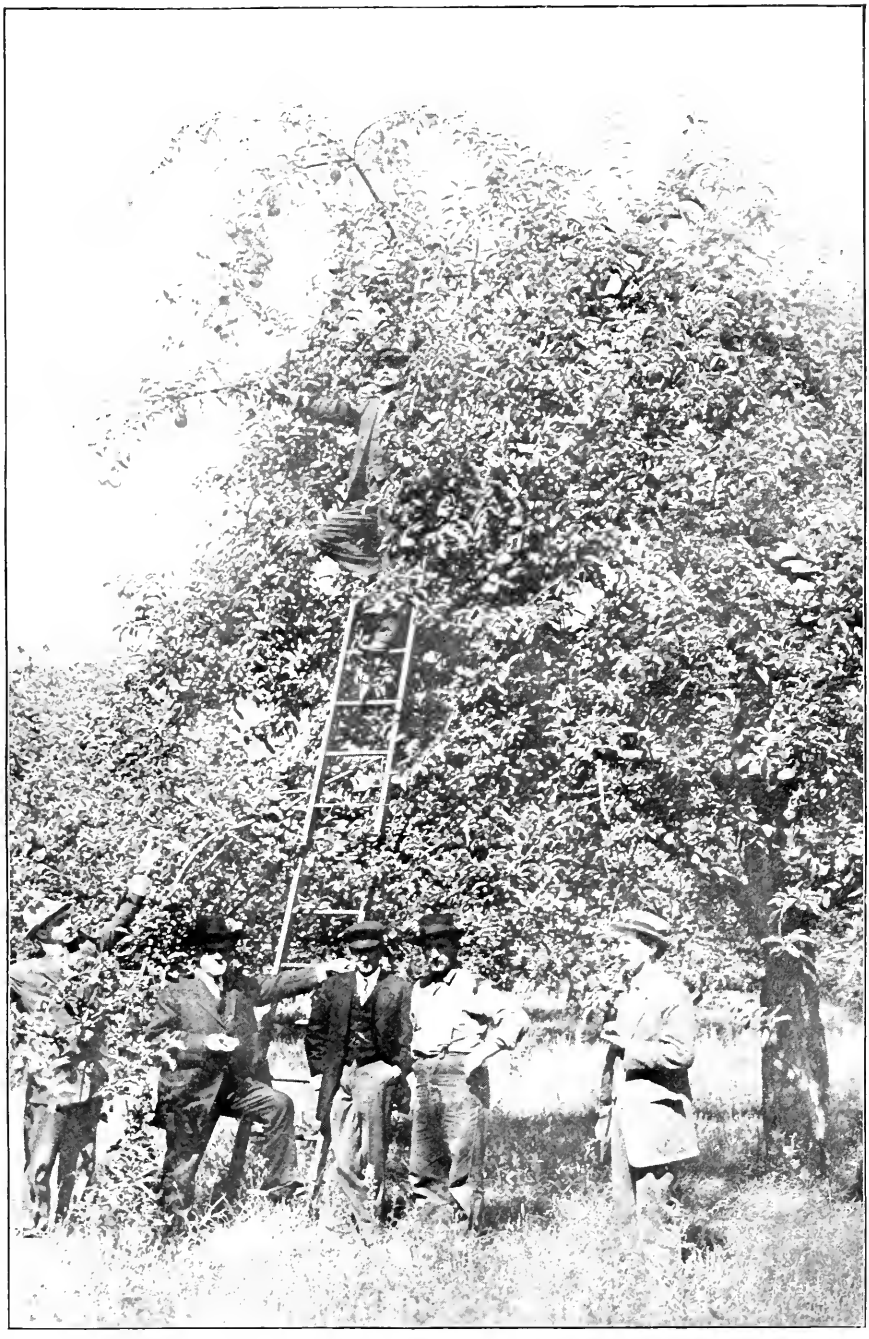
We usually thin to one fruit in a place, running from six to eight inches apart when trees are heavily laden with fruit; however, if trees have only partial crop the work consists largely in thinning out the clusters and inferior fruit if any. This work when systematically performed lessens the amount of the labor required for harvesting, increases the size and uniformity of our fruit which enables us to get much better prices.

CONTAGIOUS DISEASES.

I know of no better or opportune time to send a note of warning to growers throughout the peach growing sections of our state, relative to the control and care of contagious diseases which affect the peach, viz: Yellows and Little Peach.

As far as can be learned, no section of the state is entirely immune from the ravages of these two deadly diseases. While traveling over 400 miles through the west Michigan fruit belt from Grand Rapids north along the lake shore to Frankfort and return the past summer, the presence of both Yellows and Little Peach was everywhere noticed. Up to the present time no remedy has yet been found to control these two dreaded diseases. Our methods of controlling these two diseases have been along the following lines: First see to it that all diseased trees are taken out and immediately destroyed. We make it a practice of going over our orchards just before the first picking of each variety and examining every individual tree from both sides of the trees and every tree

Two-year-old block of Carman peach on farm of Friday Bros. near Coloma. Highly profitable crops of truck were grown between these trees.



O. C. Edwards (at top of ladder) displaying a King tree on the Battle Creek Sanitarium orchard.

which is not strictly healthy is marked by either glazing the tree or better still, we tie a strip of white cloth on one of the main branches. After the picking season is over we go through and pull out root and branch, everything that is diseased, not allowing a single diseased tree if possible to again leaf out or blossom. Second pointer, get interested in your neighbor's orchard, see to it that he joins hands with you in the eradication of these diseases. If done in the right spirit I believe these diseases can be practically kept in subjection and under control in any fruit section. Why not let us as fruit growers of Michigan take on renewed courage and replace the peach back into the front ranks where she belongs, give back to her her old time prestige. See to it that she has a suitable place to grow, nourish and cherish her with the right kind of culture, protect her from the ravages of both insects and diseases, provide her with plenty of suitable food so that she will develop at her best to do her bidding in every home wherever she is invited; and I assure you, my fellow fruit growers, that she will treat you equally cordial. I say that she will return back to you ten fold. Yea one hundred fold. She will treat you royally with all the necessities and luxuries of life which ever you dreamed of.

DISCUSSION.

Q. Do you leave diseased peaches until the end of the season before taking them out?

Mr. Braman—We usually take them out at the end of the picking time.

A member—We have been through the disease in Allegan county. We went to the vigilance that if a single tree in a diseased condition, even to the extent of a small limb was affected with the yellows, the whole tree went down.

Mr. Braman—(continuing.) Just as soon, however, as we fall into a lax habit, then the results are not so satisfactory, at least with us; and now I should like to know if you really favor these drastic extermination measures, or would you say that it would be all right to continue these lax methods of harvesting fruit, etc.?

Mr. Braman—It seems to me that the best friends the peaches have are those who are friendly to exterminating disease wherever it is found. I think I would see to it that my neighbors got the spirit of cleaning up as well as myself, but the only practical way to solve this question is to adopt stringent methods and drastic measures.

A Member—I understand that the diseased trees when rubbed against other trees could not inoculate these. There is a point of difference here. I have also heard that when diseased trees are rubbed against other trees there would almost invariably be inoculation. I would like to know just where the truth lies on this question.

President Smythe—These are questions that Professor Waite is better prepared to answer and I think it would be well to ask him for information on this particular point, when he takes up his topic bearing on this subject. I think this would be better than for us to try to figure it out.

Q. I would like to know if it would not be better to burn the tree right there.

Mr. Braman—This is sometimes difficult to do, but I think it is wise if possible.

A Member—In our county we are having trees affected with Little Peach. I would like to know how we can know this, and what are the first symptoms of the disease?

Mr. Braman—The first symptoms in our locality are dropping of leaves on the inside of the tree. We had trees that made from three to four feet growth, that showed no signs of Little Peach, especially in one orchard until the trees began to get through growing. It started right in where the growth first began and crept up. You will notice it in the color of the fruit, and sometimes it will cause a delay in the ripening of the fruit, and sometimes the fruit will ripen prematurely. It varies with the season. If the season is dry there will be delay in ripening. We have not had a very great deal of trouble with it. The first two trees I noticed was a number of years ago in a block of Oceanas. I cut them down and have not noticed the disease in that immediate vicinity now for a number of years. We have not lost many with it. We did not allow them to run over from one year to another, but burned them up. One or two trees during one season got neglected until burning time; they were not burned up and there was some of the disease that developed right there. The healthy trees were inoculated.

Mr. Smythe—If we used half as much judgment in this matter as they did when they had the foot and mouth disease, we might accomplish something. You know when they are suspected, not a bit of stock was allowed to be moved through an infected territory until it had been quarantined a sufficient length of time, so that it was absolutely all right. This Little Peach and the Yellows is as bad in Berrien county as anywhere in the state. We have no Yellows Commissioner. Unless the fruit growers get busy and eradicate the disease it will prove a very great damage.

Mr. Hale—I would like to have a little more definite information as to how I am to know this disease of Little Peach for sure, for I want to say right here that I think that disease one of the hardest of all diseases to detect. I went to Douglas when Messrs. Waite and Daniels were carrying on their experiments and examination to learn how to detect Little Peach. I didn't know whether I had it or not. We had our meeting there for that purpose. They didn't have any fruit. They were going to tell of the particular color and crinkle of the leaf, how to detect it. I was slow to catch on and somehow I couldn't get a right color of the leaf to know when it was that or something else. I picked more leaves and said I have got it now. Professor comes up and looks wise: "No," said he, "That is not just the color," and then I thought it was pretty near time for me to get busy. I tried some more experiments and was wrong about every time. After a time I took a little branch and inspected it and said: "I haven't got it here," but then the Professor said this: "You have got it, you have got it." That was the joke, but I bring this out to illustrate how difficult it is to detect that Little Peach. I cannot tell it to this day.

Mr. Smythe—I have had some experience with Little Peach and it was the advice of a man who came to us from the department that when we see on the trees evidence of Little Peach, the best way was to take no risk and jerk them out.

Q. Is there danger of carrying this infection from one tree to another through pruning tools?

Mr. Braman—I don't know about this as my experience is very limited. I would not be surprised if this would be so, but I am sure you would make no mistake and you would be on the safe side if you sterilized your tools.

Q. Would it not be wise to do it anyway?

A. Yes, I think it would be a good idea.

A Member—The trouble with most of our commissioners is they mark what they are certain of and that they know is disease, and they leave a good many trees that have something wrong with them, and in this way lots of trees are carried over that should be taken out. It seems to me that if we could have courage to order them to mark everything that was suspicious and then replace these trees with good ones, I believe we would all have lots better orchards.

Mr. Braman—There is a point in this, but not many of us have the courage to carry out our convictions of what we really feel and know was for the best.

Mr. Welch—Years ago when we practiced pruning the trees, growers were careless and part of the peaches on the well side of the tree were picked and the tree left standing until fall. Those that had preferred to leave their trees lying on the ground did so and they were the means of the disease being spread even after the effort to exterminate it was made. There is but one safe method and that is never done as it should be.

A member—I would like to have question number 24 answered. It is: What varieties of peaches are most profitable in this section? Are we setting out too many Elbertas?

Mr. Braman—That depends upon which market you want to cater to. I have quite a large percentage of my market at Grand Rapids. I have a large home trade there which requires a succession of varieties—early, medium and late. For carload lots I cater to the Engles, Elbertas and Goldmines; the latter one being the best I have. I didn't think much of it at first, but after giving it a summer spray it has proved to be one of the most profitable peaches I have. As to whether we are setting out too many Elbertas, I do not think so. A standard peach like the Elberta will not be produced in sufficient quantity to glut the market. In other words, there will always be a demand for it.

Q. What is that Goldmine peach like?

A. It is shaped something like the Crosby. They are good bearers, hardy and set plenty of buds.

A member—Regarding the idea of when this disease is spread, I would like to know what the experience of the peach-growers here have been. I have been told by the state officers and others to cut the tree down and destroy it. Several years before I had any yellows I cut down an affected tree and dragged that tree across the orchard to the side to burn it. The next year or perhaps two years after I could follow the path where I dragged that tree, by Yellows. Now I should like to know whether the disease was communicated to those other trees or has it developed since that time. Now I chop the tree over and let it lay there until I come through in the fall and then clean up. I have had no more paths.

Mr. Smythe—I have heard tell before of the same thing happening when an infected tree was hauled through an orchard. That is according to the law. It is covered with germs and if the affected parts are left in the orchard the infection is liable to be carried to other trees.

COMPETITIVE SPEAKING BY M. A. C. STUDENTS.

Mr. Smythe—This morning there is to be a competitive five-minutes' talk by the boys from the Agricultural College, and the audience is to judge who is the winning man. In justice to the boys we want you to listen very carefully so you can render a proper judgment in the matter. Professor Eustace will assist and it will probably be a little less embarrassing to have someone do this for the boys, with whom they are personally acquainted.

Professor Eustace—I wish it were possible to introduce every one of you to every one of these young men, but that is impossible. I am very anxious for them to know as many of you personally as possible, so when you meet them around the hall or anywhere it would be appreciated if you would walk right up to them, tell them who you are, where you live, what you are doing and give them all the inspiration you can.

You are to be the judge of their effort here, and I trust you will try as well as you can to keep in mind the different names, appearance of the men, so that you can vote intelligently.

The first speaker is Mr. U. S. Crane of Fennville and he will speak on the subject of "Co-operation of Fruit Growers."

Mr. Crane—Mr. Chairman, Ladies and Gentlemen: I am, perhaps, not very much at ease in a place like this because I am among men who have had experience. Nevertheless, I believe there is one thing above all that we as horticulturists and as fruit growers in Michigan need, and that is co-operation. I believe we should have co-operation in Michigan among Michigan horticulturists because we need higher standards of judging, of sorting our fruits; because we should have a broader field of market; because we could get better rates and terms from the railroads and other corporations, if we were united. As an instance of an association that is accomplishing these results, let me call your attention to the Hood River of the northwest. You perhaps know, some of you, more than I do about the fruit growers' union in Hood River, but they are accomplishing great things for the fruit growers. They are getting oftentimes, as you know, as much for a box of apples as we are for a barrel. This should not be, as we are much nearer to the markets. We should get more for our apples than we do, and why do we not? Because we do not sort them as well as they do, and also we cannot enforce a system of sortage unless we have some organization as they do at Hood River. They have an association there formed by the fruit growers; they have a board of five directors and they have a manager which takes care of

the business end. The fruit growers simply grow the fruit. When it is about time to pick the association tells them what to pick, how much and when. The men go ahead and pick, and sort the fruit. Then the association sends around five men in a gang to pack the apples. These men are specialists in their line, and they know how to pack and they do it right. If the grower has not sorted it properly, they sort it over again at the grower's expense. But if the grower has sorted it right, then they simply pack it and each man as he packs a box of fruit puts his name or his number in that box, thereby laying himself responsible to the association for the quality of sorting and of packing of that box of fruit. I think this is the best feature, perhaps, of the Hood River association's methods and it is the thing we need most here. Besides this they advertise more and get a broader range of markets than we do. And that is another thing that we should strive for.

The third thing is that they bring the railroads to time. They get rates from the northwest which are comparable to our rates in Michigan, which should not be. So I appeal to the horticulturists of Michigan to adopt a system of co-operation, to pull together instead of pulling against each other. Thank you. (Applause.)

PRUNING.

BY CHARLES TUBERGEN.

Every owner of fruit trees expects to prune, at least he considers the advisability of the operation. There is the greatest difference of opinion as to the merits of particular styles and methods of pruning and perhaps equal difference as to the effect of the operation on the life and health of the tree. Some have observed the evil effect in pruning, and have reasoned that it is injurious, but we must not cite the individual instances and condemn the practice. We should be far enough advanced by this day to pass on the merits of the practice as a whole but some still doubt us.

Pruning is not devitalizing from three sources: Philosophy, plant physiology and common experience. By devitalizing I mean does it injure a plant to remove part of it, is the entire growth of a plant necessary to its health and longevity?

There is an intense struggle for existence among all organisms. If one species increases another decreases. They not only compete with other species but individuals of the same species rival each other for standing room. The survival of the fittest is continually showing itself. A tree is a collection of individual plants, there are no two limbs alike but are what their condition or position make them to be. The limbs of an animal are copartners as they each have a certain definite function to perform. The limbs of a tree rival each other in performing the same function, the production of leaves, flowers, and buds. All have noticed the young trees as their struggle to have all their buds produce. It can never hope to have as many limbs as are buds. During the struggle

some perish and the remaining are benefited, therefore all the limbs are not necessary and some may be a detriment to it.

Man wants the fleshy portion of fruit and not the seeds. He must thin vigorously in order that size and quality may come before number. People should look into a neglected orchard and see what goes on in the tree tops.

Plant physiology, it is the common assertion that pruning exhausts as the cutting off of limbs destroy a given amount of tissue in the production of which the plant has expended effort. Vitality of a plant is not fixed but determined by conditions under which it grows, character of soil and treatment it receives. If a plant is what its environment makes it, the removal of a portion of it can't destroy its vitality unless it is so great as to interfere with the nutrition of the remaining parts. There is an exact balance between the feeding capacity of the plant, that is its root system and food supply and the superficial growth of the plant. The more active and efficient the root the larger the top. If part of the top is removed there is an endeavor to supply the deficiency by an exceedingly rapid growth. Pruned plants are always more active than unpruned ones because of the concentration of a somewhat constant food supply into a smaller number of branches. Now, some will say if it increases growth, why not cut off larger branches? The vitality will not be touched, but they expose dangerous wounds. Apt to open the tree so remaining parts scald and borers get in. Spoils the symmetry and convenience of the tree also.

Common experience is the strongest proof. What if pruning was devitalizing, advise a grape grower not to prune. We could not afford to discontinue it. Gains in size, quality of fruit, ease of cultivation and spraying are the benefits obtained if pruned as it should be done. It is useless to speak of pruning as it should not be done. Anything done wrong is worse than is not done. We should know when, why, and how to do things before trying them. There is abundant opportunity for improvement in methods but pruning as it should be performed is indispensable to successful horticulture.

VALUE OF PRACTICAL KNOWLEDGE OF PLANT DISEASES.

BY B. W. KEITH.

Mr. Chairman, Friends and Members of Horticultural Society:

If the modern fruit grower of today could have existed thirty years ago with all his modern ideas, improvement and methods, he could have cared for and harvested his crop at a cost of one-third of what it costs him at the present stage of fruit growing. Then the protection of fruit against plant diseases was not so essential as it is today; apples, pears, peaches and other fruits blossomed, grew and ripened almost unmolested. Today, such is not the case. Thousands of dollars are lost annually in Michigan by the ravages of plant diseases and, as much if not more, is spent yearly in the prevention of these much dreaded pests.

By referring to the reports of this Society of the early 80's one can find questions of the following nature: "What can I do to prevent my peaches from Scabbing? How can I keep my plums from rotting," and so on. One can see from these that this was the beginning of a period of improvement along the line of horticulture. Growers were beginning to awaken to the fact that it was highly necessary to use fungicides and insecticides if success was to be had, an idea which has been spreading ever since. But although growers were awakened to this fact, they did not possess an accurate knowledge of the habits of the diseases and insects which caused the destruction of their crops. Likewise today growers are deficient in knowledge along the lines, although they do realize and know that protection is necessary. But after realizing the necessity of these fungicides and insecticides, the questions which naturally follow are: How, when and where are these remedies to be applied? In order to answer these questions, the grower must be perfectly familiar with the habits of the diseases and insects which he has to combat. As Dr. Freeman of Minn. says, "Often when cure is impossible, an intelligent understanding of the conditions and effects of a disease will often aid in its prevention." So the possession of an accurate knowledge of plant diseases and their causes is not only of a commercial value to the fruit grower both in cure and prevention but also in making him an intelligent observer. The advantage of such a condition amongst fruit growers would far surpass the "hit or miss" method which is practiced so much today. A grower may know all about fungicides and insecticides, but if he does not know how, when and where to apply them, his knowledge is worthless. Why is it that a certain fruit grower up near Ionia received $50,000 for one crop of apples off a forty acre Spy orchard? Why is it that another man near Traverse City received $2,000 from a five acre plot and why is it that our Uncle David Woodard succeeds as he does? Why do all these growers succeed while others in their immediate neighborhood, fail? It is simply because these successful growers have an accurate knowledge of the habits of their enemies and consequently know how to combat them in an intelligent and businesslike way; in other words they know their business.

As was stated before, the possession of an accurate knowledge of the habits of plant diseases and insects makes a man an intelligent observer; he knows how, when and where to look for his enemies in this plant and insect world. Therefore, in fact, it is the intelligent, observant man who excells in fruit production.

SOIL FERTILITY AND BACTERIA.

BY AROA ITANO.

Ladies and Gentlemen: My subject is soil fertility and bacteria. I wonder if you people ever heard of this great discovery of soil bacteria regarding the soil fertility. The fact is this: Supposing that you have here plots A and B. They are equal in the size and quality of soil and

placed under the same conditions. Now take the soil in plot A and heat it up to 95 degrees C., leaving plot B alone. Then after that you sow the seeds and let the plants grow. Then the result you would get is this that plot A brings two, sometimes three and four times as much as the crops produced in plot B. This fact was found at the Rothamsted experiment station in England. At the same time this fact was explained by one of the members of the experiment station, Dr. A. D. Hall. He explained it from the bacteriological standpoint and it is very interesting, indeed. Not only from the standpoint of science, but it is important because it can be applied to the practical work in the greenhouse. So I took an interest and put a little time for this subject myself. Now I take this opportunity to present to you the importance of the bacteria regarding the soil fertility and the principle of this heating method.

As you will know, three things are absolutely necessary for growing plants: First is the temperature, then the moisture and the plant food. Now supposing you have the suitable conditions regarding the temperature and moisture, then the growth of the plants depends upon the plant food there is in the soil. And no matter how much plant food you have in the soil, if it is not in such a condition that it can be taken up easily by plants, then it won't do any good. As a result of the experiments, we found that without decomposing the organic matter in the soil, the plants cannot take it up. Without the aid of bacteria, the decomposition of organic matter does not take place. Therefore, you see clearly that the bacteria is one of the most important factors regarding the soil fertility.

Next I like to present to you very briefly that principle of this heating method which gives such enormous results. As I mentioned before, the principle is this: There are 1-20,000,000 of soil bacteria in one gram of soil and several thousands of protozoa. These protozoa live on the bacteria. In other words, the protozoa are destroying our great benefactors in the soil. If you have a chance to examine under the microscope you can see plainly that these protozoa attacking the bacteria like the hungry wolves going after food. If you can prevent these bacteria from their enemy, the result is we get a good crop. And now by heating the soil to 95 C. all protozoa are killed while the bacteria can stand for the heat of 100 C. After the enemies are killed off, the bacteria multiply and decompose the organic matter much better and quickly and the result is an increase of fertility and we get such enormous crops. At the conclusion, ladies and gentlemen, I hope you get some idea of the importance of the bacteria regarding the soil fertility and the principle of this heating method and realize the value of the research work.

COVER CROPS.

BY GEO. W. DEWEY.

Ladies and Gentlemen: The question regarding cover crops in Michigan appears to be one of the liveliest and most vital questions under discussion as was demonstrated yesterday afternoon when this topic was up for consideration. There were a multitude of different ideas.

The first and principal reason for cover crops is to establish fertility in the soil. We have three alternatives for making our soils better; one is to apply stable manure; another to use commercial fertilizers and the last is the cover crop. The stable manure is impossible to get in sufficient quantities to really make it practical. It would be impossible to get enough stable manure from two states to make a good dressing for all the orchards in Michigan, therefore that must be ruled out.

Commercial fertilizers of course, do make the trees grow better for the time being but they do not improve the physical condition of the soil; it does not put more humus into it; it does not increase its water holding capacity. Arguing from induction, this leaves the last and most important one which is the cover crop. The orchard question seems to be analogous to the boarding house table. You must continually feed the table in order that the boarders do not become slim and have that lean and hungry look. So you must also give to the soil of the orchard something from which the tree may take on that healthy appearance as indicated by the vigorous green leaves. This fertility is brought about by using legumes as cover crops. The action of the legumes also when turned increases the water holding capacity of the soil and not only that but it increases the humus and prevents the evaporation of moisture from the soil.

Another principal reason for cover crops is to harden up the wood. This will prevent freezing of growing tips and also wards off the attacks of many orchard pests. If cover crops had been universal, it would have prevented untold losses to those who were growing peaches four years ago. And it seems to me though all this is theoretical, I believe that the cover crop would, in this case, if planted in the fall, employing such crops as oats, barley and spring vetches, it would tend to have the same action on the fruit as does the sod culture; that is, it would have a tendency to make the fruit more uniform in size and give it a richer color.

Another particular reason for the cover crop is to conserve the soil moisture. These cover crops growing late in the fall when the wood of the trees is being hardened off, would take up this extra moisture and then in the spring, when turned under, you have turned it back to the soil and there they lay down in the ground slightly below the surface, thus breaking off the capillary attraction between the surface and the sub-soil and bringing the water up to the roots of the trees but not to the surface so that it will not evaporate into the atmosphere.

I have several samples of cover crops here, taken from the college orchard Saturday. This is Spring Vetch, planted in August. This was

grown on a square yard of ground and was planted at the rate of 48 pounds to the acre. This is one of the best cover crops for hardening the wood, catching the leaves and preventing the freezing of the trees. You will notice the growth it has made since August 1st and it is continually growing thus far. It is, however, a delicate plant and will freeze later on.

This sample here is crimson clover. The seed was sown at the rate of 20 lbs. to the acre. Notice the mat of roots bearing the bacteria nodules which gathers free nitrogen from the air. You will also notice the bulk of leaves which when turned over, will provide considerable humus.

Here I have a mixture of sand vetch and spring vetch. The sand vetch is much smaller than the spring vetch but will get in its work next spring making a mass a foot high and very thick.

This is buckwheat and is sown as a catch crop. It will catch the leaves and snow during the winter, make a good cover for the soil, prevent alternate thawing and freezing and will add some humus.

Here is the cow pea. Notice the length of vine. It is a legume and adds nitrogen to the soil but one trouble with it as a cover crop is that it grows flat on the soil and will not catch the snow and leaves and is also killed at the first frost. It makes a desirable cover when used with oats.

Barley is a fast grower and hardens off the trees in good shape. It has already gone to seed. It is planted near the first of August and is now fifteen inches high and stands a good chance of catching and holding all the snow and leaves that come its way.

This specimen here is mammoth clover. It is not so good as some but is better than the crimson clover in places where it is very cold. Crimson clover is not so hardy as the Mammoth but the Crimson clover catches quicker and grows better in the spring, making it more desirable than the mammoth in regions where it does not winter kill.

When only a late growing catch crop is desired, a mixture of oats and peas is recommended; but for a good reliable cover crop for general orchard culture in Michigan, a mixture of sand and Spring Vetch bids well to take first place.

POISON IN LIME-SULPHUR.

BY K. D. VAN WAGENEN.

Friends, Members of the State Horticultural Society: In discussing this subject I would like to divide the sprays into three general classes. First—Fungicides; Second—Insecticides, and Third—Contact with Insecticides. The first are those sprays which are used for fungi, such as rot, scab, etc. The second are sprays which by means of poisons will kill insects—insects which have chewing mouth parts, that is, which chew the plants upon which they live. They will therefore take the poison into their stomachs and it will have its effect through the digestive organs. Contact insecticides are those sprays which by external appli-

cation will kill insects; insects which do not have chewing mouth parts. The first two are the ones which I wish to consider at this time.

It has long been the practice to use Bordeaux for summer spraying of fruit, and in combination with this to use some form of an arsenical poison for the purpose of killing insects which affect the trees during the summer. The arsenical poisons which are used are Paris Green and Arsenate of Lead. Arsenate of Lead sticks to the foliage better and does not have the burning effect which is so characteristic of Paris Green.

In combining arsenical poisons with lime sulphur sprays, there is one point which must be considered. There are various forms of arsenical poison. One of them is arsenate of lead and another is Paris Green and another is arsenate of soda and another is what is known as "Kedzie Mixture." The essential quality necessary is that the arsenic must be in an insoluble form and this one requirement alone will disqualify both arsenate of soda and "Kedzie mixture." Hence these two forms must not be used. The reason for insolubility is simply this, when combined with sulphur, a soluble arsenical compound will react chemically with the sulphur, forming sulfide of arsenic, which is a heavy precipitate. Evidence at hand today goes to show that this reaction destroys both the fungicidal and insecticidal action of the spray, for sulfide of arsenic is not known to be either an insecticide or a fungicide. Hence either Paris Green or Arsenate of Lead must be used in connection with lime-sulphur, if insects are to be attacked. I wish to call attention to the advantage of such a lime-sulphur spray over Bordeaux for summer spraying of apples.

The exhibit at the college which we have here shows the difference in the effect of russeting by Bordeaux and by lime-sulphur summer sprays which you have all seen. I therefore wish to bring out this point that for a summer spray instead of the Bordeaux, a weak lime-sulphur solution is very much more advisable. And with the lime-sulphur may be combined an arsenical poison for the purpose of combating insects the same as with Bordeaux. You have seen the exhibit and have doubtless noticed how much more marked was the russeting of the fruit when sprayed with the Bordeaux than when the lime-sulphur spray was used. So in closing, I wish to leave with you two points, First—that a weak lime-sulphur spray made according to the ordinary formula and applied as a summer spray will not produce anything near like the russeting effect on the fruit as will Bordeaux and second—that this lime sulphur may be combined very successfully with an arsenical poison for destruction of insects.

HOME FORCING OF VEGETABLES FOR WINTER USE.

BY J. G. FRANCE.

Mr. Chairman, Ladies and Gentlemen:

I do not believe that anyone who attends the sessions of the State Horticultural Society and hears such talks as that given by Miss Taylor about her $3,000 apple crop, or that of Mr. Fritz of his $150 an acre pear crop, can do so without coming to the conclusion that there is money in the pursuit of the occupation of Horticulture. Doubtless this inducement draws some people into the profession, but after having attended the banquet last night, and hearing the speeches made there, one cannot but believe that the majority of the people here are engaged in horticulture because they are in love with their job. If a man is in love with his job he takes pride in it, and justly. The man who raises strawberries, for instance, takes pride in having the earliest and best berries in his neighborhood, and so it is with all horticultural products. Not only is it a matter of pride for him to boast about to his neighbor but it is also a matter of personal satisfaction to himself to have early fruit and fruit of fine quality for his own use. The subject of my talk is the forcing of vegetables for home use, and it is my desire to give you a few facts which if acted upon may make it possible for you to increase your personal satisfaction in your farm products by enabling you to not only enjoy the fresh fruits of your labors during the growing months of the year but also in the dead of winter, and not force you to depend entirely upon the contents of the tin can.

When I speak of forcing vegetables I do not wish to be understood as advocating expensive green houses. This is not at all necessary, for it is something that can be done by anyone with a very small equipment. Of course greenhouses would be essential if one were going to go into vegetable forcing as a business but vegetables and some fruits may be forced in a small way very satisfactorily without their use.

You all know that plants are a lot like people, they can not work all the time, but must have some rest. People take their rest during a part of the day and at night. Plants take their rest during a certain part of the year. There are some plants which grow from seeds and have their rest during the time they are in the seed condition. There are other plants which grow for a season and then rest during a part of the year, and then grow again and produce new crops. In this climate the winter is the rest period for most plants, and it is upon this fact that the principles of vegetable forcing rests. If we let a plant rest for a little while and then wake it by proper conditions we may deceive it into thinking that it has had its rest out, and it will grow and produce a crop for us.

The plants which I wish to take up here are very common and among the easiest ones to force. The first two that I will mention are pieplant and asparagus. The method of forcing these plants is similar and very

simple. During the summer select plants in the field that are strong and vigorous, in the fall let them stay out until they have been frozen solidly for about a month, then take the plants up, and put them in your cellar and let them thaw out. The temperature of the cellar should be about 50 to 55 degrees. After the plants have thawed and the excess of moisture used up a little water should be added every two or three days, just enough to keep the plants moist, but never enough to make them wet or soggy. The cellar does not need to be very light, but more light is desirable after the plants become active. Several cuttings may be made before the roots are exhausted. By taking up only a few plants at a time a succession may be maintained throughout the winter. How nice it will be to have these two plants fresh to use when the good wife says "What shall we have for dinner today," or how nice to surprise a friend who drops in to dinner along about New Year's, with fresh, crisp asparagus that you grew yourself. Parsley is another vegetable that may be had in winter, if one has a sunny window. Pots of this may be grown outdoors during the summer and brought into the house as the cold weather comes on, and it will grow nicely in a warm sunny kitchen window, where it will be not only an ornament but will be found to be much more convenient for use than that which is buried under a foot of snow out in the garden. If strawberry plants are potted during the summer while growing in the field, allowed to freeze the same as pieplant or asparagus, and then brought into the house and placed in a warm sunny window a nice crop of berries may be had in the depth of winter. The principle precaution being to select plants of the staminate or perfect kinds.

To sum up, first, select good plants, strong and vigorous; second, allow them to get a rest by freezing; third, place in the cellar or sunny window as the case may be, and give them a little care, and you will get returns that will be both pleasing and profitable.

APPLE SCAB.

BY F. C. DAYHARSH.

Friends:—The apple scab fungus does more damage to the apple than any other pest known except the codling moth. The apple scab fungus you know, to be a greater pest some years than others. If the spring be cold and wet, the prospect is good for scabby apples. Because of the conditions under which this fungus appears on many apples, some people have the idea it is the wet weather that causes the unsightly fruit instead of a parasitic plant.

The chart I have here will show you the minute organism and its life history. The single plant we cannot see without the aid of a lens. The spot on the apple which the buyers and consumers frown upon is made up of many thousands of these plants. In order to get a crop of apples free from this pest, it requires a thorough spraying with a well-made spray. The chart shows a specimen that is free from scab on one

side while the opposite side is very much infected. This indicates to you that the spraying was not thorough.

Besides making the apple undersized, unequally developed and unsightly, it furnishes an opening for other rot producing spores to enter. A disease following the apple scab that does much damage in New York is the Pink Rot. Whole crops of apples in Western New York have been destroyed by this disease. I have not heard of the Pink Rot doing much damage in Michigan. Michigan buyers decline to buy scabby apples, not only because of their appearance, but because the fruit won't keep well in storage. The Blue Mold is a rot that works on bruised or scabby apples while in storage. The Blue Mold spores enter the opening made by the scab fungus. Your own experience has taught you that the sound apple carefully handled keeps the longest every time.

The cross section of diseased leaf on this chart, shows you how the spores of the apple scab winter over.

You people are working with the Horticulture Department at the College to determine the relative values of Bordeaux Mixture and lime and sulphur as a remedy for this disease, so it will be unnecessary at this time for me to discuss the control of this disease.

SMALL FRUITS.

(BY W. W. FARNSWORTH, OHIO.)

Those of us who have been attending these meetings the last ten or fifteen years have noticed a great change in the topics that have been discussed and the interest taken in these topics. I can easily remember only a few years ago that the discussion of apples would bring out little or no interest.

One year, some twelve or fifteen years ago I put a question on the program, partly for my own instruction: "Will it pay to plant apples on ground worth $100 per acre?" After it was discussed the consensus of opinion was that it would be better to plant our apple orchard on untillable land because we were devoting our valuable lands to something else. When the apple was so regarded, small fruits held their own.

Now we have gone to the other extreme, and the apple rules, and we are neglecting our small fruits.

The small fruits are valuable because they require a small acreage and a small capital; and if you are not far from the market they are easily disposed of and with the average trucker who has more or less of a family to assist in their care, they become a means of real profit.

This part of the subject has been discussed so I do not care to go into details but give you a few of the features that appeal to me as being the most essential.

I will limit my remarks more especially to the strawberry and currant for the reason that while I have grown blackberries and raspberries in the past I have not been doing so of late.

As to strawberries I do not think it is necessary to say anything about the need of humus because it is understood to be one of the foundations

of success. In the case of the apple you have from five to fifteen years in which to build up a good root system, which reaches down and occupies the whole surface of the ground, and there is time for the soil to be filled with the elements which are to feed these roots as it should be to produce the requisite fruit, but with strawberries this is different. The plant that was set out last spring has but one season to grow, comes into bloom in the middle of May and in a month from that time it has produced a weight of fruit several times the weight of the original plant. That plant food must be in such a shape that it can be taken up very rapidly. Early in the season, during the cooler weather, while the strawberry is making its wonderful record, the plant food in the soil does not become available very rapidly. Nitrification does not take place rapidly during the cool weather. While the strawberry is not hard on the soil, does not take a vast amount of fertilizing elements from the soil, still, that soil must be in such a condition that the plant can take up the food very rapidly. I have always felt, that a soil that was mellow and full of humus so that the roots could penetrate freely, and so that the drouth that is liable to come will not affect the plants, such a one will yield better results than a soil that was full of plant food but in poor mechanical condition. I had that illustrated and emphasized on the crop I raised the past year. About three years ago I bought a piece of land, thirteen acres of heavy timber. It was cleared off and the stumps taken off and drained and put into corn the first year. The following spring, two years ago this spring, we planted it to strawberries. The first crop came last spring. You remember what kind of a season we had. There were frosts and heavy rains and warm weather and frosts again, and all around me the neighbors did not have more than thirty to fifty per cent of a crop. We had to encounter the same difficulties that they did but in spite of the frosts and all the drawbacks, we harvested one of the finest crops we ever had and I think it was because of the large amount of humus in that soil. The plants were so full of vigor that even after the third lot of blossoms had dropped off because of the frost, there was still vigor enough to put forth blossoms sufficient to produce a very fine lot of berries and they were enough larger to make for the possible loss because of the frost and other causes.

We can not all have new ground but we can try to imitate that and try to put our soil in condition of new ground as nearly as possible. Strawberries require a great amount of moisture; require a soil that is moist. However the ground that is naturally wet will stand better when drained but I do not think it yields quite as good strawberries. Personally I prefer artificial drainage and that done thoroughly.

One of the best ways to put this soil in condition is to get clover sod or plow under rye and vetch or cow peas,—anything that will fill the soil full of humus. Do not plow under a great big crop of vegetable matter and then proceed to set plants at once. Humus is decayed matter so without that decayed condition you will not be able to get any benefits.

Take clover sod and set out the berries the coming season. Begin applying stable manure early and then plow just before ground freezes. I like fall plowing for strawberries; the manure that was applied last fall will have leached down all through the soil; it has become mingled

with the soil it has caused at the present time a larger growth of clover sod and soil. By this means you have saved every bit of the fertilizing value of the manure and you have grown more humus. If that has not been done, feed up your soil during the coming season by applying on it as early in the spring as possible stable manure. I am in favor of early spring planting.

Another method: You can take up the plants early, pinch off the blossom stems, set in beds, let set for two or three weeks, and after these plants have been set out and properly cared for, they will throw out short feeding roots. Then they can be transplanted again during the summer. That is not the best way, but it will do all right if you are unavoidably detained because of other work. It is a good plan if you are sending off for plants and they reach you in bad condition. They can be put in a bed in this way and they will not be so likely to die.

If you have the ground fall plowed, you can begin to work it in the spring, cutting with a disc and rolling. The ground for strawberries should be pretty firm. Will get a better growth and the plants the first year will fruit better. The ground should be worked down in good condition so as to make it as firm as possible.

I plant with a machine but I do not think there is much advantage in using a transplanter except in a dry time although the work can be done rapidly, setting out a row of plants as fast as a team walks along and each plant is watered as it is set out.

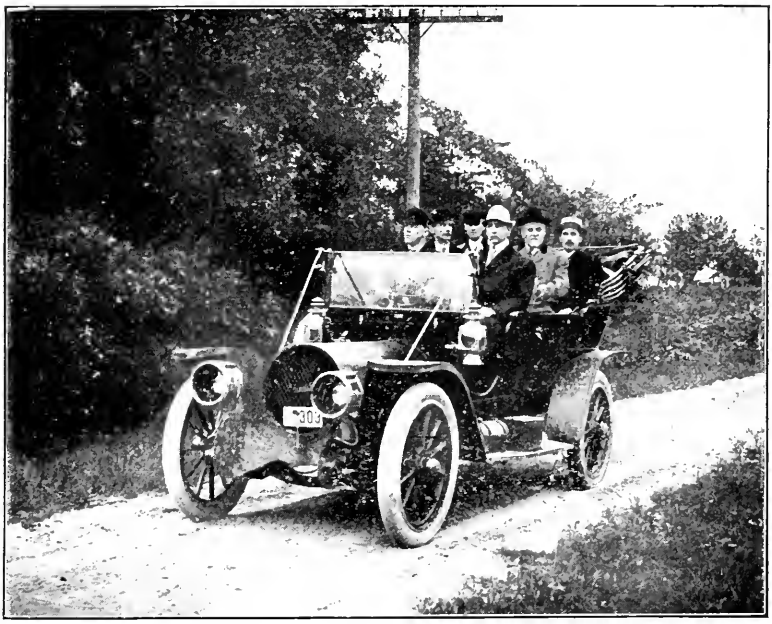
There are some things that we make a point in doing. We go right over and pack the ground very firmly. One thing, commercial growers understand and that is never to take plants from a bed which has born fruit. The old strawberry bed is so exhausted of its energy by the production of a large crop of fruit that the young plants are lacking in vigor and vitality. This is one mistake which is the cause of more failures perhaps than most anything else on the part of amateurs. Select your plants from beds which have never born any fruit. Another thing in taking up these plants never allow them to dry out. Take up a handful of plants and cut off the roots. Set them all out with the roots and if the roots become tangled, you should take pains to straighten them out and by cutting them off to three or four inches in length, these roots being near the surface, the ground will start and go to feeding the plants and they will then begin to grow all right.

Begin cultivating the ground as soon as you set the plants. The strawberry must have moisture and the ground that has been rolled loses this by evaporation. Also the ground which is of a light sandy nature, if it is rolled down smooth in the spring, the winds blowing over it will blow soil away from some of the plants on higher ground and cover others on lower ground. We avoid that by cultivating.

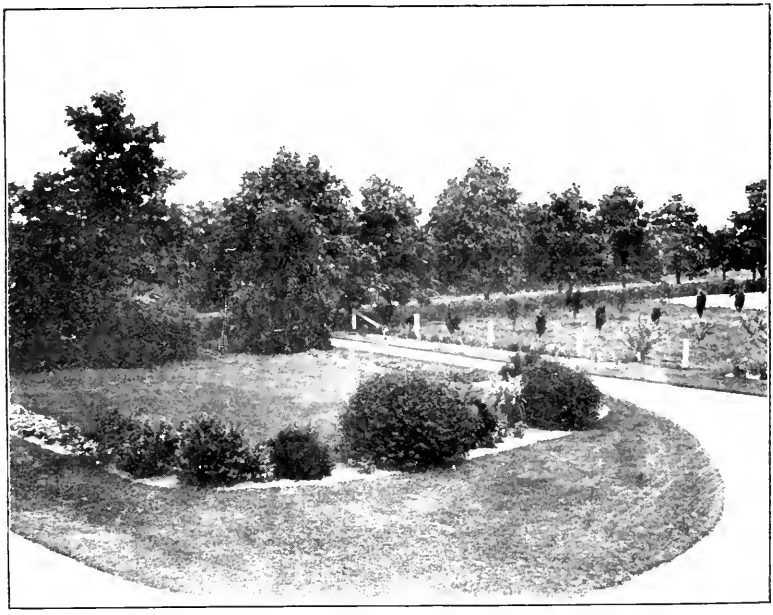
The cultivation through the summer consists of hoeing often and cultivating with a double cultivator. There is nothing like an earth mulch. This helps to hold the moisture and also to keep down the weeds especially after the runners have started. It is cheaper to go through it before it gets very weedy than to let it go longer when you will be obliged to go through and take out the weeds from among the runners.

Always keep the blossoms cut off from newly set plants. The new berries do not amount to anything and they are too much of a tax on the vitality of the newly transplanted plants. You want to save

Ten-year-old Wagener and Jonathan orchard of E. W. Lincoln near Greenville.



A bunch of Battle Creek fruit enthusiasts on their way to the C. E. Young orchard.



The experiment Station grounds at South Haven, Frank A. Wilkin, Supt.

that energy; we formerly cut off the first runners, but we have abandoned that practice; now we let them throw out runners, and when a damp time comes, these runners are separated out and the young plants are placed where needed in the row. Let them run along until perhaps September when there is a moist time and by keeping out the cultivator for a couple of weeks, the runners have a chance to go across the rows and then the rolling cutters cut these off, leaving a row fifteen or eighteen inches wide. In this way, we get a good row system. Then we go through varieties which form too many plants with hoes which are cut down to three or three and a half inches wide, shaving crosswise of the row. We leave a strip across the row and shave off another strip just deep enough to cut off the crowns of the plants. If you do not cut deep enough to cut off the plants, continue going a little deeper.

You cannot grow the best crop of some varieties of strawberries, without thinning any more than you can grow first prize corn with a dozen stalks in a hill. Of course this will depend upon varieties. The Warfield and Dunlap will grow more plants than some others and they are liable to become weeds. A weed is a plant out of place. When two strawberry plants are where one only should be then one of the plants is a weed and should be removed. This is much better done early. Remove that robber plant so that the rightful occupant of the ground may have an unobstructed feeding ground.

We begin mulching along about the middle of November. We do not wait until the ground freezes up—we began this year about the middle of November and we are nearly done by this time. We use wheat straw, oat straw, and sometimes some other material. This question of mulching is a problem that is quite a puzzle in many localities. Some use marsh hay. Some have grown mulching materials by sowing corn. Some sow oats among the plants but I never had faith enough in that to try it. You know that during August and September it is pretty dry and a growth of oats or barley is robbing the plants of just so much moisture which they should really have in building up a good, strong system so it looks to me as though it was a positive damage to the plant rather than a help. Some use manure but this is usually so full of weed seed that it makes a lot of trouble in the spring. You should cover just deep enough to hide the plant. You can use most anything for a mulch that will do this.

In order that strawberries prove a profitable crop from a commercial standpoint you must give attention to the matter of variety which your market demands. If you cater to a nearby market, you will find that you will not be very apt to pay much attention to firmness at least not so much as you will to whether the berries are of a dark or light color. Some localities require a berry that is a light color while others require a dark red berry. Under our conditions we grow a great many cherries so we can not grow late varieties of strawberries. On the other hand, early varieties with us are not very profitable as a rule because our markets are filled up with berries from the South, so we naturally take the middle of the road class such as the Highland, Dunlap, Warfield. Some of our neighbors have other varieties and do well with them. There is one new variety lately introduced which was originated somewhere out in Missouri. One year's experience with them has been very satisfactory to us. They make an ideal row, are strong hardy plants, fruit

well and have fine stems and leaves and the fruit looks like fancy Gandy. It is called the Columbia, and it is all right for market or shipping.

One requisite of a commercial strawberry is firmness so that it can stand shipment without getting soft. Of course in packing, proper conditions must be observed. I had a little experience last year that I will relate. During the forepart of the season, the weather was cool and for a week after, I began picking. We had made arrangements with a couple of teams to be in readiness in the section where we could get pickers with directions to bring them if the weather warmed up. Well, all of a sudden the weather did warm up and the berries began to ripen. The pickers came on and worked as hard as they could but the following Monday it was so hot that a third of them were laying in the shade. The berries were piling up on us. The pickers were not making headway. We had a large number of plants that the fruit was a little soft and I thought the thing to do was to plough these under. So I set the teams to work. It was a hard thing to do and seemed like a great pity but by this prompt action we were able to pick the rest of the berries and the results proved the wisdom of the act. If we had hesitated a couple of days the berries would have been spoiled so by sacrificing a few of them we saved all the rest. I relate this to emphasize the fact that we must be prepared for any emergency that may arise. The strawberry business is not something that you can get started and then go away on a visit and then expect everything to go on smoothly. You must be right on hand to attend to all the details and you cannot leave this to someone else.

We do not sort our berries only as the pickers sort them; we do not strive for a fancy berry; just a first class genuine article. We do not attempt to grow by hill culture.

CURRANTS.

Now, as to currants. The currant has been very much neglected. You will understand the fruit does not do well in the south. You take it south of central part of Ohio and as a rule it does not succeed. It wants a cool, moist climate and a rich moist soil. It is the greatest feeder of any of the small fruits, so feed them heavily. They can be grown in an orchard. They are a very good financial fruit to grow and they can be picked after the cherries have been harvested.

I set one-year plants, six to eight feet apart and I plant in an apple, plum or pear orchard, but never in a cherry or peach orchard, for peach ground is not usually good currant ground. I have a plum orchard set sixteen feet apart each way which has been planted for fifteen years. At the time of planting, or rather the next year, I set it out to currants. These plum trees tops are just touching when well loaded. Originally I planted currants in the tree row as well as in between the rows but afterwards we took out the row between the trees and left those in the tree row and we have always had magnificent crops. I have been saying these last years. "These currants must come out," but when I would see what fine crops we got and what good prices the fruit would bring, and when I saw that they were not hurting the plums, I just simply said, "We will leave them for another year."

We plant currants either in the fall or early in the spring. While you can plant a currant in May, you do not get the growth that you would if planted the fall before or in early spring. They should be planted rather deep. Cut the tops back to four or five inches. One very important fact is to get six or seven branches started close to the ground. An advantage in doing this is after they have borne two or three crops you can cut out part of the old branches and let the young ones come in to take their place. When we set them out first, we cut them back and plant them deep and the first winter you have them on this heavier ground, plow up to them in the fall and use a cover crop, such for instance as turnips. Do not plow deeply but keep them thoroughly cultivated then prune for the first few years and do not let too many shoots grow. After three or four crops, then begin to thin out the old wood.

The insect enemies are the currant worm and the borer and a few fungus enemies, but our currants stand right in our plum orchard and get the same spraying which is given the plums, which will destroy any fungous disease on the currants and then as soon as the blossom falls, we spray the plum tree three or four times with lime and sulphur and arsenate of lead at intervals of four or five days. Our practice and experience have been that to prevent curculio we must spray oftener than usually recommended, and this spoils current worms. Then as soon as the currants are off, we spray the plums for the prevention of rot, and this spraying also has its effects on the currant. We have had no trouble whatever with the current worm, or the scale, or any of the fungous diseases that used to trouble us. The harvesting of the currants is the easiest of all matters. We let them go until the cherries are harvested and then go after them. You don't have to look after the clouds as you do with the strawberries. When you go into a currant patch you don't care whether it rains or shines. Then the fruit comes at a time when it is a sort of holiday season in the fruit business and the returns for your work are fully as satisfactory as from any fruit which you can grow.

As to the kind of varieties that is largely a matter of the local market. I have seen sections where the Fay was most prolific but this variety don't amount to anything for me however. The Red Cross are very productive, and of a very good quality, a little mild and light in color. The Wilder is perhaps the best all round currant of them all; not so strong as the Victoria or Red Cross, but good color and prolific. I had patches of them several times where it was utterly impossible to walk down between the rows when loaded. We just had to commence and pick the bushes as we came to them. While the Victoria is not a very large currant,—not so large as the Red Cross—it has a splendid color, is of good quality, and when properly fed give an abundant yield. And then it is a late currant and has the advantage of not being attacked by the borers and brings an excellent price, better than some of the others on the market. The pruning can be done as a renewal system,—the old wood being taken out and the new shoots allowed to come up from the side. Any branches that may droop or that may be broken off should be gotten out of the way.

We begin pruning at any time in the fall and carry it on through the winter.

We use stable manure and cover crops as fertilizer. After the first year or two we quit growing other crops than currants. Then we drill in two or three rows of soy beans, cultivate them at the same time that we do the currants and then in the latter part of August or September, we sow in turnips and after the frosts have killed the soy beans the turnips come on. This cover crop system has been very successful with us.

One point in closing I may mention that it would be well for you to guard against danger in planting currants of their roots working up by freezing during the winter. A better way is to keep them well covered with mulch during cold weather the first year or two.

DISCUSSION.

A member—Have you ever used commercial fertilizer on strawberries and if so when and how?

Mr. Farnsworth—I have used it in different ways. As a complete fertilizer on the plants in summer, after planting, and I have also experimented with nitrate of soda in the spring. I have never got any very definite results. I believe that while a good many do use commercial fertilizer and many get excellent results, yet the commercial fertilizers are at some disadvantage with the strawberries more than with other fruits for the reason that the strawberry demands humus more than any other fruit and that is where commercial fertilizers are deficient. The claim is made that you get a firmer berry by commercial fertilizers. In our work, our markets are not very far distant, and we ship every two hours. Our grocers to whom we ship would rather pay the three or four cents extra for freight for fast freight and have the berry reach them fresh from the vines than to wait until they get them in the ordinary way so we have not had to watch that question of firmness and I am not able to give very much information on this question.

Q. Did you ever try hill culture out?

Mr. Farnsworth—No. In order to use that to any advantage, you would want to have a fancy market. Hill culture is all right, but the great bulk of the strawberries are grown by the thin matted row system. You can get a first-class article and more of them in this way and at a less cost than from the hill system. On the other hand of course there is no question but what more fancy berries can be raised by the hill method than otherwise.

Q. How far apart do you set plants?

Mr. Farnsworth—That depends upon the variety and on the soil. On this new ground, we set out Dunlaps four feet apart each way, which is plenty close enough. If we were planting some other varieties on a thinner soil, we would set them perhaps one foot or eighteen inches apart. I have rows four feet apart and in the rows eighteen inches.

Q. How do you like the London Market currant?

Mr. Farnsworth—I have heard it recommended by many and I bought some of them. If I have the genuine London Market, I don't like it. Either I don't have the genuine article or it is worthless with me.

Q. How much should be expected from an acre of strawberries.

Mr. Farnsworth—Well I never yet got four hundred bushels to the

acre. I have grown one hundred fifty to two hundred bushels. If I got 100 then I am barely satisfied. 150 is a good crop. In carrying on the business on a large scale there is more or less waste. The man who gets more than this off from an average acre is the man who has his own pickers. There is always more or less of a waste. Myself and my best man are right there on the ground and we look after the matter very closely and if we are able to get 150 bushels to the acre we think we have a large crop.

Q. How about a crop of apples. Do these plants take anything away from their strength?

Mr. Farnsworth—If they bear heavily, you must simply feed for two crops. You can't expect that you can get something for nothing.

Q. What kind of soil would you advise?

Mr. Farnsworth—Our soil is a rich chocolate colored loam. For currant soil, I should like to have the ground plowed to the clay.

Q. What sub-soil?

Mr. Farnsworth—Clay sub-soil; surface soil is dark sandy loam.

Q. What do you think of mixing the different varieties in strawberry culture?

Mr. Farnsworth—A good many varieties will not bear at all alone, having imperfect blossoms, and many of these such as the Warfield will not bear alone on account of being of only one sex, but when planted with Senator Dunlap, will prove to be highly productive.

Q. Do you know anything about the Aroma?

Mr. Farnsworth—Yes, it has been a little weak, liable to winter-kill and has not proved very hardy. It is superceding the Gandy in some sections but it is not as successful as the Columbia promises to be with us.

Q. Have you been troubled with strawberry root rot, etc., leaf roller, or other disease?

Mr. Farnsworth—That brings up one point I should have mentioned of rotation; we only pick one year. Ordinarily we plant last spring and pick this coming spring and then plow it under and plant to potatoes, and these are followed by rye which is turned under in the spring before it comes to maturity. Our beds are not infested and we never have any difficulty with root rot or leaf roller; in fact have never seen them on my place and ordinarily we think it costs more to clean out an old bed than to grow a new bed.

Q. What do you think of the black currant?

Mr. Farnsworth—That is largely a question of market. If you have a market that calls for it all right. The same can be said of the white currant, but there has been very little call for it in our market. Black currants are profitable in many places and the Crandall is perhaps the best.

Q. What about sowing mulch in strawberries? Have you tested it?

Mr. Farnsworth—No, sir.

Q. I would like to have question No. 1 answered: "The Wilson Blackberry is playing out"; what varieties take its place?

Mr. Farnsworth—While I have grown blackberries, I have never grown the Wilson; have grown mostly the Eldorado.

Q. Do you know anything about the Dwarf?

Mr. Farnsworth—I have a few of them, but it has not borne yet and I do not know enough of it to express an opinion except by hearsay.

Q. How does the Eldorado compare with the Mercero Eldorado?

Mr. Farnsworth—Not much difference.

Q. I would like to ask if you have had any experience with gooseberries on the market?

Mr. Farnsworth—A few years ago there was a demand at canning factories and we had a few but I do not know enough about them to really express intelligent opinion and so would not like to be quoted as saying just what that was.

Q. I would like to have question No. 30 answered, which is as follows: "How many have had profitable results from the use of commercial fertilizer? Can we afford to buy stockyard manure?"

The Chairman—I would like to have Mr. Friday answer this.

Mr. Friday—Yes, I have had some experience in this and have found both profitable.

The Chairman—Mr. Hilton have you had any experience?

Mr. Hilton—Yes, sir; and I have not found it unprofitable.

The Chairman—I would like to have as many of those present here who have had experience to signify whether you have found it profitable to use commercial fertilizers—hold up your hands.

The Chairman—I see there are five hands up. Now I would like to see how many there are who have used commercial fertilizers and didn't secure satisfactory results.—Not so many.

A member—I would like to have No. 27 answered.

Q. Name a succession of strawberries, early, medium and late for this section.

The Chairman—Mr. Nichols, would you please answer this?

Mr. Nichols—I don't know that I could really give an answer to this question that would be worth very much; but there is the Dunlap and Warfield and William Belt that are a good midseason berry and the Gandy for a late one, but for a very early one, I could not give one that would be satisfactory.

A voice—There is the Brandywine which is a good variety.

Mr. Farnsworth—There is another called the Gibson. It is very fine. I have not grown it this year.

Q. Does anyone know anything about the Aroma.

Mr. Farnsworth—This is a good variety where it will grow.

THE USE OF DILUTE LIME-SULPHUR FOR THE CONTROL OF APPLE DISEASES.

BY 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 russeting 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-sulphur preparations. During the past four years the Bureau of Plant Industry, and some of the experiment stations, have been conducting experiments with lime-sulphur fungicides and the results have been such as to warrant the recommendation of dilute lime-sulphur solution as a substitute for Bordeaux mixture in a large part of the apple spraying operations.

THE LIME-SULPHUR SPRAYS.

For two or three decades a preparation known as the lime-sulphur 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-sulphur wash. The lime-sulphur solution, now rapidly coming into use as a summer spray for apples, is only a modification of the old lime-sulphur wash.

Home-Made Lime-Sulphur Solution.—Concentrated lime-sulphur solution to be diluted and used as a summer spray on apples may be prepared as follows: Boil sixteen pounds of sulphur and eight pounds of lime with about ten gallons of water for forty-five to sixty minutes, finishing with eight gallons of concentrated solution. Then strain and dilute it with water to make 200 gallons of spray. This makes four pounds of sulphur in each fifty 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 pounds of sulphur and fifty pounds of lime and boiling them together for forty-five to sixty minutes, using enough water to finish with fifty 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 seventy-five gallon feed cooker is perhaps the most satisfactory equipment. In diluting for summer spraying two gallons of this solution should be used in fifty 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-Sulphur Solution.—A number of manufacturers are now placing on the market concentrated lime-sulphur solutions to be used as a fungicide and an insecticide. Most of these preparations test 32 degrees to 33 degrees on the Baumé hydrometer and contain in solution about two and one-half to two and three-fourths pounds of sulphur to each gallon. They are practically the same as the homemade solution, but are a little more concentrated and therefore require more dilution. A strength of one and one-half gallons of the solution to fifty gallons of water gives about four pounds of sulphur in each fifty gallons of spray and produces the same results as the home-made solution diluted to contain the same amount of sulphur.

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-sulphur 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-sulphur solution as by the Bordeaux mixture. The lime-sulphur produced very little or no russeting of the fruit and no serious foliage injury, while the Bordeaux injured both fruit and foliage of Ben Davis, Jonathan, Yellow Newtown and some other varieties. The lime-sulphur 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-sulphur 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-sulphur 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.

Results of experiments conducted in Arkansas by the Department of Agriculture were not favorable to the lime-sulphur solution in the control of bitter-rot and apple blotch. These two diseases were checked by the spray, but not thoroughly controlled. There is, therefore, some doubt as to the efficiency of the lime-sulphur solution as a remedy for bitter-rot and blotch.

In both the Virginia and the Michigan experiments the commercial lime-sulphur solution at a strength of two to fifty 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-sulphur solution did not result in injury to fruit or foliage and that it controlled codling moth as thoroughly as when combined with Bordeaux mixture.

EXPERIMENTS OF 1910.

During the past season further experiments with the lime-sulphur sprays were conducted near Waynesboro, Va. A part of the work was conducted as a demonstration in co-operation with the Bureau of Entomology. From seventy-five 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-sulphur solution, one and one-half to fifty, with two pounds arsenate of lead.

Plot 2—Home-made lime-sulphur solution, two pounds of lime and four pounds sulphur to fifty gallons of water, with two pounds arsenate of lead.

Plot 3—Bordeaux mixture, three pounds bluestone and four pounds lime to fifty gallons water, with two pounds 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 Imeperial 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 of 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-sulphur 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 midsummer 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-sulphur.

Bordeaux mixture caused more injury than either of the lime-sulphur 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-sulphur 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 fungi-

cides and about the same was true of cedar rust. The lime-sulphur solution, however, showed some superiority over Bordeaux in controlling cedar rust. This disease seems to yield more readily to sulphur sprays than to copper sprays.

Effect on the Fruit.—There was practically no difference between the lime-sulphur solution and the 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 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-sulphur 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 appearances 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 sulphur 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 1.—Lime-sulphur Solution vs. Bordeaux for Apple Scab.

No. of Plat.	Spray Mixture Used.	Per cent of Scabby Fruit.
1	Commercial lime-sulphur solution (1½ to 50) plus two pounds arsenate of lead	2.2
2	Home-boiled lime-sulphur solution (2-4-50) plus two pounds arsenate of lead	6.1
3	Bordeaux mixture (3-4-50) plus two pounds arsenate of lead	6.2
4	Check, not sprayed	99.8

It will be seen from this table that the home-made lime-sulphur 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), 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-sulphur 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-sulphur 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-sulphur solution was used in the early treatment 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 disease controlled.

In one orchard, which had been sprayed with the lime-sulphur solution, a small percentage of the fruit had a sun-burned 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 sulphur 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-sulphur 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 United States Department of Agriculture, and several of the experiment stations, as well as the work of the orchardists, seem 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-sulphur solution, diluted so as to contain four pounds of sulphur 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 one and one-half gallons to fifty 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. Where it is necessary to spray for this disease, the early lime-sulphur applications for scab may be followed at the proper time with Bordeaux for bitter-rot, thus avoiding the russet and yet controlling the rot.

Arsenate of lead may be safely and successfully used in combination with the dilute lime-sulphur solution for the control of the codling moth and other insects.

WILL ORCHARDING IN MICHIGAN PAY.

(BY BEN NEWHALL, CHICAGO.)

NOTE—Probably no other man is better qualified by reason of long experience and rare good judgment, to discuss, without bias, the subject of this article, than is Mr. Newhall. Thirty-five years of his business life was spent at the head of the well-known firm of F. Newhall & Sons, Commission Merchants, 131 South Water Street, Chicago, during which time he repeatedly visited orchards in all parts of the country, from the Atlantic to the Pacific. But especially does Mr. Newhall know Michigan. He knows it as a man knows his native town; has traveled through and seen it, not from the windows of a swiftly moving train, but on foot, on horseback, and in wagons. His acquaintance among Michigan orchardists is large: he knows not only those who have been successful in their fruit growing undertakings, but those who have failed, or made only partial success, as well.

Is the ordinary city man justified in giving up his business and attempting it?

Thousands of city people have bought, either in the last few months or are now thinking of buying, orchards and farms in all sections of the country.

So widespread has this movement become that the question becomes an important one, and not so easy to answer.

Speaking in a general way, the answer depends on four conditions; first, the bank account; second, the experience; third, the industry; and fourth, the ability to secure proper help.

But speaking specifically, a full answer would take an encyclopedia.

It seems simple enough—buy your land, stick in your trees, pick your crop and count your profits.

Just try it and see. There are more angles to the business and more conditions to consider than in a mail order business in the city of Chicago.

This great movement toward the country started some years ago with the orange groves of California and Florida. A little back-set in those two sections cooled people's ardor for a time, but not for long, and it broke out again toward the apple and peach lands of Washington, Oregon, etc., and has lately expanded into other western states that depend on irrigation, and has last of all taken in Michigan.

Twenty years ago Michigan was an apple state and raised apples that were worth while; today she only raises imitations. There are exceptions that will be noted later.

In 1896 more really fine apples were sent out of Michigan than have been raised in the whole irrigated country since they became states.

It was too easy, the raising of orchards in Michigan. Insect enemies were few, fungus diseases almost unknown, and all a man had to do in planting an orchard was to select good varieties, plant them with reasonable care, wait a few years and pick his fine apples.

Today it's different; insects by millions and new diseases galore. Every bushel of good apples raised today costs time and effort, and it's the same with peaches, cherries, pears, in fact, with all fruits.

Few of the people now rushing to the farms and orchards realize this. If they did, there would be less haste and fewer disappointments.

The orchard business in Michigan is good enough. There is nothing better for those who understand it; but so is the stock exchange and the board of trade for those who understand those lines. For the ordinary

city man, professional or otherwise, to attempt to personally plant and grow a commercial orchard without expert help, is about as hopeless as for the old time farmer to go into Wall Street.

But as before stated, the business is good—for those who know the game. There are not to exceed sixty orchards of any size in the State of Michigan, north of Grand Rapids, that have had expert care from planting time on. I know nearly all of them, and if there is a single one of the sixty that has not made handsome returns I don't know where it is, and I do know of many from which returns have been phenomenal.

I cannot say as much for the district south of Grand Rapids, for, while the Fennville District has had some remarkable crops of apples the big freeze in October, 1905, or 1906 wiped out many good peach orchards and damaged some others.

On the other hand, I know of hundreds of orchards, many of them in good location and in good soil, in all parts of Michigan, that for lack of proper treatment, have made an actual loss to the owner.

Between these two extremes are orchards that have had fair or ordinary care. Such orchards have usually averaged a reasonable, though not large, yearly profit to the grower.

While no man living can at the planting of an orchard look far enough into the future to predict what a given orchard may or may not produce ten years hence, or what prices may be, any one with fair judgment and long experience as a grower can come pretty near telling what a number of orchards under given conditions are likely to do *on the average*, in a locality with which he is well acquainted.

The following sets of figures are presented, therefore, as being an average of what might reasonably be expected under the conditions named in Western Michigan.

The first column represents probable results on an average of the orchards which receive *expert care* from the first, including selections of the proper location and soil; the second column represents what might be expected under the *usual average care*. Neither column is representative of the great number of neglected orchards so common in Michigan today.

It will be noted that the estimates are made covering four periods, the first four years (during which there will be almost no return except from crops planted between the rows) being the first period; the next three years, which are fair bearing years for cherry and peach trees, but with slight return from apple trees, the second; the next three (during which the cherry and peach should bear heavily and the apples lightly) the third.

The eleventh, twelfth and thirteenth years (being the years during which the peach trees will commence to go backward, and being heavy bearing years for cherry and showing good yields for apples of the right varieties) constitute the fourth period.

To those unacquainted with the few high class orchards of this section of the state, the figures in the first column will look wrong; the picture of the average uncared for orchard of Michigan is hard to dispel, but to such I would say these figures are not made by guess work, but by taking actual average results for the last few years of a certain number of the good orchards of the section above mentioned; likewise the second column

figures are an average of results from the middle class of orchards. There is no getting away from these facts.

Each one of us can have his own idea as to whether these actual averages of past yields and prices are safe to count on for the future. They may not be, and yet they may be exceeded in both respects.

I know of orchards where actual results this past season were far ahead of these figures, not only on apples, but on cherries and peaches as well. I have one in mind, a little apple orchard which I bought near Grand Rapids.

There were six acres of Steel Reds, Spys and Jonathans. The price paid was high ($4.25 per barrel f. o. b. for all these varieties; there were a few trees of odd kinds which I did not buy) but was not a record price for last season by any means. There were a little over 1000 barrels of those varieties on about 170 trees. The gross sales at the station, including the culls, was $4800.00. The barrels, picking and packing together cost approximately $750.00, leaving net receipts for the fruit on the trees of $4050.00, or say $650.00 per acre.

Turning to my estimates, you will see that the highest average on apples for any period is $72.00 per acre, which gives quite a leeway when compared with $650.00. True, the price paid for this little orchard was high, and the yield good, but far from a record in either respect, for yields of ten barrels per tree and prices of $5.00 per barrel are not uncommon. So much for apples.

As to peaches, the highest estimate I have made is $165.00 per acre per year.

One of the largest growers of the state near Frankfort gave me his figures a short time since, and they showed for last year's (1909) operation over $800.00 per acre net on one orchard of Elberta peaches. Considerable leeway there, too, is there not? The same grower has a large acreage of cherries. He puts them up artistically in western style, and of course gets prices above the average. His orchard of Montmorency cherries netted him over $1,000.00 per acre this past year, and his Oxharts much more. The highest estimate I make is $400.00 per acre on cherries.

It may be said: "It is not safe to base future expectation on present day prices." That's true enough, and were I going into a large planting proposition I should base my figures on a yield 50% less than I really expected, on prices 50% lower and on expenses and original cost of plant 50% higher. If on that basis I could not see a future profit, I would not start.

It's the fashion for the trade and the consumer to complain of present high prices on fruit and to predict lower ones. I always do, and yet, ten years from now, prices may be higher instead of lower.

Ten years ago, after a heavy crop, it was freely predicted that we would never again see apples as high as $2.00 per barrel at the shipping station. Since that time $4.00 has been paid several times for large orchards and in a few instances $5.00, and the average has been nearly $3.00, so predictions of lower prices may not be fulfilled, and they may be even higher than now.

Some will say: "You cannot compete against the west," but that is a mistake. Michigan can compete with any section, if they will but use the methods of the west.

We hear wonderful things about the west, and certain isolated orchards

have done wonderful things, to my certain knowledge. I know of some five hundred dollar per acre crops, and a few double that, but I know of the same in Michigan, and my belief is that while the west has, to date, averaged earlier crops and better color than Michigan, the well cared for orchards of Michigan will be doing business long after those of the west have stopped bearing.

The difference in flavor, in cooking quality, in freight rates and in cost of land is all largely in favor of Michigan, and my own belief is that the difference in net returns will average on the same side, for Michigan is waking up.

PROSPECTS TWO 500 ACRE ORCHARDS IN WESTERN MICHIGAN.

The figures in the left hand column are based on returns from actual orchards in first-class location, with good soil, and that have had expert care from the beginning.

The figures in the right hand column are based on ordinary location, average soil, and on the ordinary or average care given many Michigan orchards today.

Original Investment.

500 acres land (cleared)	$21,000 00	$14,000 00
Ten teams, utensils, harness, tools, etc	6,500 00	3,750 00
Packing sheds to be built when orchard starts bearing	2,000 00	
Sheds and fences	1,750 00	750 00
Trees and plantings of same	8,250 00	5,000 00
Total investment	$39,500 00	$23,500 00
First four years' operation—1st period—income per year on potatoes, beans, and clover, alternating, average	8,500 00	1,400 00

Expenditures per Year.

Work on orchard including clover plantings on best orchard, $4.50	$5,300 00	$1,610 00
Taxes and ins., depreciation, repairs, etc	1,250 00	650 00
Overseeing and incidentals	1,500 00	750 00
Total expenditures per year	$8,050 00	$3,010 00
Net income per year	450 00	*1,610 00
Net income, four years	1,800 00	*6,440 00
Value of orchard end four years	62,500 00	30,000 00
Total assets end four years	64,300 00	23,560 00
Less original investment	$39,500 00	$23,500 00
Net profit four years	$24,800 00	$ 60 00
Net profit per year	6,200 00	15 00
Interest on investment per year	16%	1-15 of 1%

Next Three Years' Operations.

Second period—fifth to seventh year.

Income per year.

1 case cherries per tree $1.25 each per case..	$25,937 50	
½ case cherries per tree 75 cts each per case..		$ 7,781 25
1 bushel peaches per tree $1.00 per bushel...	20,750 00	
½ bushel peaches per tree 60 cts per bushel..		6,225 00
Total income per year	$46,687 50	$14,006 25

Expenditures per Year.

Work on orchard (including clover on best orchard)	$6,000 00	$1,610 00
Taxes and Ins., dep., repairs, etc	1,250 00	650 00
Overseeing and incidentals	2,250 00	750 00
Total expenditures per yr.	$9,500 00	$3,010 00
Net income per year	37,167 00	10,996 25
Net income three year term	$112,561 00	$26,548 75
Net income first four year term.....	1,800 00	*6,440 00
Total net income seven years	$114,361 00	$26,548 75
Value of orchard end seven years	$125,000 00	$50,000 00
Total assets end seven years	$239,361 00	$76,548 75
Less original investment	39,500 00	23,500 00
Total net profits for seven years	$199,861 00	$53,048 75
Average net profit per year	28,551 57	7,578 40
Percentage profit on investment	71%	32%

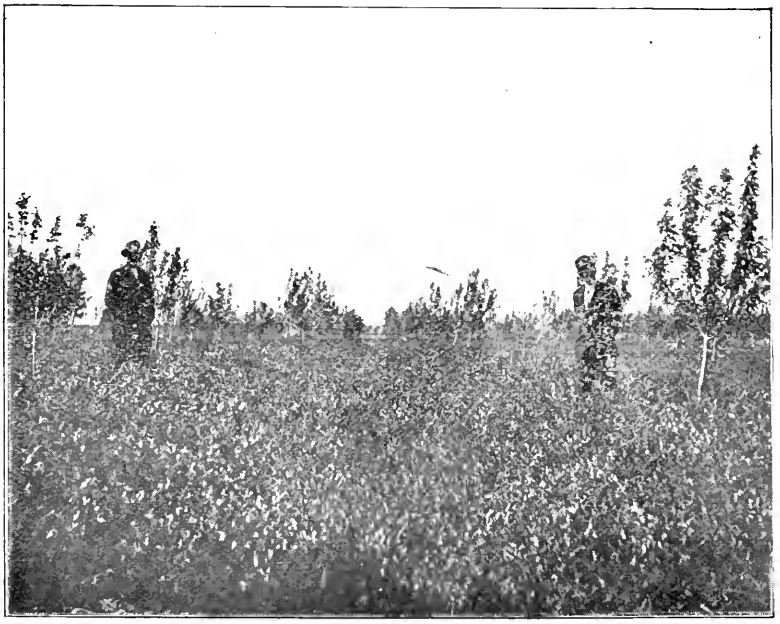
Next Three Years' Operations.

Third period—eighth to tenth years inclusive.

Income per Year.

Cherries 1½ cases per tree $1.25	$38,906 25	
Peaches 1½ bushel per tree $1.00	31,125 00	
Apples ½ bushel per tree 90 cts.....	6,075 00	
Cherries ½ case per tree 75 cts.....		$7,781 25
Peaches ½ bushel per tree 60 cts.....		6,225 00
Total income per year.....	$76,106 25	$14,006 25

Plat on the left received nothing while the one on the right received a complete fertilizer as below.



Experiments in use of Commercial Fertilizers on fruit farm of Edward Hutchins near Fennville. Applied at the rate of 1,000 pounds of 2-7-10 per acre, except on right plat the potash was left out.

Experiment on the use of Commercial Fertilizers on Clover in Edward Hutchins' orchard near Fennville. One plat given about 1,000 pounds of 2-7-10 mixed fertilizer to acre, while other received none.

Expenditures per Year.

Work on orchard (inc. clover on best or.)	$6,300 00	$2,610 00
Taxes, Ins., Depreciation, Repairs, etc.	1,250 00	650 00
Overseeing and incidentals	3,000 00	1,000 00
Total expenditures per year	$10,550 00	$4,260 00
Net income per year	65.556 25	9,746 25
Net income three years	196,668 84	29,238 75
Net income 1st seven years	114.361 00	26,548 75
Value of orchard end of ten years	200,000 00	60,000 00
Total assets end ten years	511,029 84	115,787 50
Less original investment	39,500 00	23,500 00
Total net profit in ten years	471,529 84	92,287 50
Average net profit per year	47,162 98	9,228 75
Int. on investment per year	122%	39%

Next Three Years' Operations.

Fourth period—eleventh to thirteenth years inclusive.

Income per Year.

Cherries 3 cases per tree $1.25 per case	$77,812 50	
Peaches 1½ bu. per tree $1.00 per bu.....	31,125 00	
Apples 3 bu. per tree 90 cts per bu.....	36,450 00	
Cherries ½ case per tree 75 cts. per case.....		$7,781 25
Peaches ½ bu. per tree 60 cts. per bu.		6,225 00
Apples ½ bu. per tree 40 cts. per bu.		2,700 00
Total income per year	$145,387 50	$16,706 35

Expenditures per Year—Same Years.

Work on orchards (inc. clover on best or.)...	$7,000 00	$3,000 00
Taxes, Dep., Ins., repairs, etc	1,250 00	650 00
Overseeing and incidentals	3,500 00	1,250 00
Total expenditures per year	$11,750 00	$4,900 00
Net income per year	133,637 50	11,806 25
Net income three years	401,012 50	35,418 75
Net income first ten years	311,029 84	55,787 50
Value of orchard end fourth term	300,000 00	70,000 00
Total assets fourth term	$1,012,042 34	$161,206 25
Less original investment	39,500 00	23,500 00
Total net profits 13 years	$972,542 34	$137,706 25
Average net profit per year	74,810 90	10,593 00
Int. on investment per year	195%	45%

CHERRY ORCHARDS PROFITS.

RESULTS IN NORTH MANITOU CHERRY ORCHARD 1910.

106 bearing trees—wild cherry or Mazzards not included, being 66¼% of an acre.

Trees average 16¼ ft. apart or at a rate of 160 trees to the acre.

Yield by Varieties.

	No. of crates	Average gross sales per crate Chicago	Average net sale per crate f. o. b. island	Net sales per acre f. o. b. Island	Gross sales per acre f. o. b. Chicago
10 trees Early R.	29	$2.00	$1.75	$779.00	
19 Royal Ann	39	2.02	1.70	510.00	
20 Montmorency	86	2.04	1.71	1183.00	
20 Suda Hardy	45	3.15	2.85	1040.00	
37 Blk. Tartarian	197	2.85	2.50	2132.00	
106 Total	396	....	.....	$1337.00	$1532.00
Expenses per acre picking and crates				$175.50	
Net return f. o. b. Island on the trees				1161.50	

Expense per acre picking and crates .... $ 175 50
Net return f. o. b. Island on the trees 1,161 50

Best Yield in Orchard.

Seven consecutive trees of Black Tartarian standing together in the north-west corner of the orchard away from any other cherry trees yielded 71 cases (besides windfalls and dropped cherries). These 71 cases sold at an average price of $2.85 or approximately $2.50 net f. o. b. the Island, or at the rate of $4,056.00 per acre net.

North Manitou Island, Michigan.

Ben Newhall.

SPRAYING PEACHES FOR THE CONTROL OF BROWN-ROT, SCAB, AND CURCULIO.

BY W. M. SCOTT, OF THE BUREAU OF PLANT INDUSTRY, AND A. L. QUAINTANCE, OF THE BUREAU OF ENTOMOLOGY.

The peach-growing industry in the United States at the present time has become a very important one, being second in extent among fruits only to the cultivation of the apple. According to the 1900 census there were in the territory east of the Rocky Mountains, which is subject to the troubles treated in this bulletin, approximately 91,000,000 bearing peach trees. Since that time the number of bearing trees has increased by perhaps one-fourth, making a possible total of 113,750,000 trees. Care-

ful estimates indicate that the quantity of fruit annually harvested by peach growers in this territory is not less than 10,000,000 bushels. Thus the crop for 1910, although an unusually large one, was for the territory mentioned, probably not less than 12,000,000 bushels, with a gross valuation of about $12,000,000 to $16,000,000.

Although many insects and parasitic fungi occur on the peach, comparatively few are of much economic importance. Of the diseases of the peach, the brown-rot (*Sclerotinia fructigena* (Pers.) Schröt.) and scab, or black-spot (*Cladosporium carpophilum* Thüm.), are responsible for practically all of the damage to the fruit crop and the insect injury is limited almost entirely to the attack of one species, the plum curculio (*Conotrachelus nenuphar* Herbst.).

The brown-rot probably causes more loss to peach growers than all other maladies of the peach combined, with perhaps the exception of "yellows," which kills the trees outright. In the South the brown-rot often causes the destruction of half or even practically all of the crop, and throughout the territory under consideration the annual shrinkage in yield is perhaps 25 to 35 per cent of the crop, representing a valuation of about $3,000,000 to $4,000,000. Although the brown-rot is always present in the peach orchards of humid sections, causing a rotting of a certain proportion of the fruit, it becomes notably destructive only under certain weather conditions, when within a period of 10 days or two weeks it will spread so rapidly as to result in the destruction of practically the entire crop. Such disastrous outbreaks are likely to occur during moist, humid weather as the fruit begins to ripen. The brilliant prospects of the orchardists are thus within a few days obliterated as if by fire.

The peach scab is the only other destructive disease of the fruit in the eastern United States, and, while it does not occur in such sudden and disastrous outbreaks, the sum total of the injuries caused by it are very important, resulting in a shrinkage in crop values of perhaps $1,000,000 annually. This disease occurs all over humid America where the peach is grown and is especially troublesome east of the Allegheny Mountains. It not only renders much of the fruit unfit for market, but so mars the appearance of the marketed fruit as to reduce its value.

The plum curculio is of scarcely less importance in its relation to the successful production of the peach than the diseases above mentioned. By its punctures of the fruit in feeding and egg laying and the injury resulting from the larvæ, or grubs, within the fruit it brings about a reduction in yield of a valuation amounting to perhaps not less than $3,750,000 annually. The puncturing of the fruit also greatly favors the brown-rot, and curculio control is a prime essential in preventing losses from this malady. Although the plum curculio is very generally distributed eastward of the Rocky Mountains, it is especially abundant in the Middle and Southern States. During years of full fruit crops its injuries are less important, simply more or less thinning the fruit; but when the crop is light little fruit may escape its ravages.

The troubles mentioned have more than kept pace with the development of the peach-growing industry, and the cultivation of this crop, especially in the South, has become more and more hazardous. Practical means for their control have, therefore, been most urgently needed, and much attention has been given by investigators of the Department of Agriculture and of the various agricultural experiment stations to sup

ply this want. While it has been possible by the use of certain sprays, such as Bordeaux mixture and Paris green, to effectively reduce these troubles, the sensitiveness of the foliage and fruit of the peach has practically prevented their employment, and the peach grower has been almost helpless against them. A spray effective in the control of these troubles and which at the same time may be used with perfect safety on the trees and fruit has been the most important requirement to place the industry on a reasonably secure foundation.

Experiments begun by the Bureau of Plant Industry some three or four years ago and carried out under varying climatic and other conditions in different parts of the eastern United States have established beyond question the effectiveness of the self-boiled lime-sulphur wash for the control of the fungous troubles mentioned. Earlier experiments by the Bureau of Entomology had already shown that by the proper use of arsenate of lead the curculio could be largely controlled, though on account of danger of foliage injury its use had not been unqualifiedly recommended. Cooperative experiments between the two bureaus have shown that the fungicide and arsenical may be used as a combined spray with satisfactory results in controlling these troubles and without injury to the fruit and foliage of the peach. Hence, there is now available a satisfactory method for the control of these three serious obstacles to successful peach culture.

In the following pages the brown-rot, peach scab, and curculio are treated with reference to their occurrence on the peach, and results are given of experiments and demonstrations in their control conducted jointly by the Bureau of Plant Industry and the Bureau of Entomology during 1910. The writers were assisted in this work by E. L. Jenne and E. W. Scott, of the Bureau of Entomology, and by Leslie Pierce and G. W. Keitt, of the Bureau of Plant Industry.

BROWN-ROT.—NATURE AND CAUSE OF THE DISEASE.

Brown-rot is a fungous disease which affects the stone fruits, such as the peach, plum, and cherry, and to a less extent some of the pome fruits, such as the apple, pear, and quince, producing a so-called rot of the fruit and blight of the twigs. It is caused by a fungus known to botanists as *Sclerotinia fructigena* (Pers.) Schröt. Brown-rot is the common name usually applied to the disease, but monilia, the generic name of the imperfect stage of the fungus, is often used by some of the older fruit growers.

The disease appears on the fruit as a small circular brown spot, which under moist, warm conditions enlarges rapidly, soon involving the entire fruit in decay. The spots do not usually become sunken, and the fruit remains plump until almost entirely decayed. The fungus growing in the tissues of the fruit breaks through the skin, forming small, grayish tufts of spore-bearing threads. These tufts, although few on young spots, soon become so numerous as to give the diseased area a grayish, moldy appearance, which is responsible for the term "peach mold" sometimes applied to the disease. The spores which are produced in great abundance by these fungous tufts are blown by the wind and carried by insects and birds from fruit to fruit, tree to tree, and orchard to orchard. Finding lodgment on the fruit under favorable conditions of temperature

and moisture, these spores germinate, producing a fungous growth, which ramifies and kills the tissues. These dead tissues turn brown, and the fungus breaks through the surface, producing another crop of spores. The process is very rapid, only a few days intervening between one generation of spores and another.

DAMAGE TO THE PEACH.

Although the young fruits soon after the petals are shed may become affected, as a rule no marked outbreak occurs until the fruit is half grown or larger, and the greatest destruction is wrought at harvest time. The fruit crop may reach maturity in perfect condition and yet be destroyed before it can be picked. Moreover, the fruit may become affected in transit or after reaching the market. It is no uncommon experience among peach growers to have a carload of peaches leave the orchard in apparently good condition and arrive on the market specked and practically worthless, owing to the brown-rot fungus. Through handling by pickers and packers some fruit in every package may become contaminated with spores from a few diseased fruits in the orchard. Enough moisture usually develops in the car to germinate the spores, and if the refrigeration is poor the fruit is likely to go down in partial or total decay before reaching the consumer.

The fungus also attacks the blossoms and extends from these into the fruit-bearing twigs, often girdling them. In a wet spring the fruit crop may thus be materially reduced, although this form of attack is only occasionally serious. In like manner the fungus may extend from diseased fruits into the twigs. Following an outbreak of brown-rot on the fruit, these twig infections may become so severe as to give the trees a blighted appearance.

WINTER STAGE AND SOURCE OF INFECTION.

The affected fruits largely drop to the ground, although many of them hang on the trees for months. They become dried and shriveled, and at this stage are known as brown-rot mummies. The fungus passes the winter in these mummies, which form the chief source of infection for the new fruit crop. When moistened by spring rains, the mummified fruits on the trees and on the ground become covered with fruiting tufts of the fungus, producing countless numbers of spores.

After 18 months, or at the end of the second winter, about the time peach trees are in bloom, there arise from the mummies on the ground, partly or entirely covered with soil, fruiting bodies representing the perfect stage of the fungus. These are dark-brown somewhat bell-shaped disks, resembling toadstools. In them are produced an abundance of ascospores, which rise in the air and are wafted by the wind. These, as well as the summer spores (conidia), serve to infect the blossoms and young fruits. The propagation of the fungus being thus so abundantly provided for, it is not surprising that a crop of fruit may be destroyed without much warning.

INFLUENCE OF THE WEATHER AND INSECTS.

In sections where the brown-rot is prevalent the spores are practically omnipresent, and only favorable conditions for their germination

and the rapid growth of the fungus are required to start an outbreak of the disease. The most important factor is excessive moisture in the form of rain, which not only favors the production and germination of the spores and the growth of the fungus, but renders the fruit soft and watery, and therefore more susceptible to the disease. High temperatures also favor the disease, although the fungus grows readily in mild summer temperatures. Prolonged cloudy weather with frequent light showers is more dangerous than a hard rain followed by clearing. Warm, muggy weather, when the fruit is maturing, is often disastrous to the crop.

Insects, especially the curculio and certain plant bugs, play an important part in the distribution of the spores and the infection of the fruit. Although the fungus under favorable conditions is apparently able to pass readily through the unbroken skin of the fruit, it is greatly aided by insect abrasions. In the process of feeding and egg laying, the curculio punctures the skin of the fruit, opening the way for the fungus and in many cases perhaps actually inserting the spores. This insect may render spraying for brown-rot partially ineffective by breaking the sprayed skin of the fruit, thus exposing the flesh to attack. In the treatment of the disease it is, therefore, important to combine an insecticide with the fungicide so as to destroy the beetles.

TREATMENT.

Experiments conducted by the Bureau of Plant Industry during the past four years have shown conclusively that this disease can be controlled by the use of self-boiled lime-sulphur mixture.[1]

PEACH SCAB.—ECONOMIC IMPORTANCE OF THE DISEASE.

Of the diseases affecting the fruit of the peach, scab is second only to brown-rot in economic importance; in fact, it is more destructive than brown-rot in some of the mountain districts. It dwarfs the fruit and causes premature dropping, thereby reducing the yield; it ruptures the skin, opening the way for brown-rot attacks; and it mars the appearance of the fruit, thus lowering the grade and reducing its market value. The disease is common wherever peaches are grown east of the Rocky Mountains, scarcely an orchard being entirely free from it. In some cases, especially in a dry season, only a small percentage of the fruit may become affected and with only a few small harmless spots, while in other cases the entire crop may become so badly affected as to be unmarketable. If the loss in the orchard and the reduction in market value are both considered, it seems evident that a loss of 10 per cent of the total value of the peach crop in the eastern United States is caused by peach scab.

THE NATURE AND CAUSE OF THE DISEASE.

The name commonly applied to this disease is "peach scab," but it is also known as "black spot" and "freckles" and in some districts it is often improperly called "mildew." It is caused by the fungus *Cladosporium carpophilum* Thüm., which grows in the skin of the fruit, pro-

[1] Circulars 1 and 27 and Bulletin 174, Bureau of Plant Industry, U. S. Dept. of Agriculture.

ducing small, circular dark-brown spots. When numerous, these spots give the fruit a smutty or blackened appearance and cause the skin to crack. Fruit badly affected does not reach normal size and often drops prematurely.

The fungus also attacks the twigs, producing brown spots, in which it passes the winter. These spots are very common in peach orchards, but they apparently do little damage to the twigs. During the spring or early summer the fungus growing in the spots produces olive-brown spores which serve to infect the young peaches. Similar spores are also produced on the fruit spots.

THE SUSCEPTIBILITY OF VARIETIES.

There is a considerable difference in varieties as to their susceptibility to peach scab. In general, the late varieties are much more susceptible than the early varieties. This is due, in part at least, to the fact that the fruit of the late-maturing varieties is exposed to infection over a longer period and the opportunity for the development of the disease is greater. Of the commercial varieties, the Heath is perhaps the most susceptible; in fact, the disease has almost prohibited the growing of this variety except in a small way. The Bilyeu variety is also badly affected and the disease has restricted its culture to high, well-drained locations. The Salway, Smock, and most of the other varieties that ripen after the Elberta usually suffer rather severely from this disease, while the Elberta may be considered somewhat less affected, although the crop of this variety often becomes badly diseased. The varieties that ripen earlier than Elberta are as a rule only slightly or moderately affected. This is especially true of the Carman, Hiley, Champion, and Belle. On the other hand, the Mountain Rose and Early Rivers are quite susceptible to the disease.

TREATMENT.

The development of the self-boiled lime-sulphur mixture as a fungicide has made possible the control of the scab without injury to the fruit or foliage. The injury produced by this disease may be almost entirely prevented at a small cost. This has been abundantly demonstrated through experiments conducted by the Bureau of Plant Industry during the past three or four years.[1]

THE PLUM CURCULIO.—WHAT THE CURCULIO IS.

The curculio is a small snout beetle of the family Curculionidæ, which contains many species of economic importance. The adult insects vary somewhat in size, but will average about three-sixteenths of an inch in length. In the course of its growth the insect passes through four stages, namely, the egg, larva, pupa, and adult. The larva, or grub, is the small whitish worm frequently found in ripe peaches, plums, and cherries and is well known to lovers of these fruits.

There are many common names for this insect, such as the "plum curculio," "plum weevil," "peach curculio," "peach worm," "fruit

[1] Circulars 1 and 27 and Bulletin 174, Bureau of Plant Industry, U. S. Dept. of Agriculture.

weevil," "little Turk," "curculio," etc. The name here used, however, is perhaps best fixed in literature on economic entomology and has been adopted for this species by the American Association of Economic Entomologists.

The plum curculio is a native American insect and feeds originally, as it feeds at the present time, on wild plums and other wild fruits, especially Crataegus. Its injuries were noted as long ago as 1736, and it was the subject of an extended article published in 1804. Our early horticultural literature abounds with references to its depredations, especially to plums, which were apparently grown with the greatest difficulty.

So far as is known, the plum curculio is still confined to North America, ranging from southern Canada south to Florida and Texas and west to about the one hundredth meridian. It appears to be restricted in its westward spread by the more arid climate of the Great Plains region. It is probably present throughout its entire area of distribution, but is especially abundant in the Central and Southern States.

FOOD PLANTS AND CHARACTER OF INJURY.

Practically all stone and pome fruits, such as peaches, plums, apricots, nectarines, cherries, apples, pears, etc., are used by the curculio for feeding and egg-laying purposes. Injury is done by both the adult and larva. The former punctures the fruit in feeding and in egg laying, and the grubs live within the fruit and spoil it for market or other purposes. The character and extent of injury vary with different fruits, and while the present paper deals with the insect as an enemy of the peach the statements here made are fairly applicable to other stone fruits, such as plums, cherries, apricots, and nectarines.

Most of the peaches punctured while small soon fall from the effect of the injury or on account of the presence of the developing grubs. After a peach is of some size, about one-third grown, most of the larvæ apparently are unable to develop successfully in it, owing to its vigorous growth. There is a considerable period, therefore, when the curculio is able to inflict but little damage to vigorous-growing peaches, though the fruit may be more or less scarred by the feeding and egg punctures, from which gum may exude, especially during the moist weather (figs. 4 and 5). As stated elsewhere, these punctures and the exudation of gum greatly favor the brown-rot, forming a nidus for spores of the fungus and furnishing an easy point of infection. After the period of rapid growth of peaches has passed and the ripening process has begun, the curculio larva is able to develop readily in the fruit and, as the beetles are still ovipositing when early and midsummer varieties are ripening, wormy ripe peaches are often to be noted at picking time. The loss caused by worminess of fruit, while often quite important, is perhaps less so than that resulting from the "stings" which deform and scar the fruit. Wormy fruit and that which is scarred to any extent ripen prematurely, as a rule, and in untreated orchards may constitute a considerable proportion of the crop.

LIFE HISTORY AND HABITS.

How the curculio passes the winter.—The curculio passes the winter in the adult or beetle stage under trash in orchards, along fences, terraces,

etc., but especially in woods adjacent to orchards. The beetles come out of hibernation in the spring at about the blooming period of the peach, feeding at first upon the buds and foliage and later also upon the fruit.

Occurrence in orchards.—The invasion by the beetles of orchards in spring and the effect of their abundance of neighborhood woods have been several times investigated. Much may be done to reduce their number by keeping the orchards and surroundings free from trash. Where practicable, it will be desirable to burn over in early spring woods adjacent to orchards in order to destroy the beetles hibernating there. Jarring records of considerable areas of peach orchards have been made which show the occurrence of the curculio first in large numbers adjacent to woods, terraces, or other favoring places.

Egg-laying habits.—Peaches are less suitable for the egg-laying purposes of the curculio than smooth-skinned fruits, such as plums, apples, etc. Observations by Mr. Jenne indicate that the fuzz may be so copious on young peaches as to prevent the puncturing of the skin by the beetle. He observed that eggs were frequently deposited at the bottom of a tubular boring excavated down in the fuzz as far as the skin of the peach, which was usually scraped somewhat, later resulting in a russet spot on the fruit. In older fruit, however, the female is able to place her eggs under the skin in about the usual manner. In ovipositing, a hole is first excavated through the skin and into the flesh,about as deep as her snout will reach. Turning around, an egg is inserted by means of the ovipositor. Once more turning around, the snout is used to push the egg into the egg cavity and to fill it with bits of surrounding tissue. The next step is to cut the characteristic crescent slit at one side of the egg cavity, the excavation extending back under the egg to prevent its being crushed by the rapid growth of the fruit. Egg and feeding punctures on a newly set plum are shown in figure 8, much enlarged.

Period of oviposition and number of eggs laid.—Egg laying begins as soon as the young fruit is of sufficient size and may continue for several months, depending upon the vitality of the individual beetles. Most of the eggs, however, are laid during the first six or eight weeks after egg laying begins.

At College Park, Md., the greatest number deposited by any one female was 426 and the minimum 62, with an average of 274.56 eggs for the individuals under observation. At Youngstown, N. Y., the maximum is 257 and the minimum 72, with an average of 161.75 eggs. At Washington, D. C., under laboratory conditions, a single individual deposited 557 eggs, which is the highest of all records thus far obtained for this insect; the lowest number deposited was 126 and the average for the 4 beetles under observation was 306. At Myrtle, Ga., this range was from 154 as a maximum to a minimum of 1, with an average of 76.44 per individual. At Siloam Springs, Ark., the records include an unusually large number of eggs, namely, 4,724, from 29 beetles. These records show a maximum of 388 and a minimum of 4 eggs, with an average for all pairs of 162.97 eggs. At Douglas, Mich., the records show a range from 201 to 25, with an average for the 18 individuals of 78.56 eggs. The final average number of eggs per female for all localities above mentioned is 144.85, with a range of from 1 to 557.

There is a general agreement in that the great majority of the eggs have been placed by the end of eight weeks. Approximately, one-fourth

of the total eggs are deposited during the first two weeks; one-half have been deposited by the close of the first month; three-fourths within six weeks; and about 88 per cent of the total within eight weeks after the oviposition begins.

Time spent in the fruit.—Records of the time spent in the fruit as the egg and larva have been determined for many individuals and in various localties, including Illinois, District of Columbia, western New York, Georgia, Arkansas and Michigan.

In all localities the majority of the larvae emerged within three weeks after the eggs were laid, and, with one exception, emergence had practically ceased by the close of the fourth week.

Time spent in the soil.—When full grown the larva deserts the fruit and burrows below the surface of the soil. Practically none of the larvæ go deeper than 3 inches and the great majority penetrate not more than 2 inches. A small cell is made where the pupal stage is passed and where transformation to the adult or beetle occurs. Some days are spent in the soil by the larva before changing to the pupa, and the newly formed adult may not emerge for several days or even weeks, especially if the ground be dry. The effect of a shower, however, is to bring the new-generation beetles out in numbers.

A large number of observations have also been made on the length of time spent in the soil by different individuals, including a total of several thousand and from about the same localities as already mentioned. All of these observations go to show that comparatively few insects complete their underground transformations in less than three weeks from the time of entering the soil as larvæ. In from four to five weeks, however, the great majority of the beetles are out and by the close of the sixth week emergence has practically ceased.

Time required for transformation from egg to adult.—The average time spent in the fruit for the numerous localities investigated proved to be 19.48 days, and the average time spent in the ground was found to be 30.89 days, giving an average life-cycle period for the insect of 50.27 days.

Complete life-cycle observations were also made on a total of 597 individuals from many parts of the country, which gave a final average for the period per individual of 50.71 days, differing only a fraction of a day from the time determined in an essentially different manner. Approximately 50 days would therefore appear to be the average life-cycle period for the plum curculio for the country as a whole. The range though, will vary considerably and as actually determined in the case of the individual records was from 37 to 58.45 days.

Habits of beetles from emergence until hibernation.—After emergence, beetles of the new generation feed upon various fruits and plants until fall, when they enter hibernation quarters, appearing the following spring, as already stated. While there is some evidence to indicate that there may be a small generation in the South, this will be comparatively insignificant and for practical purposes the insect produces but one generation annually. The beetles which develop one summer live over the following winter, ovipositing during the spring and summer, and gradually die off, until by early fall practically all of them have disappeared. The life of the more hardy beetles is thus seen to be some 12 or 14 months.

RESULTS OF SPRAYING EXPERIMENTS AND DEMONSTRATIONS DURING 1910.

During the season of 1910 the same experiments were carried out as during 1909, which were reported in Circular 120 of the Bureau of Entomology and in Bulletin 174 of the Bureau of Plant Industry, and in addition the recommendations given in these publications were put in effect on a commercial scale to serve as an object lesson for growers. During 1909 the experiments made in the Hale orchard at Fort Valley, Ga., included the treatment of 1,100 Elberta trees for the control of peach scab, brown-rot, and curculio. The self-boiled lime-sulphur mixture (8-8-50) plus 2 pounds of arsenate of lead was used.

This combined treatment gave the following results: At picking time 95.5 per cent of the fruit on the sprayed block was free from brown-rot, 93.5 per cent free from scab, and 72.5 per cent free from curculio. On the unsprayed block only 37 per cent of the fruit was free from brown-rot, 1 per cent free from scab, and 2.5 per cent free from curculio injury. In packing the fruit for market it was found that the yield of merchantable fruit on the sprayed block was ten times as great as from the unsprayed block containing the same number of trees.

During the season of 1910 neither the brown-rot nor the plum curculio was so abundant in Georgia as the year previous, and the contrast between the sprayed and unsprayed blocks was, therefore, not so striking. Nevertheless, the very satisfactory results obtained fully substantiated the conclusions previously reached as to the value of spraying.

The work in Georgia was carried out at Fort Valley, Barnesville, and at Baldwin. At Fort Valley a block of 1,064 nine-year-old Elberta trees was treated in the orchard of the United Orchard Company. In addition to numerous experiments planned to show the effect of treatments at different times and with different mixtures, the demonstration treatment was put in effect on a block of 848 Elberta trees, a similar number being left unsprayed for purposes of comparison. The trees were sprayed (1) as the calyxes were shedding, April 1, with 2 pounds of arsenate of lead and 3 pounds of lime in each 50 gallons of water, (2) two to three weeks later, April 19 and 20, with 8-8-50 self-boiled lime-sulphur and 2 pounds of arsenate of lead; (3) on June 17, about a month before the fruit ripened, with self-boiled lime-sulphur alone.

In order to determine the effect of the treatments, the fruit at picking time (July 12 to 15) was gathered from 68 trees in the sprayed block and from 63 trees in the unsprayed block. This fruit was carefully graded into "merchantable" and "culls," with the results shown in Table III.

TABLE III.—*Results of demonstration spraying in the peach orchard of the United Orchard Company, Fort Valley, Ga., 1910.*

Plat.	Yield.	Merchantable fruit.	Culls.	Fruit affected with brown-rot.
	Bushels.	*Per cent.*	*Per cent.*	*Per cent.*
68 trees (sprayed)	101	86.2	13.7	5.3
63 trees (not sprayed)	92	54.6	46.4	20.0

It will be noted that from the 68 sprayed trees there was a total yield of 101 bushels, of which 86.2 per cent was merchantable and 13.7 per

cent was culls. On the unsprayed block of 63 trees there was a total yield of 92 bushels of fruit, of which 54.6 per cent was merchantable and 46.4 per cent was culls, a gain in merchantable fruit due to the treatment of 31.6 per cent.

EXPERIMENTS IN WEST VIRGINIA, 1910.

In order to demonstrate the control of peach scab and to determine how much spraying is required on late varieties, an experiment was conducted in the orchard of L. P. Miller & Bros., at Okonoko, W. Va., during 1910. There are about 600 acres of 12-year-old trees in this orchard, and it is composed of a large number of varieties beginning with Southern Early and ending with Bilyeu. Until summer spraying was undertaken in 1908 the peach scab had been most disastrous to the crops in this orchard, about one-half of the fruit being lost every year. Spraying, however, largely overcame the trouble, and in 1910 the loss was comparatively small, notwithstanding the difficulty of thoroughly spraying such a large orchard at the proper time.

The spraying experiments were confined to the Elbertas, Salway, and Bilyeu, and about 500 trees each of these varieties were used. The Bilyeu set a good crop, while the crop of Elberta and Salway was only medium to light, but ample for an experiment. For the most part the weather was unfavorable for good work. During the time the first and second applications were being made it was cloudy and showery and the day following the second application it rained rather hard all day. The Elberta trees were sprayed according to the following plan:

Plat 1.—Self-boiled lime-sulphur and arsenate of lead, one month after petals fell, May 11.

Plat 2.—Self-boiled lime-sulphur with arsenate of lead, one month after petals fell, and self-boiled lime-sulphur alone, one month later, May 11 and June 15.

Plat 3.—Self-boiled lime-sulphur, one month after petals fell and one month later, May 11 and June 15.

Plat 5.—Self-boiled lime-sulphur six weeks after petals fell and one month later, May 26 and June 28.

Plat 6.—Commercial lime-sulphur, 1 to 100 with arsenate of lead and lime, one month after petals fell, and with lime only one month later.

Plat 0.—Check; untreated.

At picking time, August 22 to 26, the crop, including windfalls, from four trees in each sprayed plat and six unsprayed trees was sorted to determine the percentage of fruit affected with scab and the percentage of merchantable fruit. The results are shown in Table VII.

TABLE VII.—*Results of treatment for peach scab on the Elberta variety, Okonoko, W. Va., 1910.*

Plats.	Total fruits.	Fruit affected with scab.	Fruit badly affected with scab.	Merchantable fruit.	Culls.
	Number.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
1	1,322	65.2	3.0	86.1	13.9
2	1,566	20.9	0.1	95.5	4.5
3	2,277	20.2	1.4	93.1	6.9
5	1,819	55.8	0.9	93.6	6.4
6	1,924	49.3	1.5	93.9	6.1
Check	2,918	99.6	41.1	53.7	46.3

The third column of the above table shows the percentage of fruit affected with scab, including fruit so slightly affected that its market value was not materially reduced, while the fourth column shows the percentage of badly affected, unmerchantable fruit. The fifth column shows the percentage of good, merchantable fruit obtained from each plat, while the sixth column shows the percentage of culls due to scab, brown-rot, curculio, and other causes.

Plat 1 received only one application, and the results were all that could be expected in a wet season, such as last spring. Although 65.2 per cent of the fruit was affected with scab, only 3 per cent of it was badly affected.

Plats 2 and 3, which were sprayed twice, gave the best results, only a little more than 20 per cent of the fruit in each being affected with scab. Most of this scab infection was commercially negligible, the spots being small and rather inconspicuous. In plat 2 less than 1 per cent of the fruit was badly affected, and in plat 3 only 1.4 per cent was so affected. The only difference in the treatment received by these two plats was the use of arsenate of lead with the self-boiled lime-sulphur in the first application on plat 2. This made no difference in the control of scab. It apparently raised the percentage of merchantable fruit, plat 2 having 95.5 per cent and plat 3 having 93.1 per cent. This difference would certainly have been greater had there been more curculio in the orchard.

The good results obtained from the treatment of these two plats may be better appreciated by comparing them with the results from the unsprayed trees. Practically all (99.6 per cent) of the unsprayed fruit was affected with scab and 41.1 per cent of it was badly affected. Only 53.7 per cent of the fruit was suitable for market, leaving 46.3 per cent of culls.

Plat 5 received the same treatment as plat 3, except that both applications were delayed two weeks. The results indicate that one month after the petals fall is a better time to begin spraying for scab than two weeks later.

Plat 6, which was sprayed with commercial lime-sulphur solution, 1 gallon to 100 gallons of water, had only 1.5 per cent of fruit badly affected with scab, although 49.3 per cent of it was affected more or less. These results indicate that the scab can be held in check by a very dilute solution of the lime-sulphur solution. It burned the foliage considerably and caused some of the leaves to drop, but the injury almost disappeared as the season advanced and the fruit matured in good condition.

A similar test was made on the Salway variety, which ripens some four weeks later than the Elberta. There were four sprayed plats, consisting of about 80 trees each, and 17 trees were left untreated for the purpose of comparison. The self-boiled lime-sulphur (8-8-50) was used in each application, and arsenate of lead at the rate of 2 pounds to each 50 gallons was added in the first application only.

On September 22 and 23 the crop from four trees in each plat was sorted for scab and brown-rot, and the results are shown in Table VIII. In this case the classification of scabby fruit was made on a commercial basis; that is, the fruit having only a few small specks of scab, which did not materially detract from its market value, was not classed as

scabby. The figures given in the table therefore represent the percentage of fruit so badly affected as to have but little value on the market.

TABLE VIII.—*Results of spraying on the Salway variety in the Miller orchards, Okonoko, W. Va., 1910.*

Plat No.	Dates of spraying.	Total fruits.	Scabby fruit.	Rotted fruit.
		Number.	*Per cent.*	*Per cent.*
8	(1) One month after petals fell, May 12; (2) June 17; (3) July 15...	1,557	5.5	2.5
9	(1) One month after petals fell, May 12; (2) June 17.....	1,599	5.3	1.9
10	(1) One month after petals fell, May 12.....	1,132	27.2	6.8
11	(1) Six weeks after petals fell, May 26; (2) June 28.....	1,065	5.8	1.0
12	Check; not sprayed.....	2,349	87.5	37.6

It will be observed that the results from plat 8, which had three applications, are about the same as those from plat 9, which had two applications, the scab and brown-rot having been almost completely controlled in both cases. The results of the treatment of plat 9 are shown in figures 9 and 11. The superiority of two treatments over one may be seen by comparing plats 9 and 10. The latter received only one application and 27.2 per cent of the fruit became affected with scab, while only 5.3 per cent of the crop on plat 9 was affected. Plat 11 received the same treatment as plat 9, except that the applications on plat 11 were delayed two weeks, the object being to determine the best time to begin the spraying. In this case there was very little difference in the results from the two plats. Of the fruit from the unsprayed trees, 87.5 per cent was rather badly affected with scab and 37.6 per cent was affected with brown-rot, as shown in figures 10 and 12. In other words, the unsprayed crop was almost a total loss.

The Bilyeu variety was given the same treatment as that applied to Salway and the results were about the same. In this case the fruit was not sorted and counted, but at picking time comparative notes were made, attempting to show the estimated percentages of brown-rot and scab. Fully 50 per cent of the unsprayed fruit was lost on account of these diseases, while there was a loss of only about 5 per cent of the fruit sprayed twice, although much of it showed some slight spotting with scab. On the plat sprayed three times the scab was almost entirely prevented. In most cases three treatments will be necessary for the best results against scab on late-maturing varieties like the Bilyeu.

EXPERIENCE OF FRUIT GROWERS.

Following the recommendations of the United States Department of Agriculture, a considerable number of fruit growers have adopted the combination treatment, and in Georgia during 1910 perhaps not less than one-fourth of the peach orchards were sprayed for the curculio, brown-rot, and scab. In connection with the department's experiments at Fort Valley, Barnesville, and Baldwin, Ga., an effort was made to give personal instruction to as many orchardists as possible in order to start them in the work, and by visits and by correspondence assistance was rendered to growers in other parts of the State. Thus at Fort Valley the Hale Georgia Orchard Co. sprayed three times its entire bearing

orchard of about 100,000 trees. The same schedule of treatments was also adopted by Mr. W. C. Wright in his orchard of 60,000 trees and by others in the immediate neighborhood. Also at Marshallville, Ga., the treatment was adopted by Mr. S. H. Rumph and other leading growers, the total number of trees sprayed in this general section aggregating about a million.

At Barnesville, Ga., practically all of the large orchardists used the combined spray, aggregating not less than 500,000 trees. At Baldwin, Ga., some of the leading growers sprayed not less than 100,000 trees. Messrs. Stranahan Bros., of Warm Springs, Ga., have been spraying for the past three years and were among the first large peach orchardists to adopt the lime-sulphur treatment even before it was out of its experimental stage. Also around Adairsville and at numerous other points in Georgia spraying was adopted by the leading growers, at least 2,000,000 trees for the State as a whole being sprayed. Considering all of the Southeastern States it is probable that in this territory 3,000,000 trees were sprayed during 1910.

Considerable spraying has also been done by peach orchardists in West Virginia, western Maryland, and Pennsylvania, including a total of perhaps 1,000,000 trees. The treatment has also been adopted by some growers in Illinois, Missouri, and Arkansas, aggregating about 500,000 trees, making on a conservative estimate a grand total of 4,500,000 to 5,000,000 trees sprayed during 1910 with the self-boiled lime-sulphur wash and arsenate of lead.

We have been able to personally examine some of these orchards, and have had reports from many of the orcharists regarding the results of the treatment. So far as it has been possible to determine the results have been uniformly satisfactory and the slight injury from the spray comparatively unimportant. It seems rather remarkable that so many growers in different parts of the country should be so successful in using a new treatment for the first time. This may be taken to indicate the entire practicability of the recommendations.

EFFECT OF SPRAYING ON THE QUALITY OF THE FRUIT.

The good results from the treatment do not end with the control of the curculio, scab, and brown-rot. The sprayed fruit is as a rule somewhat larger, much more highly colored, and firmer than unsprayed fruit. It keeps longer, carries to the market in better condition, and brings better prices. A carload of Elberta peaches shipped from Baldwin, Ga., on July 29 contained 166 crates of sprayed fruit and 324 crates of unsprayed fruit. This fruit was sold on the New York market on August 2, the 166 crates of sprayed fruit bringing $2.50 per crate, while the 324 crates of unsprayed fruit brought an average of $1.75 per crate, a difference of 75 cents per crate in favor of the sprayed fruit.

The effect of the treatment is to fairly clean the fruit from disease and to put it in a more or less sterilized condition, adding greatly to its keeping quality. This superiority of sprayed as against unsprayed fruit is one of the marked benefits and has been noted by all growers who have adopted the treatment.

On July 14 sprayed and unsprayed Elberta fruit in the Hale orchard at Fort Valley, Ga., was picked and packed for a shipping test, but

owing to a car shortage was not shipped. There were 64 crates of unsprayed fruit and 400 crates of sprayed fruit. This fruit was stacked out on the ground where it remained in the sun and during occasional showers of rain until July 18 (4 days) and then 6 crates of each lot were examined for brown-rot. It was found that 62.7 per cent of the unsprayed fruit had rotted, while only 8 per cent of the sprayed fruit was so affected, showing conclusively the better keeping quality of the latter.

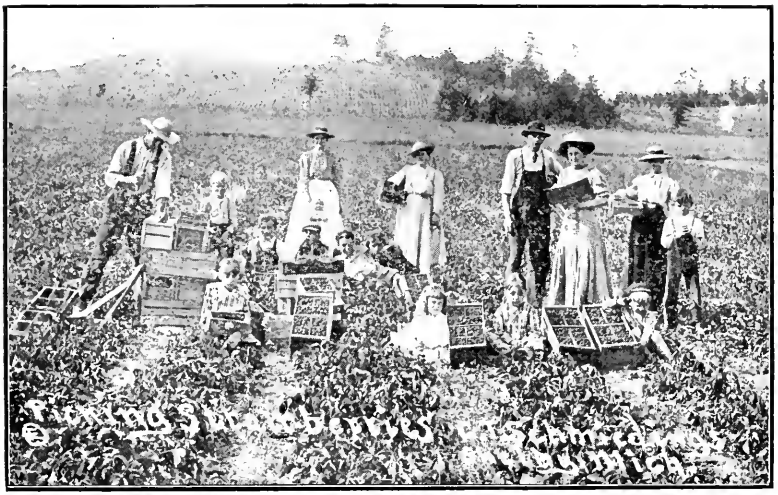
EFFECT OF THE SELF-BOILED LIME-SULPHUR WASH ON SCALE INSECTS.

Observations and experiments go to show that, when used as a summer spray, the effect of the self-boiled lime-sulphur wash on the control of scale insects which may be present on the trees, especially the San Jose scale, is important. While to secure the best results in the control of scale insects it would be desirable to coat the limbs and twigs more thoroughly than is accomplished in ordinary summer spraying, nevertheless in the course of the work as practiced against the curculio, brown-rot, and scab noticeable good is accomplished. Although the spray is not strong enough to kill many of the adult scale insects, it is effective to an important extent in bringing about the death of the young scales. Experiments made by the Bureau of Entomology in the use of the self-boiled lime-sulphur wash as a summer spray for the San Jose scale have shown that two or three applications will result in a marked improvement in the condition of the trees by fall. The effect of the wash is to prevent the settling of the young scales upon the twigs and branches, so that by the close of the season the trees are largely free from the insects.

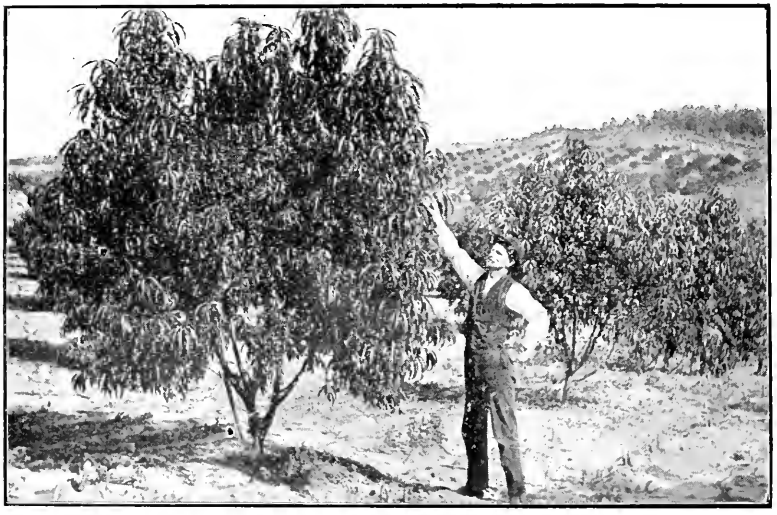
Further observations are necessary to determine just how much benefit will result from these applications in the control of scale insects, but it seems probable in peach orchards regularly sprayed for the curculio and for scab and brown-rot that the usual winter treatments for the San Jose scale may be reduced to perhaps one application every two or three years. Any observant orchardist should be able to determine for himself the necessity for winter treatments, depending upon the abundance of the scale insects. The lime-sulphur wash is furthermore effective against numerous other sucking insects, especially plant lice, which may be present on the trees.

PREPARATION AND USE OF THE SPRAY.

Spraying for the brown-rot, scab, and curculio does not differ in principle from the usual spraying practices. It is essential that an efficient spraying outfit be employed, so that the work may be done expeditiously and with thoroughness. Where the orchard interest is at all important it will be desirable to employ a power sprayer, such as a gasoline or compressed-air outfit. Excellent work, however, may be done with the ordinary barrel sprayer, which is suitable for orchards of a few hundred trees. In applying the spray, all parts of the tree should be reached. This is especially important in the first application, which is directed principally against the plum curculio. The purpose should be to coat thoroughly the foliage, twigs, and young fruit to insure to the fullest extent possible the poisoning of the beetles. The same precautions as to poisoning the foli-



Two and a quarter acre strawberry patch of C. T. Schmieding, Shelby, Mich. Sold $800 worth of berries to the Hart Canning Factory at 70c per 16-quart crate; also sold $325 worth of plants. Brandywine and Senator Dunlap varieties.



Two-year-old New Prolific peach trees on farm of C. T. Schmieding, Shelby—600 in the block.

Bartlett pears grown under sod mulch by Geo. E. Chatfield, South Haven.
Find boy's face and compare with pears for size.

Some of S. B. Hartman's "peaches", Athens, Mich.

age, fruit, and buds are also essential in making the second application, as the beetles are still very numerous, feeding and ovipositing freely. (See Table II.) This is also the most important application for the prevention of scab infection, which is prevented only by thoroughly coating the young fruits. In subsequent applications the efforts should be directed more to coating the fruit with the spray to protect it from brown-rot infection, especially as it begins to ripen.

The schedule of applications takes account of the ripening period of the principal commercial varieties of peaches. Applications made later than a month or six weeks before picking time are likely to result in the fruit being more or less spotted with the spray when harvested, somewhat marring its appearance for market purposes. This danger can be largely avoided by using nozzles which throw a mist-like spray, coating the fruit with very fine dots rather than with large blotches.

DIRECTIONS FOR THE PREPARATION OF SELF-BOILED LIME-SULPHUR WASH.

The standard self-boiled lime-sulphur mixture is composed of 8 pounds of fresh stone lime and 8 pounds of sulphur to 50 gallons of water. In mild cases of brown-rot and scab a weaker mixture containing 6 pounds of each ingredient to 50 gallons of water may be used with satisfactory results. The materials cost so little, however, that one should not economize in this direction where a valuable fruit crop is at stake. Any finely powdered sulphur (flowers, flour, or "commercial ground" sulphur) may be used in the preparation of the mixture.

In order to secure the best action from the lime, the mixture should be prepared in rather large quantities, at least enough for 200 gallons of spray, using 32 pounds of lime and 32 pounds of sulphur. The lime should be placed in a barrel and enough water (about 6 gallons) poured on to almost cover it. As soon as the lime begins to slake the sulphur should be added, after first running it through a sieve to break up the lumps, if any are present. The mixture should be constantly stirred and more water (3 or 4 gallons) added as needed to form at first a thick paste and then gradually a thin paste. The lime will supply enough heat to boil the mixture several minutes. As soon as it is well slaked water should be added to cool the mixture and prevent further cooking. It is then ready to be strained into the spray tank, diluted and applied.

The stage at which cold water should be poured on to stop the cooking varies with different limes. Some limes are so sluggish in slaking that it is difficult to obtain enough heat from them to cook the mixture at all, while other limes become intensely hot on slaking, and care must be taken not to allow the boiling to proceed too far. If the mixture is allowed to remain hot for 15 or 20 minutes after the slaking is completed, the sulphur gradually goes into solution, combining with the lime to form sulphids, which are injurious to peach foliage. It is therefore very important, especially with hot lime, to cool the mixture quickly by adding a few buckets of water as soon as the lumps of lime have slaked down. The intense heat, violent boiling, and constant stirring result in a uniform mixture of finely divided sulphur and lime, with only a very small percentage of the sulphur in solution. It should be strained to take out the coarse particles of lime, but the sulphur should be carefully worked through the strainer.

DIRECTIONS FOR USING ARSENATE OF LEAD.

Many experiments have shown that well-made arsenate of lead is much the safest of all available arsenicals for use on the peach. Arsenate of lead is to be found on the market both as a powder and as a putty-like paste, which latter must be worked free in water before it is added to the lime-sulphur mixture. The paste form of the poison is largely used at the rate of about 2 pounds to each 50 gallons of the lime-sulphur wash and is added, after it has been well worked free in water, to the lime-sulphur spray previously prepared. As there are numerous brands of arsenate of lead upon the market, the grower should be careful to purchase from reliable firms. A decided change in color will result when the arsenate of lead is added to the lime-sulphur mixture, due to certain chemical changes which, in the experience of the writers, do not injuriously affect the fungicidal and insecticidal properties of the spray or result in injury to the foliage.

In large spraying operations it will be more convenient to prepare in advance a stock mixture of arsenate of lead as follows: Place 100 pounds of arsenate of lead in a barrel, with sufficient water to work into a thin paste, diluting finally with water to exactly 25 gallons. When thoroughly stirred, each gallon of the stock solution will thus contain 4 pounds of arsenate of lead, the amount necessary for 100 gallons of spray. In smaller spraying operations the proper quantity of arsenate of lead may be weighed out as needed, and thinned with water. In all cases the arsenate of lead solution should be strained before or as it is poured into the spray tank. The necessary care should be exercised to keep the poison out of the reach of domestic and other animals.

DANGER OF INJURY FROM SPRAYING.

As stated elsewhere in this bulletin, the foliage of the peach is extremely sensitive to injury from such sprays as Bordeau mixture and arsenicals, such as Paris green, arsenate of lead, etc. This sensitiveness has been the sole reason why it has been impracticable to spray peach orchards with fungicides and insecticides such as Bordeaux mixture or Paris green, as has for years been the custom in the case of apples, grapes, and other deciduous fruits.

Of the various arsenicals available for use, well-made arsenate of lead has proved to be the safest. Shortly after the development of this comparatively new insecticide, it was at once extensively experimented with on peaches by numerous entomologists and it was tried to a limit extent by peach growers. A single application of arsenate of lead in water did not result in injury so important as to prevent its use. However, when two or three applications were made, as is necessary in the control of the curculio, serious shot-holing and falling of the leaves and even burning of the fruit resulted, the latter in extreme cases, falling to the ground. The use of lime with arsenate of lead lessened the danger of injury considerably, but used even in this way for two or three treatments, especially under certain weather conditions, resulted in extensive injury to foliage and fruit.

When it was established that the self-boiled lime-sulphur wash was an effective fungicide and entirely safe as a spray for the peach, one of the interesting questions presented was whether arsenate of lead might

be safely used with it to effect a combination spray for both insects and diseases. While on chemical grounds it appeared that the addition of arsenate of lead to the self-boiled lime-sulphur mixture would result in an important decomposition of the spray and greatly add to its probable injurious character, in practice the combined spray was found to be entirely safe. Observations extending over three seasons have failed to show any serious injury resulting from the use of this spray, even when as many as three applications were made. Thus, in the test of numerous brands of arsenate of lead at Barnesville, Ga., during 1910, carried out by Mr. E. W. Scott, of the Bureau of Entomology, peach trees were given three thorough applications: (1) With arsenate of lead in limewater at the rate of 2 pounds to 50 gallons, and (2) in the self-boiled lime-sulphur wash used at the same strength. In all cases very serious injury resulted to fruit and foliage on the plats sprayed with the arsenate of lead in limewater, whereas there was no discernible injury on the plats treated with arsenate of lead in the self-boiled lime-sulphur wash. It is not understood why the arsenate of lead apparently loses its injurious properties when used in the self-boiled lime-sulphur wash, though its safe employment in this way is most fortunate.

In the schedule of applications only two arsenate of lead treatments are recommended, as these will measurably control the curculio and a third treatment would considerably increase the danger of injury. Where the curculio is very destructive, however, the grower should use his judgment as to whether a third application of the poison would be advantageous.

The effect of the arsenate of lead upon the fruit is to increase its color notably. This increase in color from two applications in self boiled lime-sulphur wash improves the appearance of the fruit. Three or even two applications of the poison alone or in limewater, however, result in a very excessive reddening, especially on the side exposed to the sun, on which later may appear brown, sunken spots of variable size, accompanied with more or less extensive cracking of the skin. This condition of the fruit is shown in figure 13.

The self-boiled lime-sulphur mixture when properly prepared according to directions does not injure the fruit or foliage, but if allowed to remain hot in concentrated form before dilution enough sulphur may go into solution to produce injury to the foliage. Users of this spray should therefore follow carefully the directions given for its preparation, bearing in mind that a good mechanical mixture of the sulphur and lime suspended in water and only slightly combined is desired rather than to dissolve any considerable quantity of the sulphur.

During the application of the spray, it is very important that the mixture be kept well agitated to insure its uniform distribution. As both the self-boiled lime-sulphur wash and the arsenate of lead quickly settle when the spray is left undisturbed, an excessive amount may be applied to some trees, while others receive an insufficient quantity. While most spraying equipments are supplied with adequate agitating apparatus, the orchardist should assure himself that the spray is being properly stirred in the tank during its application. Under conditions of imperfect agitation and consequent settling, the ingredients of the spray may be applied so strong that serious injury will result. This has been observed to be the case, especially following the employment of compressed-air sprayers with inefficient agitators.

COST OF TREATMENT.

The cost of the combined treatment for the control of brown-rot, scab, and curculio is insignificant when compared with the resulting benefits, The trees at Baldwin, Ga., were sprayed with a good hand outfit, and 3 men were able to spray 1,000 trees a day. With labor at 75 cents a day (the wages paid in that section), arsenate of lead at 10 cents a pound, sulphur at 2½ cents a pound, and lime at $1.10 a barrel, the cost for three treatments was $27.60 a thousand, or a little less than 3 cents a tree. At Fort Valley, Ga., a gasoline-power sprayer was used The trees there were larger and the water was not so convenient, making the cost somewhat higher than at Baldwin. In this case the cost of three treatments was $32 a thousand, or a little more (than 3 cents a tree. Where wages are higher the cost will be somewhat greater. For three treatments, the first with arsenate of lead alone, the second with self-boiled lime-sulphur and arsenate of lead, and the third with self-boiled lime-sulphur alone, the cost will range from 3 to 5 cents per tree, depending upon the labor conditions, the size of the trees, the convenience of the water supply, and the equipment used. For average-sized 7-year-old trees, as a rule 1 gallon of spray per tree will be required for each application. In the first application not quite so much will be required, owing to scant foliage at that time, while a little more will be required for the second treatment. The third application should be lighter than the second, using finer nozzles so as to avoid staining the fruit with blotches of lime.

From the experience of the writers it seems safe to conclude that in most of the peach orchards of the eastern United States an increase per tree of at least one-half bushel of good merchantable fruit, worth about 50 cents, may be obtained from spraying at a cost of 3 to 5 cents. Spraying, therefore, is the most profitable of all the orchard operations.

SCHEDULE OF APPLICATIONS.

Most of the peach orchards in the eastern half of the United States should be given the combined treatment for brown-rot, scab, and curculio. This is particularly true of the southern orchards, where all these troubles are prevalent. In some of the more northern orchards the curculio is not very troublesome, but as a rule it will probably pay to add the arsenate of lead in at least the first lime-sulphur application.

The self-boiled lime-sulphur mixture referred to in the following outlines of treatment should be made of a strength of 8 pounds of lime and 8 pounds of sulphur to each 50 gallons of water, and the arsenate of lead should be used at the rate of 2 pounds to each 50 gallons of the mixture or of water. When the poison is used in water there should be added the milk of lime made from slaking 2 to 3 pounds of good stone lime. When used in the lime-sulphur mixture additional lime will not be necessary.

Midseason varieties.—The midseason varieties of peaches, such as Reeves, Belle, Early Crawford, Elberta, Late Crawford, Chairs, Fox, and Beers Smock, should be sprayed as follows:

(1) With arsenate of lead alone, about 10 days after the petals fall, or at the time the calyxes are shedding. (Fig. 14.)

(2) With self-boiled lime-sulphur and arsenate of lead, two weeks later, or four to five weeks after the petals have been shed.

(3) With self-boiled lime-sulphur alone, four to five weeks before the fruit ripens.

Late varieties.—The Salway, Heath, Bilyeu, and varieties with a similar ripening period should be given the same treatment prescribed for midseason varieties, with an additional treatment of self-boiled lime-sulphur alone, to be applied three or four weeks after the second application.

Early varieties.—The Greensboro, Carman, Hiley, Mountain Rose, and varieties having the same ripening period should receive the first and second applications prescribed for midseason varieties.

Where the curculio is not particularly bad, as in Connecticut, western New York, and Michigan, the first treatment, which is for this insect only, may be omitted. Also for numerous orchards throughout the Middle States where the insect, especially in the younger orchards, is not yet very troublesome, orcharists should use their judgment as to whether the first application may be safely omitted. Where peach scab is the chief trouble, and brown-rot and curculio are of only minor importance, as may be the case in some of the Allegheny Mountain districts, satisfactory results may be had from two applications, namely, the first with self-boiled lime-sulphur and arsenate of lead four to five weeks after the petals fall, and the second treatment of the above schedule with self-boiled lime-sulphur alone three to four weeks later. These two treatments, if thoroughly applied, will control the scab and brown-rot, especially on the early and midseason varieties, and will materially reduce curculio injuries. Even one application of the combined spray made about five weeks after the petals fall would pay well, although this is recommended only for conditions where it is not feasible to do more.

PEACH DISEASES AND RE-ESTABLISHMENT OF YOUNG ORCHARDS IN MICHIGAN.

PROF. M. B. WAITE, PLANT PATHOLOGIST, U. S. DEPT. OF AGRICULTURE, WASHINGTON, D. C.

Many of you know that, in co-operation with Prof. Taft, through his deputy, Mr. H. G. Welch, we carried out a three years' test of what is known as the "extermination" method for getting rid of the "yellows" and the reduction was fairly successful at the time. Furthermore, I have told you about the control of the brown rot and black rot by summer spraying of the peach so that we feel that the old line diseases of the peach are now fairly controllable—the "yellows" by destruction and the "yellow spot" or "brown rot" by spraying. It is true that the "curl leaf" is a disease of prime importance, but it is under control by spraying and the methods are well known, so the problem that we have to dispose of and solve is along a little different line.

When it comes to the question of the re-planting of peaches and the recovery of the peach industry in the state of Michigan, I feel that it is one of the great horticultural problems of this section, one of the greatest problems of this country wherever peaches are raised. When

I first came into the state of Michigan and saw here in Benton Harbor three large steamers standing ready to take away the tons and tons of fruit; strings of wagons in these streets; a train of thirty-five cars going out on the Big Four loaded with this fruit; then at Grand Rapids—at that time the biggest peach market in the world where 150 car-loads were being shipped out every day—I say when I remember what I saw then and note the change that has taken place since then, I cannot help but emphasize the fact that we are facing a problem here that demands most serious consideration.

Now when I come into the state of Michigan and drive through the peach belt I will sometimes go ten or fifteen miles and hardly see an orchard in good condition. I was informed a year ago last summer when I spent a day inspecting the orchards around Grand Rapids, that there could hardly be found an old peach orchard of ten years before. You all know the situation in many of the former peach districts. There are some sections along the lake shore that make a very fine showing even yet, but it is certainly astonishing the way the peach orchards have gone out.

Now let us take up this subject. Since I have spent two months or more among you and having made an annual visit to your peach belt in connection with Mr. Horace Welch, I almost feel that I am one of you and so what I am going to say to you this afternoon will be on the level as one of you.

What are the troubles? Let us get some idea and some relative weight of these troubles. Here they are as I have been able to think them over. Perhaps I am a little bit rusty, not having been through all of your orchards, but it seems to me that first and foremost is the "winter freeze" injury. That I consider the leading trouble; indeed I almost am willing to say that it is the cause of more of the trouble in the peach belts than all other troubles put together.

The next thing that has impressed me is soil poverty, especially humus. The third problem that I consider of importance is the root fungus diseases. These are very largely associated with the soil poverty, because on good soils the peach cannot grow these root troubles, but on poor soils is practically impossible to do otherwise. The fourth thing of importance I consider to be the "black peach aphis." That is an insect trouble. Then the fifth is the "yellows." In some individual districts that has been the overwhelming trouble at times. It did it here long before my day. You will remember that it swept the peach orchards off the map here practically before my time; and it came pretty nearly doing that as the "little peach" did recently do it in a section of the peach belt, and especially in some parts of Oceana county. Once when standing on a hill, I counted nine fires where there were big piles of peach trees that were being burned. I rather think this is a debatable question, and I would not be surprised if there would be some discussion on that point, but the reason why I put it down here so low is that it has been largely under control.

Poor drainage is another cause of considerable trouble in peach orchards. Many orchards have been planted on land not suitable for peach culture. Corners of the peach orchard have run down into low lands and once in a while a whole orchard has been located on ground too poorly drained and the orchard has not thrived, because a peach will

not grow in wet soggy soil; in other words, it will not stand "wet feet."

The seventh factor that I want to take up is dumping ground. The San Jose killed off trees; the curl leaf made some trouble; root rot, which perhaps can be put in that group, have all been instrumental in doing a lot of damage.

The eighth point is simply pure neglect. Cultivation and fertilization, pruning and spraying were left out. If a man neglects his orchard that will be a loss to him. I do not however, feel that we should discuss these particular points because it is to the interest of every individual to attend to his orchard along these lines. So we will turn our attention to those injuries that are not so readily avoidable or that require more careful consideration than cultivation and general care of an orchard.

First I want to speak of frosting. Beginning with the great freeze in 1899 we have had a series of misfortunes in this state. I have visited the Michigan peach orchards and studied them very carefully every year except this year. That freeze was an awful hard blow on the Michigan peach growers, but nevertheless they turned in and produced a lot of fruit afterwards. Indeed, it was remarkable how the trees recovered from that freeze. Practically every peach tree in the state was more or less affected—were soggy and hard, had dry rot in the center or something of the kind. Many trees broke down and old orchards went to pieces after that.

Then there was a hard freeze again in January, 1904, that put many orchards out of commission. It was felt in New York and New England. Then we have had another freeze since then that has done more or less damage. There were a great many dead trees that year and most of these dead trees were on dry, sandy knolls, particularly where the snow blew off and here and there in many orchards, individual trees. I noticed these dead trees because we could hardly figure out why these trees froze out on the sandy knolls. It was a clear case of winter kill. The ground was bare and dry. The trees were frozen in their roots. It is the very thing that Mr. Rose was talking about and I am glad that he has appreciated that problem and has solved it.

What about these dead trees that died on good land in apparently the same way? When the growers were pulling out these trees, this curious fact developed—that every one or practically every one that we examined were attacked by the fungus root rot. They were going along all right and bore their crop of fruit, but they were weaker and when that freeze came they were all too weak to stand it and so went down. It was such a time as this, and of the same nature, that in October, 1906, struck the peach belt and did so much damage.

Are these things to be expected in the future? We have all kinds of extremes, so that some year in the distance there may be a freeze in October, but probably it will not come again for a hundred years. That is, it would not be expected to occur within our lifetime in any ordinary peach orchard. Now if a large part of this trouble is frost injury, and I think this audience will agree with me in the main, that means that we have a fair show to plant orchards and avoid that sort of a thing in the future.

You have had an unusual combination of bad seasons for frost and the chances are that you will not have the same things again and if the average of weather conditions maintain, you will be free from such occur-

ences for a long period. In the state of Florida, the frost line as indicated by a series of frosts, has moved about fifty miles south, but that has affected a newer industry than the raising of peaches in Michigan and while perhaps the frost line has gone down a little lower in Florida I do not think that we are obliged to move the frost line for the Michigan peach belt. Some things can be done to make them practically free from frost. Mr. Rose has told you how he hauls stable manure on to all exposed places on knolls. If you can get trash of any kind, mowed weeds, marsh grass, and if possible mulch the trees around the crown for a few feet from the tree. Mulch the whole surface of these bare spots, especially devoid of humus. Whenever possible use cover crops. This whole question has had due consideration at this meeting and so it will probably not be profitable to take it up in detail, but in passing I might say that crimson clover, vetch and rye, even corn, sowed broadcast, not only furnish humus but catch the snow and make a good covering during cold weather. Then there is oats. I have never heard of your sowing winter oats, but we have such in the South. Winter oats would grow later in the season. In Virginia they grow oats quite late as a cover crop. If possible you should get a growth after the middle of August started on your peach orchard and get just as big a growth as you can by cold weather. Then supplement that by an artificial application of manure. If you cannot get that, then get chips from the chip piles, bark or anything you can get. I have suggested putting prunings around the trees. We have winter sun scald and these prunings piled up around the trees will protect them. This whole question is not separate from the one of soil poverty. I really believe that a good deal of the frost injury comes from a poor condition of the ground. You know you can take new land with a turf of moss and leaves, the forest trash on it, and the ground will stay unfrozen and you would be able to plow it when you could not think of plowing in old land. The slight mulch has acted as a blanket. I suspect a great deal of root winter killing comes from the fact that the soil is bare from covering. The barer the soil is, the more subject the trees are to winter killing. Dry seasons make it worse than when there is plenty of moisture in the ground. When you planted out these Michigan peach orchards on new land, you had all that humus; you had all that material in the soil and the peach tree delighted in that soil, rich in humus, and prospered and flourished and suffered much less from winter killing, especially root winter killing, than on soil nearly worn out.

Unless you use cover crops skillfully, the ground is very apt to be depleted in humus. You can practice rotation of corn and oats and clover and renew your supply of humus through the clover in the peach orchard, but unless you can have a cover crop there will be a wearing out of the soil and it will become deficient. The remedies for this whole land poverty is to get on to new lands if you can, but there is in reality but little land remaining suitable for peach growing that can be purchased. But since this cannot be had the next best thing is to use cover crops as far as possible.

The next thing, when the land is well covered is the use of commercial fertilizer. I am a strong advocate of this. One reason why is because I took up a lot of abandoned land in the state of Maryland and planted out 200 acres of orchard and have grown them on commercial fertilizer

and stable manure very largely, I have applied eight and ten tons of stable fertilizer and 1,000 pounds of commercial fertilizer to the acre for several years. I have seen splendid results from commercial fertilizers. The problem is not so simple with you perhaps as it is with us. I do not understand just why, but I judge that this is so from the discussions that have taken place. But you will see how I recognize, and why I recognize the value of fertilizers. Those trees to which Mr. Hale referred in the first place had leaves that were six, eight and ten inches long instead of four or five inches long and about one inch in width. I knew that was impossible without nitrogen. When I went up and saw that fruit I did not find a greenish, sappy, imperfect fruit that would come from over-nitrogenous fertilizers. I found a large well colored fruit. That meant phosphoric acid and potash and I, was just as sure as I could be. I remember the occurrence very well and I was glad to have him bring that out. Anyone could have seen that, who knew the effect of potash and phosphoric acid.

I was also interested in what Mr. Rose had to say about the distances apart that he planted his peach trees and also the putting of heavy applicatons of manure on his peach trees. I planted my trees 12x16. They were intended to be 24x16. I cut out the 12 foot fillers too soon, and then had them 16x24. I discovered they were too thick so I planted my next block 18x24. In four years, these trees covered the space and that in spite of heavy pruning. 18x24 feet will answer for five or seven years, but they get to be too thick after that. The next time I plant out an orchard I will set the trees 16x24 with the 16 ft. trees for fillers.

My seven year olds are closing the 24 ft. space. That is what can be done with fertilizers. We had Elberta peaches this year that looked like apples, I never sold any of them for less than $1.25 per crate and from that to $1.50, $1.75 and $2.00. They were sprayed with self-boiled lime sulphur as well, and right here I want to say that you must fertilize your peach orchards if you want them to grow large. Push the orchards on land that has been in orchard and it does very much better if possible to give it a three years' rest. I am rather inclined to plant corn as a part of the scheme, but it is wrong to keep up cultivation and depleting the land of humus. Haul out some stable manure if possible. When you plant an orchard just let me give you a trick. Never manure the little tree on a very poor piece of land. Dig the holes, fill the holes up with manure and make a little mound. Let that get rotted before you plant the tree next spring. When you plant the tree in the spring, dig out the manure, fill in with the ground that has been manured and place rough manure on top the ground, but not in the hills. The next thing is to haul to the young orchard just after it is planted out stable manure and put one or two shovels full around the trees to be cultivated in later in the season. Stable manure will give a young orchard on old peach land a boost that nothing else will do. There are two or three reasons for this. It is a cure, almost, from the tree standpoint for the Black Rot. Then it will stimulate the root growth so that it will outgrow the root fungi.

In this connection, I wish to offer just a word of caution. I am advocating now the driving of your peach orchards at high speed, manuring, fertilizing and getting your old land full of humus. But you must be careful to stop this within a reasonable time. It will not do to carry

it too far. Very thorough cultivation early in the season up to August is what should be given then. Give the tree a chance to reach a complete dormancy. The reason why I mention this is because it seems to me that the other side is the weak one as a rule.

One of the great troubles in replanting has been the group of root parasites which have been attacking the old trees, living on the roots and yet the trees have carried them and borne fruit in spite of them. As far as I know that group comprises two or three things. In the first place fungus that gets on the peach and also on the apple. It rots the tips of the root fibres and occurs on the seedling. It needs further investigation. Then again there is a little undescribed fungus which I thought was the cause of "little peach" but I do not know about this for sure. Then there is the black peach aphis; indeed it is hard to keep track of what is going on underground. I have seen enough of these troubles to be quite sure that a large part of the difficulty of planting young orchards on old peach land is not in the absence of humus but the presence of parasites that attack these. There is one place where an advantage comes in of having a three years' rest or change—by putting on something on which they cannot live. Then by manuring and fertilizing the young tree grows so fast that it will outgrow them.

You can grow the tree nearly free from it by manuring the holes but you can take a tree that is sick, nearly half dead, and recover it with a bushel or two of stable manure.

DISCUSSION.

Question. I would like to know if there are any trees on peach land that are more susceptible to the yellows than others.

Prof. Waite: There may be some slight variations, but they all get it about the same. In one part of the country, the native seedlings seem to be resistant, but down in Virginia we found the peach trees from seedlings that were about the worst affected of any we ever saw.

Question: What do you say to planting a peach orchard on land that has to be drained.

Prof. Waite: I do not think it is advisable to plant peach trees on land that requires draining. I know that some have done it and it is perhaps a problem that you can solve better under your particular conditions than anyone else.

In this connection, and before going farther, I wish to say that of the miscellaneous diseases one of the great problems now is to spray your fruit trees and grow this fine fruit. It will not pay you to fertilize and manure and give your trees perfect cultivation if you do not spray. For, unless you do spray, it will be impossible for you to raise fancy fruit and unless you can grow this kind of fruit your orchards will not pay you very much. Your trees should be sprayed during the summer with self-boiled lime sulphur. In the matter of fertilizers it is rather hard for anyone to give a formula that will fit any particular orchards.

Question: You spoke of peaches being as large as apples. How large were those apples?

Prof. Waite: We picked peaches so large that 54 filled a crate.

A voice: I had peaches that 42 of them filled a half bushel basket. They ran 66 to the crate and we had still larger peaches than that.

Question: Have you used the nitrate of soda to put on separately and if so would you put it on in the fall or the spring.

Prof. Waite: I would wait until late spring, until after trees are out in leaf.

Mr. Welch: When we get to diseases I would like to say something. We have worked together for nine years and have experimented in every way that any body was able to experiment. We dug up more than 1,000 peach trees and examined the trees from the roots to the top and still for all that we didn't known any more afterward than we did before, but the point I wish to make is that when we started out on this extermination plan, which was to cut out the trees so that they could not spread from the bloom, we could see some results. It has been five years now since we made the last inspection to which Prof. Waite referred in that territory of six miles square and I have been pretty well over our state since that time and where the disease exists, where that extermination work has been carried on, I find that the orchards are in better shape today than anywhere else in the state where the disease exists. Our point was when we started out to exterminate this disease by the method employed we started in with the idea that we didn't want diseased blossoms to inoculate healthy blossoms and the results are that our section is more free from the disease today than any part of the state of Michigan where they have the disease.

Mr. Hartman: Has it been determined whether the yellows spreads at some particular stage of the growth of the tree, for instance at blossom time, or does it spread at any time and also is the disease as virulent when it first comes into a neighborhood as it is later? It has just come into our neighborhood and we have started in to clean it up and I would like to know if it is safe to plant trees under the impression that later on it will not be so bad as it is at present.

Prof. Waite: I think it is usually more virulent at first. In answer to the second part of you question, are the yellows transmitted from the old cases to the new cases and at what period; we suspect only that it is done in the spring of the year. In our practice we think the only way is to have those trees taken out.

Question: On our bare soil I would like to know if you would get enough results from barnyard manure without adding potash?

Prof. Waite: I hardly think so. You do however, get splendid results from manure in Michigan and I am basing this statement on the behaviour of trees out of Michigan rather than in Michigan. In Maryland we use stable manure, but with it we use potash and lime as well. The peach tree demands lime. If the lime is not there it needs to be put there. Many of the western orchards have too much of the lime so that while a moderate application of stable manure may give excellent results yet I would advise the adding of phosphoric acid and potash as well.

Question: Prof. Waite spoke of adding nothing but arsenate of lead to these mixture of lime and sulphur. Have you tried any of these to know whether they would burn the leaves like arsenate of soda?

Prof. Waite: We tried several of the others—The Kedzie formula, Arsenate of Lead and Paris Green, and they made trouble.

Question: Will the lime fertilizer for peaches apply to plums as well?

Prof. Waite: I think so in the main. We are now carrying on ex-

tensive experiments on apples, in order to get our bearings and we are not getting results as quickly and easily on our apples as on our peaches. I think the principles are the same except the peach is the grossest feeder and responds to the fertilizers a little better. I think that the Japanese plum would behave much the same and for the same reason.

A member: Forty years ago I had a beautiful four-year-old orchard which all went out in yellows in less than two years. Scattered here and there in that orchard were yellow peaches double the size that they should be at the time. I can remember very distinctly of hearing that the "yellows" were disseminated through the blossoms and I would like to know how it could be.

Prof. Waite: We suspect this to be the way it is disseminated, but we do not know.

Mr. Welch: Do you have any idea that there is anything in the ground that might have a tendency to produce the yellows disease.

Mr. Waite: I think not.

Mr. Pugley: How will we know whether a tree needs lime?

Answer: The only way I have of finding that out is to give it some and see how it responds. In Maryland, we assume that the land needs lime, because the water is soft while here the water is hard and so there is not so much need of it here. The best way to try it out is to put in a duplicate strip lime one and not the other. We see it in the cow pea and cover crops and we can also tell it on the ground by the behaviour of the weeds, the horse sorrel, etc. You can also tell it on the peach tree. When the peach tree is green the tree is deficient in lime. There are three or four different things that show this, one of them being the rolling of the leaves.

Question: Will the lime correct the acidity of the soil?

Prof. Waite: Yes, sir. I have a suspicion that much of our land needs lime.

A member: I would like to ask if there is any difference in lime? We have been told during the last year that there is no difference. What will be a fair application to a peach orchard?

Prof. Waite: The lime in different sections of the United States varies considerably. Dr. Lay found out that while plants needed a certain amount of magnesia in the soil, they did not want too large a proportion of magnesia in lime and so a lime with too much magnesia would not be desirable; and yet, there are peculiar situations in which they might be a remedy for the soil conditions.

As far as the agricultural lime and stone lime is concerned a good deal that is said about that is fake. If you want to get lime you send to the lime company and you get it in lots of lump lime and this can be applied in two or three different ways. One simple way is to haul it to the field, fill a basket and drop it in piles the proper distance apart. Some plough furrows the desired distance apart and put it in these furrows. About one ton or 25 bushels to the acre is a good satisfactory application and it will last for four or five years. No one likes to apply too much lime to his land because it burns out the land and causes the soil germs to grow too rapidly and consume too much of the nitrogen and is therefor not desirable. Any good user of lime will follow it with green manure and cover crops, promptly. Apply lime to the same

land on which cover crops are grown. It is associated with the use of green manures and cover crops.

Question. Will you please explain regarding the shell lime and rock lime advertised.

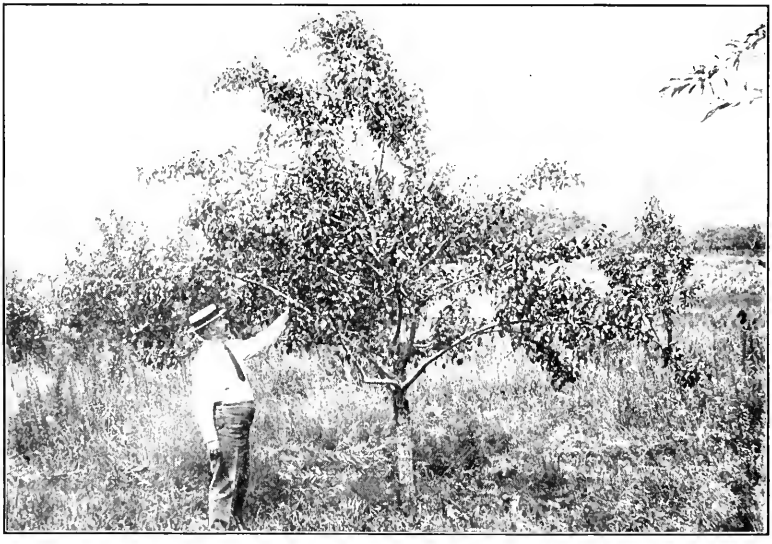
Prof. Waite: It is lime that is not fit to sell any other way. I understand that is in a ground form. Shell lime is a good lime. On certain light sandy loams, they find that the ground lime stone or air slacked lime is better than caustic lime. Ordinarily the caustic lime on sour swamp and humus land would be better. Don't get deceived. When you take a pound of dry stone lime and allow it to slake with a little moisture, you have two pounds of slaked lime, because it has absorbed the water and carbonate of lime, so when you buy this kind you are paying for water as well as lime.

ANNUAL REPORTS

OF

LOCAL HORTICULTURAL SOCIETIES.

Duchess apple trees on farm of O. E. Gustoff, near Northport. Beans and other hoed crops are grown between the rows until the trees require the whole ground.



State Dairy and Food Commissioner G. M. Dame inspecting his Flemish Beauty pear crop in August, 1910, Northport, Mich.

Apple harvest at the Omena, Leelanau county, orchard of Hawley & Snyder of Hart.
The 1910 crop on this 75 acre orchard of 2,850 trees nearly balanced the entire purchase price paid the year before.

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Wm. Hicks, Benton Harbor, R. 2.
B. J. Earnan, Benton Harbor.
Chas. Tibbites, Benton Harbor, 156 Edwards Ave.
B. Bartram, Benton Harbor, R. 4.
A. K. Thompson, Niles.
C. T. Jones, Benton Harbor, R. 6.
W. J. Davis, Benton Harbor, 193 Ohio St
D. L. Ringle, Benton Harbor, R. 4.
C. A. Leland, Benton Harbor, R. 4.
George Friday, Coloma.
Carl Tabor, Sodus.
Jacob C. Weber, Watervliet.
A. F. Sheldon, Riverside.
M. Thar, Riverside.
N. E. Wadsworth, St. Joseph, R. 1.
F. McKee, Benton Harbor, R. 3.
L. Camfield, Benton Harbor, R. 4.

PROCEEDINGS FOR 1910.

This society was organized in 1902. The annual meeting was held in Library Hall, Benton Harbor, November 23, 1909. December 10, 1909, W. M. Scott, of Washington, D. C., addressed the members on the spraying of peaches and apples with the different sulphur sprays.

January 26, 1910, M. H. Pugsley, of Paw Paw, gave the members a very interesting talk on the methods of growing grapes.

February 10, 1910, S. B. Hartman addressed the members in the forenoon on small fruits. McFarland of Chicago, gave a short talk on the packing of fruit from the commission merchants' view. Paul Rose followed with a short talk on fruit growing in northern Michigan.

March 3, 1910, occurred our annual spray meeting "Lime-sulphur" was given by R. A. Smythe; "Spraying the apple" by Frank Howard.

June 1, 1910, was the final meeting and the condition of the fruit crop was summed up.

SAUGATUCK AND GANGES POMOLOGICAL SOCIETY

(Auxiliary to State Society.)

OFFICERS.

Edward Hutchins, Fennville, R. F. D. 1, – – – – – President.
Charles B. Welch, Fennville, R. F. D. 2, – – – – – Secretary.
Horace G. Welch, Fennville, R. F. D. 2, – – – – – Treasurer.
Charles E. Bassett
H. H. Goodrich – – – – – – – Vice-Presidents.
E. H. House

MEMBERS.

Wiley, D. W., Douglas.
Dunn, Wm. H., Ganges.
Atwater, E. H., Ganges.
Davis, Chas., Fennville, R.
Plummer, Wm. H., Fennville.
Goodrich, H. H., Ganges.
Gooding, T. L., Fennville, R. 1.
Weed, P. P., Fennville, R. 2.
House, E. H., East Saugatuck, R. 1.
Wark, Edward, Fennville, R. 2.
Eubank, O. V., Fennville, R. 1.
Cleffy, James, Fennville, R. 1.
Birkholz, Chas., Fennville, R. 2.
Hayes, John R., Fennville, R. 2.

Gaze, Geo. C., Fennville, R. 3.
Leland, E. P., Fennville, R. 1.
Rickert, W. C., Douglas.
Taylor, Grace L., Fennville, R. 2.
Fabun, J. C., Bravo, R. 2.
Paquin, N., Bravo, R. 2.
Tourtellotte, D. D., Glenn.
Wedge, J. D., Allegan, R. 4.
Broe, P. H., Fennville, R. 3.
Herbert, Fred, Douglas.
Tillinghast, Clark, Douglas.
LaDick, Wm., Fennville, R. 1.
Funk, J. M., Bravo, R. 2.
Chapman, J. G., Fennville, R. 1.
Roblyer, Hiram, East Saugatuck, R. 1.
Hayes, Frank, Saugatuck.
Thompson, A., Saugatuck.
Kenter, Vern, Fennville, R. 1.
Kingsbury, E. E., Fennville, R. 1.
Rouse, W. E., Fennville, R. 1.
Kerr, Wm., Douglas.
Plummer, F. W., Fennville, R. 1.
Kitchen, M. W., Fennville, R. 1.
Weightman, C. B., Fennville, R. 1.
Cawthorp, F. S., Bravo, R. 2.
Clausen, H., Douglas.
Dreher, Adolph, Fennville, R. 2.
Turrell, W. J., Fennville.
Kibby, W. J., Fennville, R. 2.
Knox, A. R., Fennville, R. 1.
Kingsbury, A. O., Fennville, R. 3.
Hirner, John, Fennville, R. 2.
Heinze, Emil, Fennville, R. 2.
Miller, Jesse L., Bravo, R. 2.
Roblyer, Chas., Bravo, R. 2.
Stevens, A. H., Bravo, R. 2.
Schrimger, David, Bravo, R. 2.
Symons, Chas., Bravo, R. 2.
Dorning, J. F., Bravo, R. 2.
Dailey, Chran, Bravo, R. 2.
Repp, Lewis, Bravo, R. 2.
Wells, Henry, Bravo, R. 2.
Wright, Perry, Bravo, R. 2.
Wark, Will, South Haven, R. 6.
Clapp, Geo., Glenn.
Berry, John, Glenn.
Williamson, C. P., Bravo, R. 2.
Hamlin, W. M., South Haven, R. 2.
Wolfgang, L. C., Bravo, R. 2.
Wadsworth, Jas., Fennville.
Stillson, W. B., Fennville, R. 1.
Howland, David, Fennville, R. 2.
Hoover, A., Fennville, R. 1.
Munger, R. C., South Haven, R. 2.
Weed, Mrs. Will, Fennville, R. 2.
James, Harvey, Bravo, R. 2.
Plummer, L. E., Fennville, R. 1.
Hilbert, Henry, South Haven, R. 2.
Smith, C. S., South Haven, R. 2.
Fabun, J. C., Bravo, R. 2.
Conrad, S. L., Bravo, R. 2.
Dean, G. D., Fennville, R. 1.
Armstrong, W. H., South Haven, R. 2.

REVIEW OF PAST MEETINGS.

The following resume of the annual address of Hon. D. W. Wiley, President of the Saugatuck and Ganges Pomological Society, delivered January 5, 1895, presents some interesting and valuable facts relating to the early history and work of the Society, together with something of the local conditions of the fruit industry in its early years.

"This Society was first organized September 30, 1871, under an act of the State Legislature for the incorporation of societies for the promotion of Pomology, Horticulture and kindred sciences and arts. It was known for a number of years as the Lake Shore Agricultural and Pomological Society, and continued to do business under this name until some time in 1877, when it was changed to that of the Saugatuck and Ganges Pomological Society.

"Commencing the fall of 1872 the first fair ever held in western Allegan was arranged for and held in the village of Douglas under the management of the Society." After holding these fairs for three years they were discontinued on account of the lack of suitable buildings and grounds and other facilities which the Society with its limited means was unable to provide.

"At the time the Society came into existence fruit growing here in western Allegan county was but imperfectly understood and in an undeveloped condition. The orchards of those days were small and largely composed of apples, peaches having received but little attention. About this time, however, there were a few quite extensive orchards being planted to peaches. These orchards proved so successful that from that time to the present the peach has been planted more largely than all the other fruits combined; and judging from present indications large additions to the already extensive orchards devoted to this fruit will be made the present season. At the time referred to above the entire peach crop of this section would not have furnished a full load for one of our steamboats. But then, as now, there were those among us who believed the business to be overdone. From this small beginning this industry has kept on increasing until instead of a few hundred bushels we are producing and sending to market annually from three to five million baskets, requiring some four hundred cars and not less than a dozen steamboats to transport them to market. Notwithstanding this wonderful increase that has been going on in the production the demand for fine fruit, well grown and carefully and honestly put up, has been equal to the supply, and should encourage our peach growers to put forth greater efforts in meeting this demand. In the development of this vast

fruit industry this Society has performed an important part and is justly entitled to great credit for the work done."

The peach industry continued to increase and the area planted to peach orchards expand until October 11, 1906, when an unprecedented freeze swept over lower Michigan, wiping out perhaps ninety per cent of the peach orchards of western Michigan. Prior to that time, however, the production of apples had engaged the attention of growers, and old orchards were cared for and renovated, and new orchards planted to this fruit. Some idea of the extent to which this industry has reached may be gained from the following extracts made from the annual report of President Edward Hutchins before the Society December 18, 1909:

"The fact that the work of this Society has not been without effect is attested by the fruit shipments of the past season. It is probable that during the season just closed more fruit and doubtless better fruit, judged by the standard of quality, has been shipped from western Allegan county than the whole state of Colorado can boast of, notwithstanding the wide advertising that is being given to that district as a promising fruit-producing section. While something is due to natural and especially favorable conditions, yet it is no doubt true that still more is attributable to the intelligence and enterprise of our citizens. * * * It must be remembered that natural conditions alone never achieved very much of value, humanly speaking. There is a large proportion of Michigan that is capable of producing just as fine apples as we are accustomed to ship, but not many places in the state are shipping good apples in quantities.

"The amount of fruit sold in this section the past season is, indeed, enough to gratify the ambitions of the man of unlimited pride. An early estimate of the value of the apple crop alone was placed at a quarter of a million dollars, and the size of the crop as it was finally harvested was far in excess of early estimates, and at that the crop was recognized as a very short one, less than half a crop. Add to this the large quantity of peaches, pears, plums, grapes and small fruits and the approximate must run well up to the half million mark. Surely no line of agricultural pursuit can approach within 25 per cent of this amount on an equal extent of land. I have asked the agents at all of the shipping stations in the vicinity for figures showing the total shipments, but this data does not seem to be compiled by any of them as yet, for I have only received one guess from one station."

Speaking on the marketing question in the same report Mr. Hutchins says:

"The great difficulty and weakness of the grower is that he does not know the value of his products. The market is subject to fluctuations and on a falling market he may refuse a good offer, thinking that on the basis of former prices it is too low, while, on the other hand, he may accept altogether too low a figure when prices are advancing, as it is not the buyer's business to keep him informed when prices rise. One of the best investments the growers could make would be to employ a good man simply to keep them informed regarding market prices and conditions. In default of such a man many would reap large profits by spending more time in posting themselves."

At a meeting held at Grange Hall, January 29, 1910, the Society discussed the subjects of the home-made diluted, the home-made concentrated and the commercial lime-sulphur preparations for spraying. Mr. T. L. Gooding, speaking on the subject of the home-made diluted said three years ago he first commenced the use of the lime and sulphur wash. At that time we thought the San Jose scale was going to put us out of business. About 30 per cent of his trees had scale on—not enough to injure the fruit, but enough to show that we had plenty of scale. Had one tree that was completely covered with the scale and by the use of the lime and sulphur the scale was completely destroyed. Since using the lime and sulphur we have found no scale until this fall we found a few, enough to show that we still have them with us. It seems as though we had an expensive plant (an eight-horse boiler with two elevated tanks for cooking), as others have had good results from cooking in kettles, but we feel ours has more than paid its cost and cooking by steam is very convenient and the preparation easily made and handled. Would not say that the scale is a blessing in disguise but thinks it has been a benefit to the careful grower.

C. B. Welch had made home-made concentrated lime-sulphur that analysis showed to be fully as strong as the commercial article on the market last year. It can be easily prepared with either steam or in a kettle by observing a few requirements and being thorough in doing the work. It can be made before the spraying season comes on and effect a big saving both in time and expense. Mr. Welch uses 125 lbs. sulphur, 60 lbs. lime to 50 gallons of water.

In speaking upon the use of the commercial article, C. E. Bassett, said he was not there to advocate the use of this spray. We used it last year and will use it again this year.

When the scale was first discovered in our orchards we were advised to put up cooking plants, possibly too large, but I think it paid. One year we depended on getting ours cooked at a neighboring plant with the result that some days we could not get more than two loads a day and at a time when the weather was right to put it on. We lost money waiting for it. The advantage of the commercial article is that it is ready for use at any time by adding water. Speaking further on the different brands of sulphur, Mr. Bassett described how sulphur is prepared and said that powdered commercial sulphur 99½ per cent pure, if finely ground, is practically as good as any and costs much less.

A joint meeting of the Saugatuck and Ganges Pomological Society with the Casco and South Haven society was held at Leisure, February 8, 1910. One of the addresses was given by Joseph Kelly of South Haven on the care and marketing of apples. Mr. Kelly has practiced thinning apples and advised it. He uses shears to cut off the fruit. Said the thinning of apples is not such a stupendous job as one would think, as the work can be done quite rapidly after a little practice. He would thin to five or six inches apart, cutting off the poorer fruits. Mr. Kelly said that thinning protects the trees from severe storms and encourages annual bearing. Nor is the job so very expensive as much of the cost is saved in picking and packing the apples, besides getting nearly all No. 1 fruit. He favors scraping the trunks of the trees with a steel brush rather than with a hoe or other edged tool, also advises moderate annual pruning. He advocates absolutely straight packing and putting the grower's name on both firsts and seconds. In gathering the fruit only bullets should be picked in bags, and careless picking may injure the succeeding crop by breaking off the fruit spurs. Michigan apples require no decorating in order to sell them when they are grown, picked and packed as they should be. Fennville alone is being more advertised than the famous Washington district because buyers find up-to-date growers here with good orchards and they tell others that Fennville has good orchards We have the best apple state in the union and we should make the most of it.

A largely attended meeting and one of unusual interest was held in Fennville March 5, 1910, the matters treated being spraying appliances and machinery. In opening the meeting President Edward Hutchins said the interest in this as well as other meetings shows that there is a horticultural awakening among the fruit growers of this, as well as other places in Michigan, and it is a source of much gratification to see the interest that is manifested. Never was the outlook for the fruit grower better and never was there a time when co-operation in gaining knowledge of methods of growing good fruit, purchasing supplies and marketing is more necessary. The Society now has the largest paid-up membership that it has had in several years.

C. E. Bassett had obtained a large collection of spray nozzles which he displayed and gave a brief description of each. The Vermoreal is an old nozzle and has been in use for years. The Bordeaux and the Seneca are practically the same, but made by different manufacturers. The Cyclone, Lenox and graduated Vermorel are of one style. Of late we have had introduced a different type of nozzle with steel discs of different capacities which can be changed for different kinds of materials, and which can be replaced at a cost of only 60 cents per dozen, thus adding materially to the life of the nozzle. Another style was one with an angle neck, with which a person can spray at different angles by turning the spray rod. There are also crooks that may be used with the straight nozzles and working thus in a similar manner. Still another type of nozzle is the Mistry, which produces a fine spray.

A number present were using the Friend and liked it very much. The Calla and Bordeaux are in use in the large apple trees where a nozzle is required which carries the spray to a considerable distance.

Speaking on the subject of pumps Edward Hutchins said it is important to get one the proper size. A mistake was made in the earlier pumps in getting those that were too large and pumping too much liquid through the relief valve, thus causing unnecessary wear and trouble with that device. For a power pump a double pump with a 2½ inch cylinder and a four-inch stroke is about right for two men. Another important matter is to get a pump in which the wearing parts are easily accessible. There is considerable wear to the plunger packing and cylinder, especially where Bordeaux or other sprays with much lime are used, and these parts require frequent renewing. Get a pump in which these can be readily got at.

Geo. W. Griffin gave a very interesting talk on engines. The question of power, he said, depends on the use that is to be made of the engine. Many want one both for spray-

ing and other purposes, such as cutting fodder, sawing wood, pumping water, grinding feed, etc. I have a horse and a half gasoline engine that I have used for these purposes for the last two or three years which has given good satisfaction. The greatest trouble with it is there is too much iron in it. It weighs 300 pounds and could as well be made lighter. A new type of engine is now being made and a 3-horse engine can now be had which only weighs 160 pounds—such as are in use on twine binders.

Mr. Hamilton said that for hilly ground he has a wagon with axles 18 inches longer than usual which makes it much safer where using a derrick.

The Society met at the U. S. Government Entomological Laboratory August 10, 1910 and after viewing the work in progress there adjourned to meet in village hall. Much interest was taken in the work being done by Messrs. Braucher and Hammar who were in charge.

At the adjourned meeting Mr. Hammar extended a cordial invitation to all who were interested to visit what is known as the "bug house". He expressed his pleasure because of the appointment of the meeting at the laboratory as it gave those in charge an opportunity to become acquainted with the people. He said their work is to find out if possible the troubles of the fruit growers and to find a remedy if possible.

Prof. W. A. Taylor, Assistant Pomologist of the Department of Agriculture at Washington was present and expressed his pleasure at being able to attend the meeting. He said he could well remember when quite small attending a meeting of this Society at the little old brown school house on the town line and other meetings of the organization, and thought that the success in fruit growing in this section is largely due to the work of the Saugatuck and Ganges Pomological Society. He said: "Since coming to this vicinity I have seen the rise and decline of a great peach industry. Some of the decline is due to natural causes and climatic conditions and possibly some of it to our lack of knowledge in selecting varieties, care of the trees and fertilizing of the land. One thing that is necessary now is the fertilizing of the soil, the proper feeding of the trees. To successfully grow fruit we need good and early cultivation, just as early in the season as the land will permit, and clear through the season until a cover crop is sown. I have thought we have sometimes given too much credit to spraying and not enough to fertilizing. I have known orchards in some sections to be kept up with commercial fertilizers and cover crops. I have a preference for farm manure, especially in light soils. In the matter of spraying, this should be done at the right time. Four or five days difference sometimes makes a great difference in the profitableness of the orchard.

From an extended observation over a large number of fruit sections I am sure this section possesses many more advantages and less disadvantages than any other that I have known. I very much doubt if any other section has sent out as large a proportion as western Allegan county. With the exception of possibly one place Fennville shipped the largest amount of good fruit last year of any place east of the Rocky Mountains.

In speaking of varieties, Prof. Taylor said this is largely an experimental work. Of those that have been in bearing several years, among apples Red June this year is of good size. Some years it has been sold as a crab apple. The Jefferson, just ripening, is larger than the Red June. For fall varieties the Garfield promises to be a good market apple. The McMahon promises to be of commercial value here. It follows the Dutchess about as Wealthy does. One question in the minds of fruit growers is the relative value of the summer and winter varieties. It seems to me that we cannot afford to be without either, and we want both the early and late flowering varieties as we are more sure in this way of getting some apples every season. The question of apple growing being overdone was of more interest twenty-five years ago than now. It seems to me that at no time has the outlook been brighter for the West Michigan fruit growers than now.

Prof. A. G. Hammer spoke on the insect pests of the fruit grower. He exhibited a number of different kinds of these, some of which he said were pedigree bugs. Among the exhibits was the codling moth in its four stages of egg, larva, pupa and moth. In speaking of the latter insect he said the worm leaves the fruit in the fall and seeks a hiding place where it passes the winter in the pupal state. In the spring, about the time the trees are ready to blossom, the moth appears and after feeding a while lays its eggs. The egg hatches within a week or two and the worms are on hand about the time the trees are in blossom. It takes a very short time, less than a day, for the worms to enter the fruit. The young apple has a very fuzzy covering and the worms enter the calyx. The time in which we can reach the coddling moth with a poison so as to do effective work is very short.

Continuing, Prof. Hammar, spoke of the habits and work of the curculio. The study of this insect is his special work at present. He finds it is doing much greater damage than most of us have thought. Much of the damage, especially of the peach, that has been attributed to the cold weather is done by the curculio. From some trees which he has

been observing during the summer he found that a good crop of peaches had set, but 75 per cent of the crop had fallen on account of the work of the curculio. Encouraging results have been had by spraying the peach with arsenate of lead just as the shuck falls, and again later if necessary. Another remedy is in thorough cultivation of the orchards up into August. The worm goes into the ground to pass the pupal stage and a very little disturbance at this time kills it. Prof. Hammar found by experiment where 100 worms were placed in confinement and allowed to enter the ground that 75 per cent of them were killed by stirring the soil with a lead pencil. In their natural habits they remain so near the surface that they are killed by the ordinary harrow. Undoubtedly the curculio is doing much greater damage than we have thought by puncturing the very young fruit causing it to drop, and later by providing entrance for the spores of the rot fungus and so causing decay. Much of what is known as the June drop may be caused by the curculio.

INTERMEDIATE VALLEY FRUIT GROWERS' ASSOCIATION, INCORPORATED 1909.

(Auxiliary to State Society.)

OFFICERS FOR 1911.

Robert E. Morrow, Central Lake, – – – – – – President.
Charles S. Guile, Bellaire, – – – – – – Secretary.
William J. Dewey, Bellaire, – – – – – – Treasurer.
Charles F. Pinnell, Bellaire
Merritt Hodge, Torch Lake
F. H. Clarke, Central Lake
A. E. Sage, Central Lake – – – – Executive Committee.
I. G. Fisher, Bellaire
Elias Burns, Central Lake
Mrs. A. E. Sage, Central Lake
Mrs. C. S. Guile, Bellaire – – – Program Committee.
Mrs. M. A. Garwood, Central Lake

LIST OF MEMBERS JANUARY 1, 1911.

Abbott, R. E., Bellaire.
Adams, John, Bellaire.
Adamson, Henry, Bellaire.
Amerson, H. S., Elk Rapids.
Anway, Silas, Central Lake.
Bacon, J. E., Bellaire.
Bailey, C. L., Mancelona.
Ball, C. W., Bellaire.
Baker, H. G., Alden.
Barber, Almer, Central Lake.
Bechtold, F. W., Bellaire.
Bowers, William, Central Lake.
Bodle, A. T., Bellaire.
Burns, Elias, Central Lake.
Bush, Leonard, Bellaire.
Cabanis, Geo., Bellaire.
Cameron, John, Central Lake.
Chapin, T. N., Bellaire.
Clarke, F. H., Central Lake.
Cleveland, C. L., Bellaire.
Covert, Chas. W., Central Lake.
Dawson, Sidney, Central Lake.
Dearborn, Charles, Bellaire.
Densmore, C. E., Bellaire.
Derenzy, John, Bellaire.
Deevy, James, Bellaire.
Dewey, Wm. J., Bellaire.
Dickerson, F. B., Detroit.
Dye, Charles, Central Lake.
Ferguson, Rev. A. T., Traverse City.
Ferree, Joe, Bellaire.
Fisher, Isaac, Bellaire.
Flewelling, Simon, Bellaire.
Flye, Fred D., Bellaire.
Frank, A. E., Bellaire.
Garwood, Mrs. M. A., Central Lake.
Gizell, Frank, Bellaire.
Gordon, Lester C., Bellaire.
Gray, E. J., Bellaire.
Green, O. E., Bellaire.
Guile, Chas. S., Bellaire.
Guyer, Theodore, Central Lake.
Guyer, Thomas, Central Lake.
Harris, E. R., Ellsworth.
Hill, Jerome, Bellaire.
Hodge, Merritt, Torch Lake.
Hollenbeck, E. J., Elk Rapids.
Hemstreet, Frank H., Bellaire.
Kauffman, Dan, Bellaire.
Kauffman, S. D., Bellaire.
Lammiman, Charles, Bellaire.
La Count, R. A., Central Lake.

Leavitt, Roswell, Bellaire.
Maltby, E. H., Bellaire.
May, C. E., Bellaire.
Morrow, R. E., Central Lake.
Morrow, G. M., Central Lake.
Montgomery, G. W., Bellaire.
Mosher, Rev. W. P., Bellaire.
Mudge, Grant, Central Lake.
Mudge, Phillip, Central Lake.
Nixon, W. J., Bellaire.
Pinnell, Chas., Bellaire.
Potter, E. J., Bellaire.
Putt, C. W., Bellaire.
Richards, H. L., Bellaire.
Richards, W. H., Bellaire.
Rogers, D. L., Bellaire.
Sage, A. E., Central Lake.
Sage, O. N., Central Lake.
Scott, C. W., Rapid City.
Severance, F. M., East Jordan.
Slocum, Ralph, Bellaire.
Sowinske, Peter, Bellaire.
Underhill, C. L., Bellaire.
Vaughan, John, Central Lake.
Van Liew, L. G., Bellaire.
Weiffenbach, Chas., Bellaire.
Williams, Peter, Central Lake.
Wilson, G. H., Bellaire.
Wooton, A. B., Bellaire.
Wright, Fred S., Bellaire.
Young, Rev. Thomas, Central Lake.
George Turner, Central Lake.
N. H. Disbrow, Bellaire.
E. D. Muckey, Bellaire.

The association holds monthly meetings, during the summer months at the homes of its members; during the winter season in the villages, in the territory covered by the association. Printed programs are issued at the beginning of the year containing a list of topics to be discussed and designating the member to take charge at each meeting.

The work of the association has been mainly along the lines of better methods in spraying, pruning, cultivation and care of the orchard. It has conducted a number of field demonstrations along these lines and has been fortunate in having the assistance and advice of Professors Taft, White and Hallagen of the Agricultural College, President Farrand and Secretary Bassett of the State Society and a number of other practical and successful fruit growers at its meetings.

Taking its name from the beautiful valley encompassing the Intermediate chain of inland lakes the association has an ample field for its labors in the years to come. Antrim county was originally covered with a dense growth of the finest of hardwood timber, the bulk of it having been but recently lumbered. But a little over 33 per cent of its valuable agricultural and fruit lands are under cultivation.

Apples and cherries are our leaders in the line of fruit production but berries of all kinds wild and cultivated, grow in profusion. We have a number of successful and profitable peach orchards and the acreage set to peaches is each year being extended.

The soil of the county is mainly a gravelly loam, containing the elements necessary for producing healthy and early bearing trees. Protected by Lake Michigan on the west and having upwards of seventy miles of inland lakes we rarely have zero weather until late in January or in February when our lakes freeze over and the ice and snow hold vegetation back until danger from frost is over. Our spring seasons are practically two weeks later than in southern Michigan and our season of killing frosts is correspondingly extended in the fall. Injury to fruit from spring frosts almost never occurs in the western part of the county.

Thus far the serious diseases so troublesome to orchards further south have not affected us in this county and the association is now looking after the appointment of efficient commissioners in each township to prevent their introduction. The county is already a heavy shipper of apples and approximately 150,000 fruit trees were set in the territory tributary to the valley above mentioned during the past year.

Meetings of the association are held on the last Friday in each month and it is working to accomplish the purposes for which it was formed, namely "The promotion of the interests of horticulture and fruit growing in the county of Antrim and State of Michigan, by encouraging the raising of fruits and horticultural products and the development and extension of a market therefor."

CHAS. S. GUILE,
Secretary.

NORTHPORT FRUIT GROWERS' ASSOCIATION.

(Auxiliary to State Society.)

Preliminary meetings were held in Northport Town Hall, on August 16, 1909, August 28, 1909, and October 2, 1909. On November 20, 1909, pursuant to call and after legal notice for three weeks in Northport Leader, a meeting was held to effect permanent organization. Following officers were elected:

OFFICERS.

C. A. Nelson,	President.
R. E. Flood,	Vice-President.
A. Bentall,	Secretary.
Robert Budd,	Treasurer.
R. Probst, one year C. A. Baumberger, two years Antoine Bartlett, three years Irving Ranger, four years Isaac Garthe, five years	Directors.

Organized November 20, 1909. Annual meeting, first Wednesday after first Monday in January. Incorporated, Act 171, Public Acts 1903. Has at present 80 members. We buy spraying material co-operatively. Also we buy trees in same manner. Have purchased in the past year nearly ten thousand trees for our members. During 1910, we held six public meetings, bringing in ten speakers from outside. Also a public spraying demonstration in charge of expert. Fruit growing has received a great impetus in our locality. One man is planting sixteen thousand trees this spring, and many smaller orchards from five to forty acres will be planted. The old orchards are receiving more attention than ever before, many spraying outfits are being bought and much more pruning, etc., being done than before. Our outlook for rapidly coming to the front as one of the best fruit growing districts in Michigan is very good indeed. A list of our membership is found below.

MEMBERS.

Abbott, Robt., Northport.
Bordeaux, A., Northport.
Bordeaux, J., Northport.
Barnes, L. A., Northport.
Barth, Otto, Northport, R.
Brown, Al., Omena, R.
Braman & Son, Northport.
Bartlett, Antoine, Omena, R.
Baumberger, C. A., Northport.
Barnes, Dell, Northport.
Brown, J. D., Northport, R.
Bentall, A., Northport.
Barth, Walter, Northport, R.
Bartlett, Wm., Northport, R.
Bartlett, Oscar, Northport, R.
Birnbaum, J. W., 11205 Superior St., Cleveland, Ohio.
Bowles, J. H., Cody Hotel, Grand Rapids.
Brown, W. R., 214 Lake Ave., Grand Rapids.
Bartlett, Amos, Northport.
Curran, J. M., 153 La Salle St., Chicago, Ill.
Dame, G. M., Northport.
Dame, Isa, Northport.
Dinsmore, E. J., Northport, R.
Flood, R. E., Northport.
Frederickson, A., Northport, R.
Fonda, W. E., 11203 Superior St., Cleveland, Ohio.
Garthe, Isaac, Northport, R.
Garthe, Esten, Northport, R.
Garthe, S. C., Northport.
Gustaff, O. C., Northport.
Gill, Wm., Northport, R.
Gorman, W. P., Omena, R.
Hills, R. E., Delaware, Ohio.
Holton, G. N., Northport, R.
Johnson, Alfred, Northport, R.
Johnson, Adolph, Northport, R.
Jackson, John, Northport, R.
Kehl, Jas., Northport.
Kehl, Ed., Northport.
Kehl, C. B., Northport.
Keyes, S., Omena.
Leslie, A. M., 201 Main St., Evanston, Ill.
Matthews, J. F., Northport.
Milliken, A. H., Northport.
Massa, J. A., Northport.
McMachen, A., Omena, R.
Morgan, N. J., Omena.
Nelson, C. A., Northport.
Nelson, W. P., Northport.
Nelson, Ener, Northport.
Peck, L. R., Northport.
Porter, S. W., Northport.
Putnam, B. J., Northport, R.
Probst, R., Northport, R.
Purkiss, Thos., Northport, R.
Putnam, J. D., Omena, R.
Peterson, Hans, Northport, R.
Ranger, Irving, Northport, R.

NORTHPORT FRUIT GROWERS' ASSOCIATION.—Concluded.

MEMBERS.

Rogers, L., Northport, R.
Smith, L. C., Allegan.
Sanders, D. L., Cody Hotel, Grand Rapids.
Sutherland, J. W., Hollister Blk., Lansing.
Steele, W. F., Northport.
Steele, W. H., Northport.
Stebbins, C. J., Omena, R.
Swatosh, J., Northport, R.
Steele, Geo., Omena, R.
Scott, J. E., Omena, R.
Scott, Hugh, Northport, R.
Scott, D. H., Northport.
Scott, Henry, Northport, R.
Schroeder, M., Northport.
Scott, Ivan, Northport.
Thomas, Robt., Northport, R.
Thomas, J. J., Northport, R.
Thomas, Wm. J., Northport.
Van Holt, John, Omena, R.
Voice, Walter, Northport.
Wurzburg, P., Northport.
Warnquist, A., Northport, R.

SOUTHERN WASHTENAW HORTICULTURAL SOCIETY.

Organized to encourage the growing of better fruit and more of it. To disseminate the knowledge of practical horticulture and the best how to combat pests and diseases.

(Auxiliary to State Society.)

OFFICERS.

W. F. Hawxhurst, President.
J. W. Hull, Vice-President.
B. P. Davenport, Treasurer.
Delos A. Townsend, Secretary.
F. C. Wells, Prompter.
A. J. Warren
B. N. Smith
A. G. Cobb
Geo. Theurer, Jr. } Executive board.
Geo. Haney.

Through the earnest efforts of W. F. Hawxhurst this Society was organized. Preliminary meetings were held on September 19, October 10, and on November 11, 1910. Prof. L. R. Taft gave us an address on "Old orchards and how to save them."

The constitution as recommended by the State Society was adopted with the changes suitable to this locality. The name, Southern Washtenaw Horticultural Society. Meetings to be held on the third Monday of each month. Fees, 50 cents per member. Annual meeting the last regular meeting in each year.

At an adjourned meeting held on January 16, 1911, the above officers were elected.

MEMBERS.

W. F. Hawxhurst, Saline.
J. W. Hull, Saline.
D. A. Townsend, Saline.
B. P. Davenport, Saline.
A. J. Warren, Saline.
B. N. Smith, Saline.
A. G. Cobb, Saline.
W. L. Walling, Saline.
Geo. Theurer, Jr., Saline.
Spencer Rogers, Saline.
Geo. Haney, Saline.
F. C. Wells, Saline.
Chas. Dietiker, Saline.
James Hoyt, Saline.
Wilbur Cornish, Saline.
E. E. Russell, Saline.
Frank Tower, Saline.
Eli L. Rodeget, Saline.
Fred April, Saline.
John Lutz, Saline.
Albert Graf, Saline.
Geo. Feldkamp, Saline.
Leonard Josenhans, Milan.
O. C. Wheeler, Saline.
P. H. Rouse, Saline.
J. H. Boyden, Saline.
Henry Bredernitz, Saline.
W. H. Sweet, Saline.
D. B. Mattison, Saline.
Dr. C. F. Unterkircher, Saline
R. L. Finch, Saline.
W. H. Barr, Saline.
C. H. Schroen, Saline.
A. M. Humphrey, Saline.
Chas. Graf, Saline.
A. D. Crittenden, Saline.
Rev. D. C. Littlejohn, Saline.

MONTCALM HORTICULTURAL SOCIETY.

(Auxiliary to State Society.)

OFFICERS.

E. W. Lincoln – – – – – – – President.
Wm. James – – – – – – – Vice-President.
R. M. Beardslee – – – – – – Secretary-Treasurer.
Oscar C. Miller
J. C. Thompson } – – – – – – Directors.
F. C. Clark

NEW MEMBERS.	OLD MEMBERS.
D. S. Seaman, Greenville.	Geo. Dean.
H. N. Clement, Greenville.	Ray Smith.
John Nelson, Greenville, R. 5.	J. Bookey.
O. C. Miller, Greenville.	P. J. Lohr.
E. W. Ranney, Greenville.	E. W. Lincoln.
F. W. Burnette, Morrice.	A. J. Snyder.
C. P. Terry, Greenville.	Roy Potter.
John Kingen, Greenville.	Wm. James.
R. C. Ecker, Greenville.	Lawrence Siple.
E. B. Slawson, Greenville.	E. S. Rowley.
G. H. King, Greenville, R. 1.	F. S. Clark.

January 6, 1911, the above named officers and directors were elected for the ensuing year.

Meetings have been held about every two weeks throughout the winter in the Grange hall at Greenville with a good average attendance of members and visitors. All the branches of fruit growing have been discussed and studied with the greatest of care under the able direction of E. W. Lincoln.

Up until last year the orchards in this county with only two or three exceptions were all practically neglected; systematic spraying being unheard of in most localities. About twenty-five farmers sprayed their trees last year; the work of the Society has probably induced as many more to take it up this coming season.

On the evening of March 6, we had a Horticultural Rally at the Grange hall. O. K. White of the Lansing experiment station was the speaker of the evening. The following day he gave a field demonstration at the fruit farm of E. W. Lincoln. These meetings were very successful and much interest was shown in all of the work. Plans are now being made to have another rally during the summer.

The Society was organized February 16, 1910, with 32 members, which has been increased to 52. Seven meetings have been held during the year, all of which have been interesting and fairly well attended, especially so the field meeting held March 18, led by O. K. White of Lansing. During the year spraying chemicals to the value of $246.00 have been ordered through the State Society. This in a county where little spraying was ever done before. The benefits received have been very marked, in fact, the sprayed orchards were the only ones that bore fruit.

R. M. BEARDSLEE,
Secretary.

CUSTER FRUIT GROWERS' SOCIETY.

(Auxiliary to State Horticultural Society, organized January 15, 1910.)

OFFICERS.

D. W. Leedy	President.
F. E. Bissett	Vice-President.
Wm. L. Harter	Secretary.
D. A. Harter	Treasurer.
J. Thos. Lair	Prompter.

MEMBERS.

Barrett, Geo. H., Custer, R. 2.
Bissett, F. E., Custer, R. 2.
Franz, Chas., Custer, R. 2.
Filley, Randy, Scottville, R. 1.
Griffin, Jno. C., Scottville, R. 1.
Harter, D. A., Scottville, R. 1.
Harter, Wm. L., Custer, R. 2.
Hissong, Edw., Custer, R. 2.
Knowles, Ira E., Custer, R. 2.
Kintner, Ezra, Custer, R. 1.
Leedy, D. W., Scottville, R. 1.
Leedy, Jno., Scottville, R. 1.
Lair, J. Thos., Scottville, R. 1.
La Belle, Henry, Scottville, R. 1.
Landis, Rupert, Custer, R. 2
Larr, Geo., Custer, R. 2.
Lehman, Clinton, Scottville, R. 1.
Metcalf, W. E., Custer.
Miller, F. B., Custer, R. 2.
Mohler, Edwin, Scottville, R. 1.
Pratt, Clarence A., Custer, R. 2.
Reene, E. P., Custer, R. 2.
Resseguie, Custer, R. 2.
Snavely, Scottville, R. 1.
Southworth, L. T., Custer.
Steeley, Henry, Custer, R. 2.
Shirkey, Joseph B., Scottville, R. 2.
Slagle, Wm., Custer, R. 2.
Teeter, Geo. W., Scottville, R. 1.
Wood, Oscar, Scottville, R. 1.
Williams, Baxter, Scottville, R. 2.
Wilson, J. Hulbert, Scottville, R. 1.
Jacob Landis, Freesoil.
Arthur Smith, Custer.
C. E. Mitchell, Custer.
Mrs. D. W. Leedy, Scottville.
Chas. Mathews, Custer.
Mrs. Ella Mathews, Custer.
Mrs. Dona Leedy, Scottville.
Robert Mohler, Scottville.
J. H. Mathews, Custer.
Mrs. J. H. Mathews, Custer.
Wm. H. Saxton, Custer.
Ed. Blocher, Custer.
Chas. Neff, Scottville
Stewart Sproll, Custer.
Perry Teeter, Custer.
J. W. Fager, Custer.
Mrs. F. B. Miller, Custer.
G. V. Greene, Scottville.
G. B. Fleming, Scottville.
Jas. Chisholm, Custer, R.
Mrs. Sarah Mohler, Scottville, R. 1.
Mrs. Wm. L. Harter, Custer, R. 2.
Mrs. Ella Harter, Scottville, R. 1.
Mrs. C. Lehman, Scottville, R. 1.
Mrs. Kate Kouftater, Freesoil.
Isaac M. Steeley, Scottville, R. 1.
John Engle, Custer, R. 2.
Joseph Meyette, Custer, R. 2.
D. O. Flory, Custer, R. 2.
Geo. Chisholm, Custer, R.
Fred Royston, Scottville, R. 1.

GRAND RIVER VALLEY HORTICULTURAL SOCIETY.

OFFICERS.

J. Pomeroy Munson – – – – – – – President.
Mrs. M. E. Campbell – – – – – – – Vice-President.
George Welsh – – – – – – – Secretary-Treasurer.
Chas. W. Wilde
Chas. W. Garfield
Wm. N. Cook – – – – – – Executive board.
George E. Rowe
John B. Martin

The Grand River Valley Horticultural Society was organized in 1874, and monthly meetings have been held during the past 36 years, usually at the homes of members. It is the purpose of this Society, through its discussions and influence, to create and maintain an interest in pursuit of the various branches of horticulture. While commercial ideas and methods are given attention, the emphasis is placed on the influence that the love of horticulture can be made to exert upon the home life, the betterment of the city and the attractiveness of the countryside.

In discussing the work of the Society during 1910, Secretary Griffen said in part: "The society is closing the 36th year of its activities and who can undertake to measure the mighty influences for good that have gone forth during these years? While most of the topics discussed during the past year have been of the practical sort, it is significant that some of the most satisfying afternoons have been spent in following the speakers along lines of 'Good Fellowship,' 'Optimism,' 'Faith,' 'Religion,' and the other topics which though vital are not supposed to be bread and butter topics in the pursuit of horticulture. The finer and higher side of living, rather than mere mechanical work in the garden and field, has received the emphasis."

The long life and the unmeasureable usefulness of the Society have been due to the efforts of a band of nature lovers, many of whom have passed into the gardens beyond our ken in recent years.

Chas. W. Garfield, who still energizes and vitalizes the Society, and has kept the organization going during its darkest days, writes of its work as follows:

The Grand River Valley Horticultural Society was organized in the city of Grand Rapids in 1874 and has from the beginning maintained monthly meetings. It has been a very useful factor in awakening an interest in those attributes of farm and urban home life which emanate to the realm of horticulture.

For some years it was purely a fruit growers' society, and its meetings were held through the kindness of Mr. S. L. Fuller in a room adjoining his bank. Afterward the meetings convened in the office of the county superintendent of the poor in the county building.

Following this period, through the kind offices of Mr. D. P. Clay, a farmers' club room was arranged in this building for the use of the horticultural society and like organizations. After the new court house was built, a room was assigned to the Farmers' Club and for years the meetings convened in this room. A library was established and a museum started.

We found that the ladies did not attend the meetings in this apartment although programs were often arranged with reference to securing their assistance, and as a result of this experience, the society started the plan of holding its meetings at the homes of the members of the society. These members were some of them in the city but the majority of them were located in the country.

The spring, summer and autumn meetings convened in the country and the winter meetings were held in the city. From the adoption of this plan, the Society took on new life, as the attendance has always been satisfactory.

At the organization of the Society, there was but one florist who took any interest in its deliberations and he was also interested in fruit growing, but regularly presented at the meetings the products from his greenhouse. This gradually led to the consideration of a broader range of topics and the Society changed from a fruit growers association into a horticultural society covering the whole field. The kitchen, garden, the greenhouse, the landscape about the home, the outside flower garden, all to have their full share in the programs arranged for the various meetings. Gradually the evolution of the Society led to the consideration of topics more particularly connected with home life, and for some years, horticulture in its relation to home life, has been the main thought in the arrangement of the annual schedules of topics. The exhibits at the various meetings have concurred in this thought.

For some years the Society has followed the plan of having each meeting in charge of some member who takes the topics arranged for the program, assigns them to various individuals and thus there is given to the Society a homogenious arrangement for discussion. This has worked admirably and the papers presented have been of the highest literary character, many of them.

The newspapers, from the very beginning of the Society, have given its deliberations a great deal of space and attention. Usually some reporter from the local papers is present and the full account of the proceedings is published, as far as newspaper space will permit. During the last few years, most of the prepared papers have been published in the "Michigan Tradesman," and thus have been given wide publicity.

For many years in the early history of the Society, it took charge of considerable exhibits of fruit and flowers at the county and state fairs, making itself useful by thus advertising the horticultural capabilities and the region which it represents.

It has been especially useful in deciding the movements in Grand Rapids looking toward the securing of a more beautiful city. It has initiated some of the plans which have been carried out and it has always been a close ally of any organization having in view cleanliness, and beauty as factors in developing the city.

MEMBERS.

J. Pomeroy, R. 4, Grand Rapids.
Mrs. M. E. Campbell, R. 5, Grand Rapids.
Almond Griffen, 41 Lyon Pl., Grand Rapids.
Chas. W. Wilde, R. 2, Grand Rapids.
Chas. W. Garfield, Grand Rapids Savings Bank.
Wm. N. Cook, 80 LaGrave St., Grand Rapids.
Geo. E. Rowe, Editor Fruit Belt, Grand Rapids.
John B. Martin, 98 Monroe St., Grand Rapids.
Thos. E. Graham, 39 W. Bridge St., Grand Rapids.
Robt. D. Graham, Commercial Savings Bank, Grand Rapids.
H. O. Braman, R. 4., Grand Rapids.
O. W. Braman, R. 4, Grand Rapids.
Henry Smith, Monroe and Division Sts., Grand Rapids.
Wm. Molloy, 15 S. Pine St., Grand Rapids.
Mrs. F. O. Cutter, 55 Thomas St., Grand Rapids.
Colin H. Graham, R. 13, Grand Rapids.
J. W. Pennell, 1173 S. Division St., Grand Rapids.
V. B. Gross, Station 2, Grand Rapids.
J. H. Hall, 291 N. Ottawa St., Grand Rapids.
Chas. Hogue, Dutton.
W. K. Morley, 300 Bates St., Grand Rapids.
J. F. Richardson, R. 2, Hudsonville.
W. Willard, R. 2, Grand Rapids.
G. A. Rumsey, 493 S. Ionia St., Grand Rapids.
O. R. L. Crozier, 205 N. Lafayette, St. Grand Rapids.
H. W. Miller, R. 9., Grand Rapids.
H. E. Moseley, 153 Madison Ave., Grand Rapids.
S. J. Knapp, R. 4, Grand Rapids.
A. Bos, Hudsonville.
Frank Welton, Grand Rapids National City Bank.
Franklin Barnhart, Nelson-Matter Co., Grand Rapids.
John Preston, R. 13, Grand Rapids.
F. P. Wilcox, 67 Wonderly block, Grand Rapids.
Mrs. R. W. Corson, 209 Madison Ave., Grand Rapids.
L. T. Wilmarth, 452 Cherry St., Grand Rapids.
Mrs. W. H. Banks, 376 Grand Ave., Grand Rapids.
Mrs. E. D. McBain, 285 Crescent Ave., Grand Rapids.
Hon. Edwin F. Sweet, M. C., 279 Fulton St., Grand Rapids.
L. A. Paine, 279 Crescent Ave., Grand Rapids.
Lizzie Coryell, 160 Clinton St., Grand Rapids.
Mrs. W. W. McKean, 333 S. Union St., Grand Rapids.
Mrs. Julis L. Fletcher, 23 S. College Ave., Grand Rapids.
Miss Lucy Ball, 788 Wealthy Ave., Grand Rapids.
L. F. Jones, Jones Seed Co., Grand Rapids.
W. P. Smith, 491 N. Diamond St., Grand Rapids.
Chas. Lamphear, R. 4, Grand Rapids.
A. S. White Printing Co., Grand Rapids.
L. J. Rindge, 55 Barclay St., Grand Rapids.
W. L. Cukerski, Fulton St. and Valley Ave., Grand Rapids.
J. A. Simes, Sparta.
Thos. Wilde, R. 2, Coopersville.
E. A. Stowe, Michigan Tradesman, Grand Rapids.
Mrs. John Graham, R. 13, Grand Rapids.
C. N. Remington, Jr., 89 Paris Ave., Grand Rapids.
C. S. Udell, 354 Crescent Ave., Grand Rapids.
W. K. Munson, R. 4, Grand Rapids.

RELIGION IN LOVE OF NATURE.

Paper read at annual meeting of Grand River Valley Horticultural Society held in December, 1910.

The subject given to me was "Religion in love of Nature." I believe that a love of

nature not only teaches us religion, but that it is also an answer to that much discussed question of the present time, "How shall we keep the young folks on the farm?"

There is an old saying to the effect, "Bachelors' wives and maidens' children are always well trained," and, being an old maid, of course I believe I know how the children can be kept on the farm. My solution of the difficulty would be to give them a course of nature study.

We all know that God reveals himself to us in his great out-of-doors. The more we love the great open, the nearer we are to him.

Life in the country is usually considered uninteresting and monotonous; while, had the horticulturist eyes to see, and ears to hear, he would find himself surrounded by wonders on all sides.

The city child is taken into the country to learn botany, geology, zoology, and numerous other oligies. The country child in the midst of these lessons all the time, seldom learn them unless he come to town to school.

Now I am not looking at this from a stand point of dollars and cents; but from a desire to rear a child so that he may be equipped to get all the happiness he can out of this world, all the contentment he can in his environment, and to be a good man. I believe I could also show you, if I had the time, that this would be a paying proposition from a monetary point of view.

What I want you to do is this. When your son, and this applies to your daughter as well, is old enough to read, buy him a few books. Books are so cheap now, the only thing I know of that has not advanced with other high prices, that there is no reason why a child should not have a few books, that are all his own, in which he may stamp his name and which are his sole property. Start his collection by buying him some simply told story of the formation of the earth, how it is effected by heat and cold, by wind and water, what changes have taken place and are continually taking place upon its surface. You will soon find the river, the hill, the meadow and valley have taken on a new aspect to him. They begin to mean something. He begins to think as he goes about. The walk after the cows is no longer a task, it is a pleasure.

Get him a book on trees. What is there in nature that is more interesting? Teach him, how they are almost human, how they need room and light to grow just as people do, or they become dwarfed and stunted. Let him read how they eat and sleep and breathe. You have but to start a child on a subject like this, and he will find so much in it, that he will go on of his own accord. There are no idle rambling thoughts in the brain of the boy who is ever on the alert to identify a strange leaf or a bare brown tree trunk.

Then there are the stories of the plants and flowers. They eat, grow, marry and rear families in our very midst; yet we give them no heed. Call them to the attention of the boy and he will do the rest.

And last, but not least, do not let the bird life about him escape unnoted. Teach him the names of these "great commoners." Train his ear to know their songs and calls, his eye to recognize at sight, the architect, from the construction of the little nest.

The boy, whose soul has been awakened to the wonders about him, has learned something to make him happy. If fortune is kind to him, he has an increased joy in the world; if she does not favor him, he forgets his disappointments in the attractions dame nature spreads before him. There is no lodgement for sorrow, grief, hate or revenge in the mind of the boy who sees what is constantly going on about him in the streams, earth, and sky; who knows the birds, trees and flowers. This boy has a source of happiness and contentment within himself that no money can buy.

The boy to whom a love of nature has been taught has faith. He has seen and knows how all things are planned and, he soon believes that he is a part of this great scheme and must do his best. He has reverence. He is so impressed by the great growing world about him, so throbbing with life, that he respects all living things. He has love, and it is such a love for the open that there is no charm for him but in the wide fields. Prayer is in his heart at all times for as the poet says:

"He prayeth best, who loveth best,
Both man and bird and beast."

A boy equiped with a thorough love of God's beautiful world has a religion on which may rest any creed to which he belongs.

See that you teach it to him.

A. I. HEFFERAN.

LENAWEE COUNTY HORTICULTURAL SOCIETY.

OFFICERS.

C. M. Cone,	President.
Stillman W. Bennett,	Vice-President.
E. W. Allis,	Secretary.
Chas. H. Randall,	Treasurer.
H. C. Bradish,	Librarian.
Chas. Poucher	
Dr. J. E. Westgate	
H. C. Bradish	
Jeanette Nickerson	Executive Committee.
Mrs. Chas. Randall	
Mrs. E. W. Reeder	
Mrs. Hill	
Mrs. Randall	Table Committee.
Mrs. Ransburg	

Meetings held at Horticultural Hall, Court House, Second Wednesday of each month. Organized February 15, 1851.

MEMBERS.

E. W. Allis, lock box 195, Adrian.
W. H. Barrett, Toledo St., Adrian.
Mrs. W. H. Barrett, Toledo St., Adrian.
H. C. Bradish, 12 Chestnut St., Adrian.
Mrs. H. C. Bradish, 12 Chestnut St., Adrian.
S. W. Bennett, Adrian.
Mrs. S. W. Bennett, Adrian.
Mrs. H. A. Brainard, N. Main St., Adrian.
M. T. Cole, Adrian, R.
C. M. Cone, E. Maple Ave., Adrian.
A. Edwards, Adrian, R.
Mrs. A. Edwards, Adrian, R.
Frank Ehinger, Adrian, R.
Mrs. Harry Fee, S. Main St., Adrian.
Mrs. Irving Finch, Broad Street, Adrian.
Miss Carrie Gregory, College Ave., Adrian.
Mrs. Wm. Gurin, N. McKenzie St., Adrian.
Benjamin Gurin, N. McKenzie St., Adrian.
H. V. C. Hart, Broad St., Adrian.
Mrs. H. V. C. Hart, Broad St., Adrian.
Mrs. Adelia Hill, Adrian, R., Treat road.
Mrs. R. A. Hood, McKenzie St., Adrian.
Mrs. C. W. Kimball, S. Main St., Adrian.
James H. Kelley, Tabor St., Adrian.
Mrs. James H. Kelley, Tabor St., Adrian.
D. W. Love, St. Joseph St., Adrian.
Mrs. D. W. Love, St. Joseph St., Adrian.
Mrs. Alice Lowe, Adrian.
G. S. Mann, Finch St., Adrian.
Miss Helen Nickerson, Adrian, R.
Jeanette Nickerson, Adrian, R.
Mrs. Fanny J. Otis, Adrian.
Mrs. Parkhurst, Adrian, R., Treat road.
Chas. Poucher, Park St., Adrian.
Mrs. Chas. Poucher, Park St., Adrian.
Wm. V. Pierce, Adrian.
Mrs. Wm. V. Pierce, Adrian.
Mrs. Jane Pratt, Adrian.
Chas. H. Randall, Park St., Adrian.
Mrs. Chas. H. Randall, Park St., Adrian.
Mrs. E. W. Reeder, Adrian.
Mrs. Louise Barnum Robbins, Adrian.
F. J. Shannon, Adrian, R. 1.
Mrs. F. J. Shannon, Adrian, R. 1.
Miss Nellie Stowe, Adrian.
Adelbert Ward, Adrian, R. south.
Dr. J. E. Westgate, Adrian, R.
Mrs. J. E. Westgate, Adrian, R.
Mrs. Chas. Willbee, Sr., Adrian.
Chas. Willbee, W. Maumee St., Adrian.
Mrs. Chas. Willbee, W. Maumee St., Adrian.
Mrs. L. L. Wray, College Ave., Adrian.
B. O. Corbitt, Palmyra, R.
Mrs. B. O. Corbitt, Palmyra, R.
Harry Moore, Palmyra, R.
L. S. Johnson, Sand Creek, R.
Mrs. L. S. Johnson, Sand Creek, R.
W. G. Porter, Sand Creek, R.
Mrs. W. G. Porter, Sand Creek, R.
Fred Bay, Blissfield.
Cicero Kendrick, Blissfield, R.
Mrs. Cicero Kendrick, Blissfield, R.
B. E. Niles, Blissfield, R.
James Lane, Holloway.
Mrs. James Lane, Holloway.

Our Society has had twelve meetings, one each month, during the last year.

I will send you the newspaper reports of two of the meetings of which I happen to have extra copies. Two Adrian papers copied each report. In fact the papers have always given our Society firm support. Many of the leading ladies give us much assistance by membership and otherwise, and the Adrian's Woman's Club suggested the apple question for the January meeting, "Michigan apples, versus Western apples," and voted to attend our meeting in a body. The day was stormy, but our rooms were well filled.

E. W. ALLIS,
Secretary.

Eight-year-old Yellow Transparent apple tree that bore more than a barrel in 1910, on "IXL" fruit farm of O. S. Bristol, near Alment, Lapeer county.

A low headed cherry tree on A. M. Willobee fruit farm near Old Mission.
Note the ease of picking the fruit.

Cherry harvest on William Gill Tompkins fruit farm near Old Mission—
one of the greatest cherry sections in the world.

SOUTH HAVEN AND CASCO POMOLOGICAL SOCIETY.

(Organized 1871.)

OFFICERS.

Joseph L. Kelley, – – – – – – – President.
Miss Kate B. Merritt, – – – – – – – Vice-President.
H. E. Merritt, – – – – – – – Secretary.
R. F. Dean, – – – – – – – Treasurer.
F. A. Wilken, Mrs. Amos Tucker, Geo. E. Chatfield – – – – – Executive Committee.

MEMBERS.

J. J. Atherley, 120 Oak St., S. Haven.
M. H. Bixby, 752 Wilson St., S. Haven.
Geo. C. Burk, S. Haven.
Geo. E. Chatfield, S. Haven, R. 4.
C. C. Chesebro, S. Haven, R. 3.
A. B. Coith, 829 Phillips St., S. Haven.
Mrs. A. B. Coith, 829 Phillips St., S. Haven.
Edgar Dean, Berlamont.
F. J. Dean, Berlamont.
R. F. Dean, S. Haven, R. 3.
A. W. DeRocher, Berlamont.
Grafton E. Flory, S. Haven, R. 5.
R. E. Gibson, S. Haven.
B. G. Green, S. Haven, R. 4.
F. A. Gregory, S. Haven, R. 2.
Mrs. F. A. Gregory, S. Haven, R. 2.
Miss Florence L. Gregory, S. Haven, R. 2.
Geo. W. Griffin, S. Haven, R. 2.
Harry Hamilton, Bangor.
A. S. Henderson, S. Haven, R. 1.
C. A. Herriman, S. Haven.
S. F. Hill, 223 Huron St., S. Haven.
D. E. Histed, S. Haven, R. 2.
Jas. Hosking, Sr., S. Haven, R. 1.
Jas. Hosking, Jr., S. Haven, R. 1.
J. C. Hunt, S. Haven, R. 1.
J. W. Johnson, S. Haven.
J. C. Johnston, S. Haven.
Wm. Jones, S. Haven.
E. L. Keasey, S. Haven, R. 1.
Joseph L. Kelley, S. Haven, R. 3.
Harry L. Knapp, S. Haven.
Geo. Lannin, S. Haven, R. 6.
Paul Lino, S. Haven.
E. Lovejoy, S. Haven, R. 5.
Ezra W. McCaslin, Bravo.
W. C. Marshall, S. Haven, R. 2.
H. E. Merritt, S. Haven, R. 2.
Miss Kate B. Merritt, S. Haven, R. 2.
E. A. Merson, 507 Phoenix St., S. Haven.
C. J. Monroe, S. Haven.
C. O. Monroe, 360 Pearl St., S. Haven.
John M. Mott, 405 Erie St., S. Haven.
Geo. Myhan, 203 Dyckman Ave., S. Haven.
Miss Ruth Myhan, 203 Dyckman Ave., S. Haven.
W. C. Nichols, S. Haven.
Jas. Nicol, S. Haven, R. 2.
F. W. Osborn, S. Haven.
F. J. Overton, S. Haven.
Geo. W. Parish, S. Haven.
Ray Pennell, S. Haven.
F. A. Pinney, S. Haven.
Geo. L. Rich, S. Haven.
G. W. Robison, S. Haven, R. 2.
Frank E. Rood, Covert.
Lew Schwaberow, S. Haven, R. 4.
E. E. Shaw, Grand Junction.
A. G. Spencer, S. Haven.
A. G. Stout, S. Haven, R. 3.
Burton Sweezy, S. Haven, R. 2.
Amos Tucker, S. Haven.
Mrs. Amos Tucker, S. Haven.
F. A. Wilken, 802 St. Joseph St., S. Haven.
Mrs. F. A. Wilken, 802 St. Joseph St., S. Haven.
Alfred H. Williams, S. Haven, R. 5.
Arthur Wood, S. Haven.

The season of 1909–10 was a prosperous one for the South Haven and Casco Pomological Society. Thirteen meetings were held, of which four were in the neighboring towns of Covert, Leisure, Lacota and Bangor, and three were summer picnics.

The annual dinner was a popular feature as usual.

The "outside" meetings, though a decided innovation, were considered a substantial success and will be repeated.

The summer meetings were peculiarly enjoyable in that the dry prose of discussion was varied with something of the poetry of nature and copious illustrations in color.

The first was held with Vice-President Geo. W. Griffin on the North Shore; the second with Supt. F. A. Wilken at the Experiment Station; the third at the farm home of President Kelley on the South Side.

Among the visitors at the second summer meeting were President R. A. Smythe and Secretary C. E. Bassett of the State Horticultural Society, Prof. H. J. Eustace, M. A. C., and R. H. Sherwood of Watervliet.

A feature of this meeting was a brief talk by L. H. Bailey, the venerable father of Prof. L. H. Bailey of Cornell.

Having enjoyed an uninterrupted existence of forty years, just in the full vigor of man-

hood, with the strength and maturity that came only from experience, the South Haven Society looks forward with confidence to a future of even greater activity, of more definite usefulness, and of wider influence.

SUTTONS BAY FRUIT GROWERS' ASSOCIATION.

(Auxiliary to State Society.)

W. M. Payne, – – – – – – – – Secretary.

MEMBERS.

Philip Egeler, Suttons Bay.
W. M. Payne, Suttons Bay.
J. O. Duncan, Suttons Bay.
Wm. Horn, Suttons Bay.
Claus Alpus, Suttons Bay.
Henry Kahis, Jr., Suttons Bay.
Henry Kahis, Sr., Suttons Bay.
Wm. Van Glahn, Suttons Bay.
Rev. J. J. Maatleslad, Suttons Bay.
Jos. Crocker, Suttons Bay.
John M. Curran, Suttons Bay.
Claus Van Glahn, Suttons Bay.
Frank Weiler, Sutton Bay.
Theo. Esch, Suttons Bay.
Ole Larson, Suttons Bay.
Henry Egeler, Suttons Bay.
Geo. Steffens, Suttons Bay.
Mat Spininkur, Suttons Bay.
L. E. Bahle, Suttons Bay.
Mrs. Anna Reynolds, Suttons Bay.
Robt. A. Wyley, Suttons Bay.
Herman Alpus, Suttons Bay.
Henry W. Smith, Jr., Suttons Bay.
John Deuster, Suttons Bay.
John Bremer, Suttons Bay.
John Blacken, Suttons Bay.
E. J. Peck, Suttons Bay.
John Smiseth, Suttons Bay.
William Zeler, Suttons Bay.
C. L. Joynt, Omena.
S. A. Keyes, Omena.
Rev. Herman Hyman, Traverse City.

KALAMAZOO COUNTY FRUIT GROWERS' SOCIETY.

(Auxiliary to State Society.)

OFFICERS.

E. F. Stoddard, – – – – – – – – President.
C. E. Campbell, – – – – – – – – Vice-President.
F. W. Bohnet, – – – – – – – – Secretary-Treasurer.

MEMBERS.

C. Van Zee, Kalamazoo, R. 10.
Fred Meyers, Alamo, R.
Homer Deal, Kalamazoo, R. 9.
S. B. Hough, Kalamazoo, R. 3.
E. R. Jackson, Plainwell.
Henry Knowles, Kalamazoo, R. 9.
W. H. Dennis, Kalamazoo, R. 5.
John Reenders, 142 Wall St., Kalamazoo.
Harry Middleton, 204 N. Rose, Kalamazoo.
E. H. Kirklin, Kalamazoo, R. 12.
Wm. Healy, Bloomingdale.
C. S. Bender, Kalamazoo, R. 5.
Anson Rolfe, Kalamazoo, R. 9.
Thomas DeLeew, Kalamazoo, R. 9.
L. E. Campbell, Kalamazoo, R. 9.
Miss E. C. Reynolds, 709 W. Cedar, Kalamazoo.
G. A. Cavanaugh, Kalamazoo, R. 10.
Wallace Deal, Kalamazoo, R. 9.
L. H. Stoddard, Kalamazoo, R. 12.
E. H. Woodhams, Kalamazoo, box 44.
S. H. Hough, Kalamazoo, R. 3.
M. F. Drake, Kalamazoo, R. 9.
James G. Walker, Kalamazoo, R. 6.
L. E. Shurley, Kalamazoo, R. 7.
G. W. Cronkhide, Kalamazoo, R. 7.
C. S. Bender, Kalamazoo, R. 5.
Anson Rolfe, Kalamazoo, R. 9.
John Runders, Kalamazoo, 142 Wall St.
W. T. Vetterlein, Kalamazoo, R. 7.
Fred Bohnet, Kalamazoo, R. 9.
E. F. Stoddard, Kalamazoo, R. 12.
D. C. Williams, 1816 Asylum Ave., Kalamazoo.
Thomas Davis, Kalamazoo, R. 5.
Wm. Randall, Kalamazoo, R. 10.
A. J. Shakespere, Kalamazoo, R. 5.
A. R. Hinga, Kalamazoo, R. 1.
C. Van Zee, Kalamazoo, R. 10.
C. S. Bassett, Kalamazoo.
L. E. Winterburn, Kalamazoo. R. 10.

BELDING HORTICULTURAL SOCIETY.

(Auxiliary to State Society.)

John D. Strain, – – – – – – – Secretary.

MEMBERS.

E. E. Chickering, Belding.
W. H. Chickering, Belding.
B. A. Chickering, Belding.
R. W. Belding, Belding.
E. L. Carpenter, Belding.
O. A. Nummer, Belding.
M. H. Brown, Belding.
J. D. Strain, Belding.
Geo. Wooldridge, Belding.
B. W. McKibbon, Belding.
Benj. Hall, Belding.
Earnest Benton, Belding.
Fred. Benton, Belding.

FREMONT HORTICULTURAL SOCIETY.

(Auxiliary to State Society.)

J. W. Miller, – – – – – – – Secretary.

MEMBERS.

E. E. Giddings, Fremont.
Geo. Wilbur, Fremont.
Lafe Waters, Fremont.
Fred. Froelich, Fremont.
David Powers, Fremont.
Jos. Purcell, Fremont.
J. W. Wray, Fremont.
Geo. R. Warren, Fremont.
Jos. Trumbley, Fremont.
Dirk Kolk, Fremont.
Duane Darling, Fremont.
Chas. Gamble, Fremont.
Chas. E. Emmons, Fremont.
Fred J. Atchison, Fremont.
Stephen Schreur, Fremont.
J. E. Palmer, Fremont.
O. E. Shaver, Fremont.
Emmett Eldred, Fremont.
S. E. Doud, Fremont.
Chas. A. Meteer, Fremont.
Henry Arendsen, Fremont.
Jas. H. Simpson, Fremont.
C. V. Stratton, Fremont.
H. M. Robinson, Fremont.
H. W. Parker, Fremont.
Carl Kimbell, Fremont.
E. J. Taylor, Fremont.
Ray B. Stuart, Fremont.
E. S. Meade, Fremont.
Wm. Meyers, Fremont.
J. B. Odell, Big Rapids.
Jas. V. Johnson, Big Rapids.
Henry Mathews, Holton.
Frank Mathews, Holton.
O. F. Marvin, Holton.
Severt Swenson, Holton.
Chas. H. Boyd, Reeman.
C. H. Knowles, Fremont.

IONIA HORTICULTURAL SOCIETY.

(Auxiliary to State Society.)

Luther E. Hall, – – – – – – – President.

MEMBERS.

Herbert F. Kellogg, Ionia.
Ernest T. White, Ionia.
W. W. Sage, Ionia.
Allen Cameron, Ionia, R. 5.
Perry H. Stebbins, Saranac.
C. C. Luce, Ionia, R. 1.
Thomas F. Martin, Ionia, R. 1.
W. S. Smith, Muir.
J. B. Welch, Ionia.
E. D. Weaver, Ionia.
Norman A. Tuttle, Ionia.
Finando Hoover, Ionia.
W. W. Bemis, Ionia.
B. E. Goodwin, Ionia.
C. W. Hunter, Fenwick.
F. B. Howard, Ionia.

Lee P. Spaulding, Ionia.
E. E. Branch, Ionia.
H. J. Schilds, Ionia.
G. Webster Moore, Ionia.
H. D. Waldron, Ionia.
Forest P. Trowbridge, Ionia, R. 4.
Herbert L. Smith, Shiloh, R. 21.
Jens Jensen, Orleans, R. 20.
Cecil Eavey, Ionia, R. 1.
H. L. Wilson, Ionia, R.
John Flater, Ionia.
George F. Stow, Fowler.
C. I. Goodwin, Ionia, R. 2.
N. B. Hayes, Muir.
Frank E. Hall, Ionia, R. 24.
James Steadman, Ionia, R. 4.
Lynn Bamborough, Ionia, R. 8.
George Gott, Ionia, R. 4.
Maurice Yeomans, Ionia, R. 4.
I. J. Brooks, Ionia, R. 4.
D. S. Waldron, Ionia.
George Hulliberger, Saranac.
M. M. Callen, Ionia.
F. T. Flanagan, Orleans, R. 20.
G. E. Green, Ionia, R. 8.
Charles Mattison, Ionia.
F. E. Kendall, Ionia.
James Little, Shiloh, 21.
H. B. Webber, Ionia.
Frank Taft, Ionia.
Fred Bluemly, Ionia.
George Sage, Ionia.
Chas. Stoddard, Ionia.
John Whitmore, Shiloh.
Jens Spennec, Orleans.
J. R. Densmore, Ionia.
J. I. Hazlett, Ionia.
Wm. Robertson, Ionia.
Charles North, Fenwick.
F. A. Little, Shiloh.
I. M. Sloybaugh, Orleans.
Arthur Wilson, Ionia.
Arthur Barrodaile, Ionia.
J. Dibble, Shiloh.
George Conkey, Shiloh.
James A. McCarty, Ionia.
Harry S. Knapp, Murr.
J. J. Eaves, Ionia.
H. L. Allen, Ionia.
H. M. Brown, Murr.
C. Snow, Ionia.
Charles Harter, Ionia.
Sam. Eavey, Ionia.
H. R. Bluemly, Butternut.
A. S. Curtis, Ionia.
Alvin Hoaple, Ionia.

EATON COUNTY HORTICULTURAL SOCIETY.

(Auxiliary to State Society.)

OFFICERS.

C. M. Hunt, President.
Levi Wilton, Vice-President.
Frank Ford, Secretary.
F. A. Warner, Treasurer.
H. H. Van Auken, 1 year
L. D. Dickinson, 1 year
John Potter, 2 years
E. B. Ely, 2 years
A. W. Hill, 3 years
W. R. Quantrell, 3 years
Directors.

MEMBERS.

H. H. Van Auken, Charlotte.
Jacob Upright, Charlotte.
W. A. Tanner, Charlotte.
N. L. Smith, Charlotte.
Herbert Williams, Charlotte.
Levi Wilton, Charlotte.
John Potter, Charlotte.
Fred Shepard, Charlotte.
Frank Wythe, Charlotte.
C. M. Hunt, Eaton Rapids.
Frank Ford, Eaton Rapids.
Dwight Backus, Potterville.
L. D. Dickinson, Charlotte, R.
C. V. Roblin, Charlotte.
Williard Upright, Charlotte.
E. B. Ely, Olivet.
C. H. Wells, Vermontville, R.
E. W. Hill, Vermontville, R.
F. A. Warner, Vermontville, R. 1.
Frank Field, Charlotte.
W. R. Quantrell, Charlotte.
H. H. Church, Vermontville.
S. B. Todd, Vermontville.
M. W. Sprague, Vermontville.
H. E. Green, Olivet.
Roy Freemire, Vermontville.
Cyrus Gehman, Vermontville.
Benjaman Barnum, Sunfield.

MASON COUNTY HORTICULTURAL SOCIETY.

(Auxiliary to State Society.)

R. C. Sabin, – – – – – – – – Secretary.

MEMBERS.

D. H. Grout, Ludington.
D. D. Olmstead, Ludington.
Louis Hawley, Ludington.
J. K. Olmstead, Ludington.
Frank Kibbey, Ludington.
Theo. Ervin, Ludington.
Jesse Houk, Ludington.
Phil. Meisenheimer, Ludington.
Wm. Metzler, Ludington.
Oscar E. Hawley, Ludington.
Wm. Fitch, Ludington.
J. C. Cribbs, Ludington.
C. L. Houk, Ludington.
Smith Hawley, Ludington.
C. E. Stewart, Ludington.
R. C. Sabin, Ludington.
R. J. Fitch, Ludington.
L. L. McClatchie, Ludington.
Jas. McDonald, Ludington.
Wm. Myers, Ludington.
Mike Fitch, Ludington.
C. D. Kistler, Ludington.
Jerome Harmon, Ludington.
H. R. Gillette, Ludington.
A. J. Houk, Ludington.
Jas. Butler, Ludington.
H. O. Bender, Ludington.
C. W. Fitch, Ludington.
Donald Jameson, Ludington.
E. E. Crotser, Ludington.
E. E. Grover, Ludington.
Frank Stearns, Ludington.
Chas. Stearns, Ludington.
W. M. Wadel, Ludington.
E. Olmstead, Ludington.
N. Reynolds, Ludington.
W. H. Brown, Ludington.
Fred Beebe, Ludington.
Will Kennedy, Ludington.
David Morton, Ludington.
Fred C. Schwass, Ludington.
J. H. Fitch, Ludington.
H. C. Cole, Ludington.
John Burns, Ludington.
Ed. Beebe, Ludington.
John Lockhart, Ludington.
Arthur Morton, Ludington.
Albert Kinney, Ludington.
Geo. Shappee, Ludington.
Clyde Deleavergne, Ludington.
Herbert Gustafson, Ludington.
Geo. Beckman, Ludington.
C. E. Kistler, Ludington.
R. J. Hutchinson, Ludington.
A. Thompson, Ludington.
B. J. Toland, Ludington.
Joseph Prevost, Ludington.
R. W. Bronson, Ludington.
O. Albrecht, Ludington.
L. B. Lyon, Ludington.
G. H. Piper, Ludington.
Geo. John, Ludington.
Ed. Parker, Ludington.
Guy Squires, Ludington.
A. Williams, Ludington.
Wm. Jameson, Ludington.
Henry Meisenheimer, Ludington.
Arthur Sheldon, Ludington.
John Rinbolt, Ludington.
H. D. Stowell, Ludington.
M. H. Hitchcock, Ludington.
E. C. Barber, Ludington.
Amos Boucher, Ludington.
D. H. Morton, Ludington.
W. H. Dean, Ludington.
Frank Buck, Ludington.
Franklin Morrell, Ludington.
J. W. Stull, Ludington.
J. W. Vannortwick, Ludington.
James Butler, Ludington.
Mott Butler, Ludington.
Maurice Butler, Ludington.
Wm. Myers, Ludington.
John Hurley, Ludington.
V. L. Olmstead, Ludington.
Hans Olsen, Ludington.
J. W. Hurley, Ludington.
L. W. Rose & Son, Ludington.
C. Carr, Ludington.
Maurice Butler, Ludington.
H. Pierce, Ludington.
Robt. Wright, Ludington.
Clark Bradshaw, Ludington.
Phil. Cribbs, Ludington.
M. O. Cluchey, Ludington.
Chas. Hansen, Ludington.
C. W. Taylor, 167 Dearborn St., Chicago, Ill.
Guy W. Hawley, Ludington.
Geo. Beckman, Ludington.
Geo. Cribbs, Ludington.
C. G. Wing, Ludington.

HESPERIA HORTICULTURAL SOCIETY.

(Auxiliary to State Society.)

OFFICERS.

Neil McCallum, – – – – – – – – President.
O. A. Rowland, – – – – – – – – Vice-President.
Archie D. Himebaugh, – – – – – – Secretary-Treasurer.

MEMBERS.

Neil McCallum, Hesperia.
Wm. Kennedy, Hesperia, R. 3.
Thos. Kennedy, Hesperia, R. 3.
Frank Darlington, Hesperia, R. 4.
H. P. Reickmann, Hesperia, Star route.
D. H. Brake, Fremont, R. 1.
Geo. N. Beisel, Hesperia, R. 5.
H. K. Bush, Hesperia.
John Bird, Hesperia, R. 1.
D. N. Becker, Hesperia, Star route.
James Caldwell, Fremont, R. 6.
A. J. Cochrane, Hesperia, R. 1.
Lincoln Drake, Hesperia,
E. A. Dempsey, Hesperia, R. 2.
Wm. Enderly, Hesperia, R. 3.
D. J. Grouzo, Fremont, R. 6.
Himebaugh, Hesperia, R. 3.
W. A. Host, Hesperia, Star route.
Lew. Johnson, Hesperia, R. 4.
John Mahan, Hesperia.
S. C. Mills, Hesperia, Star route.
Geo. McNeil, Hesperia, R. 2.
F. M. Proctor, Fremont, R.
H. V. Potter, Hesperia, R. 2.
Jay Pinkerton, Hesperia, R. 1.
E. M. Reynolds, Hesperia, R. 2.
Wm. Robertson, Fremont, R.
Geo. K. Scattergood, Hesperia, R. 3.
Jacob Schenbeck, Hesperia, R. 4.
C. C. Stuckey, Hesperia, R. 3.
David Schindler, Hesperia, R. 3.
Ralph Utley, Fremont, R. 6.
Wm. Wachter, Fremont, R. 6.
Geo. Walker, Hesperia, R. 1.
C. V. Walker, Fremont, R. 6.
Bart Woodward, Hesperia, R. 3.
W. B. Winters, Hesperia, R. 4.
David Westbrook, Hesperia, R. 1.
Geo. E. Wilbur, Hesperia, R. 5.
R. Berger, Hesperia, R. 1.
Geo. Van Wingerton, Hesperia, R. 1.
Frank Drake, Hesperia, R. 3.

ALGONAC HORTICULTURAL SOCIETY.

(Auxiliary to State Society.)

OFFICERS.

D. Munro, – – – – – – – – President.
S. Crocker, – – – – – – – – Vice-President.
J. W. Grant, – – – – – – – – Secretary.
J. H. Donaldson, – – – – – – – – Treasurer.

MEMBERS.

L. C. Snell.
J. W. Grant.
L. R. Beson.
J. J. Poole.
G. O. Doxtader.
J. H. Donaldson.
Charlotte M. Muir.
Charles La Forge.
Samuel Crocker.
W. K. Stewart.
C. C. Mitchell.
D. Munro.
W. G. Hodge.
A. M. Smith.
Miss Clara Cole.
W. E. Bostwick.
Mrs. James Harvey.
Mrs. E. F. Linn.
Judge E. B. Hinsdale.
W. R. Hamilton.
John O'Leary.
Folkert Endleman.
F. D. Galton.
George Dennis.
Henry Avers.
G. A. Snook.

C. R. Champion.
James Ames.
Miss E. A. Ames.
Rev. R. N. Mulholland.
Joseph Phelps.
C. C. Parker.
Mrs. Henry Witherspoon.
Morrell Worfolk.
Samuel Smith.

A preliminary meeting was held in the Algonac Town Hall on February 24 and on March 4 a meeting was held to effect a permanent organization. Annual meeting, first Saturday in March in each year. Meetings the first Saturday in each month.

Association has at present 35 members.

LIST OF SECRETARIES OF STATE AND OTHER HORTICULTURAL SOCIETIES.

Arizona, R. H. Forbes, Tucson.
Alabama, P. F. Williams, Auburn.
Arkansas, Prof. Ernest Walker, Fayetteville.
California, H. H. Lillienthal, San Francisco.
Colorado, Martha A. Shute, Denver.
Connecticut, H. C. C. Miles, Milford.
Delaware, Wesley Webb, Dover.
Florida, E. O. Painter, Jacksonville.
Georgia, J. B. Wright, Caro.
Idaho, Frank F. Pierce, Fayette.
Illinois, W. B. Lloyd, Kinmundy.
Indiana, C. G. Woodbury, Fayette.
Idaho, W. N. Yost, Meridian.
Iowa, Wesley Greene, Davenport.
Kansas, Walter Wellhouse, Topeka.
Kentucky, W. R. Button, Bedford.
Louisiana, F. H. Burnette, Baton Rouge.
Maine, E. L. White, Bowdoinham.
Maryland, Prof. C. P. Close, College Park.
Massachusetts, William P. Rich, Boston.
Michigan, Charles E. Bassett, Fennville.
Minnesota, A. W. Latham, Minneapolis.
Mississippi, H. E. Blakelee, Jackson.
Missouri, Dr. W. L. Howard, Columbia.
Montana, Prof. M. J. Elrod, Missoula.
Nebraska, C. G. Marshall, Lincoln.
New Hampshire, B. S. Pickett, Durham.
New Jersey, Howard G. Taylor, Riverton.
New Mexico, J. D. Sena, Santa Fe.
New York, E. C. Gillett, Penn Yan; John Hall, Rochester.
North Carolina, Prof. W. N. Hutt, West Raleigh.
North Dakota, O. O. Churchill, Agricultural College.
Ohio, H. F. Ballou, Newark.
Oklahoma, J. B. Thoburn, Oklahoma City
Oregon, Frank W. Power, Portland.
Pennsylvania, Chester J. Tyson, Floradale.
Rhode Island, C. W. Smith, Providence.
South Dakota, Prof. N. E. Hansen, Brookings.
Tennessee, Prof. Charles A. Keffer, Knoxville.
Texas, Prof. E. J. Kyle, College Station.
Utah, J. Edward Taylor, Salt Lake City.
Vermont, M. B. Cummings, Burlington.
Virginia, Walter Whately, Crozet.
Washington, L. M. Brown, Walla Walla.
West Virginia, A. L. Dacy, Morgantown.
Wisconsin, F. Cranefield, Madison.
Wyoming, Aven Nelson, Laramie.
Ontario, P. W Hodgetts, Toronto.
American Association of Nurserymen, President, J. H. Dayton, Painesville, Ohio; Secretary, John Hall, Rochester, N. Y.
American Apple Congress, Clinton L. Oliver, Denver, Colo.
American Association for Advancement of Science, L. O. Howard, Smithsonian Institute, Washington, D. C.
American Association of Park Superintendents, F. L. Mulford, Harrisburg, Ind.
American Carnation Society, A. J. F. Bauer, Secretary Indianapolis, Ind.
American Civic Association, R. B. Watrous, Washington, D. C.

American Federation of Horticultural Societies, Charles E. Bassett, Fennville, Mich.
American Peony Society, C. J. Maloy, Rochester, N. Y.
American Pomological Society, John Craig, Ithaca, N. Y.
American Society of Landscape Architects, Charles D. Lay, New York City, N. Y.
American Rose Society, Benjamin Hammond, Fishkill-on-Hudson, N. Y.
American Seed Trade Association, C. E. Kendall, Cleveland, Ohio.
Canadian Horticultural Association, William E. Hall, Montreal.
Chrysanthemum Society of America, C. W. Johnson, Morgan Park, Ill.
Eastern Fruit Growers' Association, Nat. C. Frame, Martinsburg, Va.
International Apple Shippers' Association, R. G. Phillips, Rochester, N. Y.
International Society of Arboriculture, J. P. Brown, Connersville, Ind.
Mississippi Valley Apple Growers' Society, James Handly, Quincy, Ill.
Missouri Valley Horticultural Society, A. V. Wilson, Muncie, Kan.
National Apple Show, Ren H. Rice, Spokane, Wash.
National Council of Horticulture, H. C. Irish, Botanical Garden, St. Louis, Mo.
National Horticultural Congress, Freeman L. Reed, Council Bluffs, Ia.
National Nut Growers' Association, J. F. Wilson, Poulan, Ga.
Northwestern Fruit Growers' Association, E. R. Lake, Corvallis, Ore.
Ornamental Growers' Association, C. J. Maloy, Rochester, N. Y.
Northern Nut Growers' Association, Dr. W. C. Deming, Westchester, N. Y.
Society for Horticultural Science, C. P. Close, College Park, Md.
Society of American Florists and Ornamental Horticulturists, John Young, New York.
Western Fruit Jobbers Association, E. B. Branch, Omaha, Neb.

LIFE MEMBERS OF THE STATE HORTICULTURAL SOCIETY.*

*NOTE—A Life membership which was formerly $10 is now $5. The fund thus gathered is invested in good securities and only the interest employed for *general* purposes. The Secretary desires information as to the death or change of address of any life member. Notice of the death of a member should be accompanied by a sketch of the life of the deceased one, to be entered in the records of the State Society.

Name.	P. O. Address.	County.
Adams, H. Dale	Galesburg	Kalamazoo.
Adams, Mrs. H. Dale	Galesburg	Kalamazoo.
Aldrich, Geo. C	Bravo	Allegan.
Allis, E. W	Adrian	Lenawee.
Allis, Miss Mary C. (Mrs. Beal)	Adrian	Lenawee.
Ansley, C. F	Iowa City	*Iowa.*
Armitage, James	Monroe	Monroe.
Arnold, W. D	Ionia	Ionia.
Bailey, L. H	South Haven	Van Buren.
Bailey, L. H. Jr	Ithaca	*New York.*
Baldwin, O. A. D	Bridgman	Berrien.
Ballard, Ralph, R. F. D. 4	Niles	Berrien.
Barnhart, Herbert, Rural 1	Fremont	Newaygo.
Bartram, Burr, Rural 4	Benton Harbor	Berrien.
Bassett, Chas. E	Fennville	Allegan.
Bates, T. T	Traverse City	Grand Traverse.
Bauman, F. A., Rural 13	Grand Rapids	Kent.
Baumann, Archie J	New Richmond	Allegan.
Beal, J. L	Addison	Lenawee.
Beal, W. J	Agricultural College	Ingham.
Becker, Albert J		
Beckman, Geo. H., Rural 3	Ludington	Mason.
Blain, A. W., Supt. Elmwood Cemetery	Detroit	Wayne.
Blue, George	Traverse City	Grand Traverse.
Brackett, G. B	Washington	*D. C.*
Bristol, O. S	Almont	Lapeer.
Brubaker, C. S	Hartford	Van Buren.
Bruchner, George W	Monroe	Monroe.
Bryant, C. T	South Haven	Van Buren.
Bullock, A. M	Lapeer	Lapeer.
Burham, W. P	Ionia	Ionia.
Burrows, George L., Jr	Saginaw City	Saginaw.
Caie, Robert	Yarmouth	*Nova Scotia.*
Castello, George		
Chapman, Austin B	South Rockwood	Monroe.
Chilson, Nathaniel	Tower City	*Dakota.*
Chilson, Miss Ida	Tower City	*Dakota.*
Clark, M. W	Jackson	Jackson.
Coith, Alwin	South Haven	Van Buren.
Collins, G. H	Hartford	Van Buren.
Cook, A. J	Claremont	*California.*
Cook, C. B	Owosso	Shiawassee.

Name.	P. O. Address.	County.
Cook, W. N	Grand Rapids	Kent.
Cooper, Madison	Watertown	*New York.*
Crane, John H., R. F. D. 1	Fennville	Allegan.
Crawford, Robt. J	Armada	Macomb.
Cushman, E. H		*Ohio.*
Davidson, C. M. & Co	Rockwood	*Ohio.*
Davis, Horace W	Lapeer	Lapeer.
Dayton, J. H	Painesville	*Ohio.*
Deamud, J. B., 51 Wabash Ave	Chicago	*Illinois.*
Decker, Walter E., Rural 20	Orleans	Ionia.
DeLisle, Wm. H		
Dickerson, Claude C., Route 1	Ionia	Ionia.
Dickerson, Geo. E., Stage Route	Ionia	Ionia.
Dieckman, Mrs. Josephine M	East Saginaw	Saginaw.
Dietrich, C. J	Chicago	*Illinois.*
Dixon, A. S		
Dorr, S. W	Manchester	Washtenaw.
Doyle, Thomas	Monroe	Monroe.
DuMez, John	Holland	Ottawa.
Dutton, Chas. S	Holland	Ottawa.
Dykman, J	East Saginaw	Saginaw.
Eckard, W. C	Eaton Rapids	Eaton.
Edwards, O. C. (sanitarium)	Battle Creek	Calhoun.
Elsworth, R. H.,	Traverse City	Grand Traverse.
Farrand, T. A	Eaton Rapids	Eaton.
Field, Wm. A	South Chicago	*Illinois.*
Fields, Miss Jennie E		
Flowerday, Robert	Detroit	Wayne.
Freeman, Mrs. A	Ann Arbor	Washtenaw.
Friday, George	Coloma	Berrien.
Frost, Frank H., Rural 6	South Haven	Van Buren.
Garfield, Chas. W	Grand Rapids	Kent.
Gebhardt, Benton	Hart	Oceana.
Geddes, David	Saginaw	Saginaw.
Geisler, Wm., Rural 2, box 92	St. Joseph	Berrien.
Getz, Geo. F., Lakewood Farm	Holland	Ottawa.
Gephart, H. W	Hart	Oceana.
Gibson, Mrs. W. K	Jackson	Jackson.
Graham, Elwood	Grand Rapids	Kent.
Graham, Dr. M	Jonesville	Hillsdale.
Grant, John F., 2710 Indiana Ave	Chicago	*Illinois.*
Greening, Charles E	Monroe	Monroe.
Greening, J. C	Monroe	Monroe.
Guild, E. F		
Hale, Charles F., Rural 11	Grand Rapids	Kent.
Hall, Alfred R., R. F. D. 4	Buchanan	Berrien.
Hall, Louis A., Rural 1	Berlin	Kent.
Hall, Luther E	Ionia	Ionia.
Halstead, J. B	Farmington	Oakland.
Hartman, S. B	Athens	Calhoun.
Hawley, George A	Hart	Oceana.
Hawxhurst, W. F	Saline	Washtenaw
Hayes, N. B	Muir	Ionia.
Hayden, Mrs. H. A	Jackson	Jackson.
Heinze, Edward F., R. F. D. 2	St. Joseph	Berrien.
Henser, J. H., 1262 Monadnock Bldg	Chicago	*Illinois.*
Hinebaugh, Wm. H	Ottawa	*Illinois.*
Hoffman, Mrs. Mary Dickinson	St. Joseph	Berrien.
Hoffman, M., Rural 2	St. Joseph	Berrien.
Hogue, H. H., Rural 1	Sodus	Berrien.
Holloway, Geo. F	Sawyer	Berrien.

Name.	P. O. Address.	County.
Hosner, O. G., Rural 1	Oxford	Oakland.
Husted, Noah P.	Lowell	Kent.
Hutchins, Edward, R. F. D. 1	Fennville	Allegan.
Ilgenfritz, C. A.	Monroe	Monroe.
Ives, Caleb.	Monroe	Monroe.
Jaquay, Irving	Buchanan	Berrien.
Jerome, Mrs. David H.	Saginaw City	Saginaw.
Johnson, William	Vassar	Tuscola.
Kales, Dr. John D., Savings Bank Bldg.	Chicago	*Illinois.*
Keasey, E. L.	South Haven	Van Buren.
Keith, B. H.	Sawyer	Berrien.
Kellogg, Herbert	Ionia	Ionia.
Keppel, Thos.	Zeeland	Ottawa.
Kettle, Burt	Coopersville	Ottawa.
Kidd, J. H.	Ionia	Ionia.
Kingsley, H. J.	Fennville	Allegan.
Klien, F. J., Rural 1	Farmington	Wayne.
Knight, David & Son	Sawyer	Berrien.
Kniseley, A. J.	Benton Harbor	Berrien.
Krake, H. G.	St. Joseph	*Missouri.*
Ladd, E. O.	Old Mission	Grand Traverse.
Lasch, A. A., Rural 2	Suttons Bay	Leelanau.
Lawrence, L. L.	Decatur	Van Buren.
Levenhagen, R. W.	Cleveland	*Ohio.*
Lincoln, L. C.	Greenville	Montcalm.
Lincoln, Mrs. L. C.	Greenville	Montcalm.
Loomis, P. B.	Jackson	Jackson.
Macaulay, T. B.	Montreal	*Canada.*
Maguire, H. W. 7116 Deyo St	Jackson	Jackson.
Mann, S. B.	Glenwood	*Florida.*
Marshall, William A.	Old Mission	Grand Traverse.
Marshall, W. C., 128 So. Sacramento Blvd.	Chicago	*Illinois.*
Mason, L. M.	East Saginaw	Saginaw.
Mason, Mrs. Sarah A.	East Saginaw	Saginaw.
McClatchie, G. C.	Ludington	Mason.
McDiarmid, James D.		*California.*
McGuire, J. Fred, 101 Washington St	Chicago	*Illinois.*
McNaughton, Robert T.	Jackson	Jackson.
Miller, Chas. H.	Glen Arbor	Leelanau.
Miller, Frank A.	Northville	Wayne.
Miller, John T.	Birmingham	Oakland.
Mitchell, W. H. C.	Traverse City	Grand Traverse.
Monat, Lawrence, Jr., 1540 Hawthorne Terrace	Berkeley	*California.*
Monroe, C. J.	South Haven	Van Buren.
Monroe, Mrs. Nora O.	South Haven	Van Buren.
Montague, A. K.	Traverse City	Grand Traverse.
Moore, Mrs. Samuel C.	Muskegon	Muskegon.
Moores, J. H.	Lansing	Ingham.
Morse, Miss Anna, Rural 1	Old Mission	Grand Traverse.
Munson, J. Pomeroy	Grand Rapids	Kent.
Nabors, Nellie S.	Flint	Genesee.
Neilsen, Henry L.	Ionia	Ionia.
Newhall, Benj., 131 South Water St.	Chicago	*Illinois.*
Newhall, John, 131 South Water St.	Chicago	*Illinois.*
Nichols, W. W., Geddes Ave.	Ann Arbor	Washtenaw.
Nicol, Jas., Braeside Fruit Farm	South Haven	Van Buren.
Noble, W. A.	Monroe	Monroe.
Odell, Samuel W.	Muskegon	Muskegon.
O'Donald, R. H.	Howard City	Montcalm.
Overton, F. J.	Bangor	Van Buren.

Name.	P. O. Address.	County.
Palmer, W. S	Kalkaska	Kalkaska.
Palmer, Thomas W	Detroit	Wayne.
Pennell, Ray L., Box C	Traverse City	Grand Traverse.
Perry, George L	Mt. Pleasant	Isabella.
Perry, Jacob H	Goodison	Oakland.
Petty, Thomas	Spring Lake	Ottawa.
Pierce, N. B	Ludington	Mason.
Port, Geo. L., 6439 Greenwood Ave	Chicago	*Illinois.*
Post, L. J	Lowell	Kent.
Pratt, C. A	Benton Harbor	Berrien.
Pratt, W. M	Benton Harbor	Berrien.
Prentiss, Judge Wm	Bravo	Allegan.
Read, G. P., 119 Duane St	New York	*New York.*
Reynolds, E. H	Monroe	Monroe.
Reynolds, H. G	Pasadena	*California.*
Richmond, E. D	Pentwater	Oceana.
Ricker, Dr. John D	Pontiac	Oakland.
Robischung, H. B	Cloverdale	Barry.
Roekey, Clyde W	St. Joseph	Berrien.
Rogers, A. J., Jr., Hort. Bldg	Madison	*Wisconsin.*
Rose, Paul	South Frankfort	Benzie.
Rowe, Geo. E., R. F. D. 11	Grand Rapids	Kent.
Russell, Dr. Geo. B	Detroit	Wayne.
Rust, C. E	Ionia	Ionia.
Samuelson, Norman L., 1811 W. Madison	Chicago	*Illinois.*
Satterlee, James	Lansing	Ingham.
Scales, J. C. & C. R., So. Water St	Chicago	*Illinois.*
Schreiber, Thor	Evanston	*Illinois.*
Scott, Dr. Austin	New Brunswick	*New Jersey.*
Scott, Mrs. C. W	Grand Rapids	Kalkaska.
Scott, E. H	Ann Arbor	Washtenaw.
Scudder, C. B	Augusta	Kalamazoo.
Sessions, Charles A	Mears	Oceana.
Sessions, William	Ionia	Ionia.
Sheffield, Wm. E. & Co	Benton Harbor	Berrien.
Shoop, Rev. D. R	Hastings	Barry.
Simmons, F. P., R. F. D. 1	Northville	Wayne.
Simpson, E. P	Milbourne	*Florida.*
Sinclair, W. G	Grand Rapids	Kent.
Smeltzer, Jos	South Frankfort	Benzie.
Smith, Dr. Wilson A	South Haven	Van Buren.
Smith, Henry, Cor. Monroe and Division	Grand Rapids	Kent.
Smith, E. T	Ionia	Ionia.
Smith, Howard B	Winona	*Ontario.*
Smith, H. H	Jackson	Jackson.
Smith, N. E	Ionia	Ionia.
Smythe, R. A	Benton Harbor	Berrien.
Snyder, Wm. E	Hart	Oceana.
Soule, J. B	Fruitport	Muskegon.
Stearns, J. N	Kalamazoo	Kalamazoo.
Stearns, W. E	Chicago	*Illinois.*
Steere, B. W	Carthage	*Indiana.*
Sterling, F. S	Monroe	Monroe.
Sterling, J. C	Monroe	Monroe.
Sterling, W. C	Monroe	Monroe.
Sterling, W. P	Monroe	Monroe.
Sterling, Mrs. Emma M	Monroe	Monroe.
Straight, G. W., Rural 11	Holland	Ottawa.
Tallant, C. W	Shelby	Oceana.
Taylor, Geo. C	Kalamazoo	Kalamazoo.
Taylor, R. L	Lapeer	Lapeer.

Name.	P. O. Address.	County.
Thayer, Mrs. Celia	Benton Harbor	Berrien.
Thayer, Mrs. Dora	Benton Harbor	Berrien.
Thomas, H. F	Jackson	Jackson.
Thompson, T. G	Benton Harbor	Berrien.
Thompson, W. D	Jackson	Jackson.
Toland, F. J	Ludington	Mason.
Tracy, Will W	Washington	*D. C.*
Upham, Miss Mary C., Rural 1	Old Mission	Grand Traverse.
Vaughan, Leonard H., 84 Randolph St	Chicago	*Illinois.*
Vick, James, Jr	Rochester	*New York.*
Vick, Frank H	Rochester	*New York.*
Vick, E. Colston	Rochester	*New York.*
Von Herff, Baron	New York	*New York.*
Wadsworth, W. R	Lapeer	Lapeer.
Wagner, G. M. H. & Sons	Chicago	*Illinois.*
Waite, Gilbert M	Paw Paw	Van Buren.
Walton, L. B	Attica	Lapeer.
Warren, W. H. & Son	Ravenna	Muskegon.
Watkins, L. Whitney	Manchester	Washtenaw.
Watkins, L. D	Manchester	Washtenaw.
Webber, Miss Frances E	East Saginaw	Saginaw.
Welch, Chas. B., R. F. D. 2	Fennville	Allegan.
Wells, Frank D., R. F. D. 3	Rochester	Oakland.
Western, John, 45 State St	Detroit	Wayne.
White, O. K	East Lansing	Ingham.
Whitten, C. E	Bridgman	Berrien
Whittlessey, John	St. Joseph	Berrien.
Weir, Antoine	Monroe	Monroe.
Wilde, Thomas	Coopersville	Ottawa.
Wilde, Chas., R. F. D. 2	Grand Rapids	Kent.
Wilken, F. A	South Haven	Van Buren.
Williams, S. P	Monroe	Monroe.
Wilson, Archie	Beulah	Benzie.
Wilson, Wm	Beulah	Benzie.
Wooding, Charles F	Lowell	Kent.
Woodruff, A. N	Watervliet	Berrien.
Woodward, David	Clinton	Lenawee.
Wundt, K. R	Burlington	*Iowa.*
Wurtz, Elias H		
Young, A. M	Shelbyville	Allegan.
Ziegler, J. C	Saginaw City	Saginaw.

HONORARY MEMBERS.

Name.	P. O. Address.	County.
Waite, Prof. M. B	Washington	*D. C.*
Farnsworth, W. W	Waterville	*Ohio,*
Taylor, Miss Grace	Douglas	Allegan.
Saunders, Prof. J. G	Madison	*Wisconsin.*
Bruner, M. G	Olinda	*Ontario.*
Fox, Adolphus S	Olinda	*Ontario.*
Hilborn, J. L	Leamington	*Ontario.*

ANNUAL MEMBERS.

Name.	P. O. Address.	County.
Abbey, Will	Rives Junction	Jackson.
Bagley, Wm. D	Old Mission	Grand Traverse.
Baird, W. S	Brown City	Sanilac.
Baker, A. A	Concord	Jackson.
Ballard, Mrs. Ralph	Niles	Berrien.
Barden, Floyd, Rural 6	South Haven	Van Buren.
Beal, S. W	Swartz Creek	Genesee.
Beecker, D. N	Star Route	Hesperia.
Beem, John M	Reeman	Newaygo.
Beisel, Geo. N., Rural 7	Hesperia	Oceana.
Berger, R., Rural 1	Hesperia	Oceana.
Bird, John, Rural 1	Hesperia	Oceana.
Bird, W. F	Ann Arbor	Washtenaw.
Bissett, Frank	Custer	Mason.
Bixby, M. H	South Haven	Van Buren.
Black, John	Dearborn	Wayne.
Bogue, V. T	Vassar	Tuscola.
Bos, A	Hudsonville	Ottawa.
Bouck, W. E., Rural 2	Grand Rapids	Kent.
Bovard, Orr B	Arcadia	Benzie.
Brake, D. H., Rural 1	Fremont	Newaygo.
Braman, O. W., Rural 4	Grand Rapids	Kent.
Bricken, W. G	Breckenridge	Gratiot.
Brown, H. L	Parma	Jackson.
Bruner, M. G	Olinda	*Ontario.*
Brunson, Dr. E. E	Ganges	Allegan.
Buck, Chas	Athens	Calhoun.
Bull, John, Route 1	Casnovia	Muskegon.
Burger, F. A	Bangor	Van Buren.
Bush, H. K	Hesperia	Oceana.
Buskirk, M. D	Paw Paw	Van Buren.
Caldwell, Jas., Rural 6	Fremont	Newaygo.
Campbell, Herbert	Berrien Springs	Berrien.
Canright, Jesse M., Rural 9	Grand Rapids	Kent.
Capron & Arnold	Eaton Rapids	Eaton.
Cary, H. O., Rural 1	Bangor	Van Buren.
Chapel, Eugene	Parma	Jackson.
Chapman, Wm. H	Bangor	Van Buren.
Chatfield, Geo	South Haven	Van Buren.
Cheney, J. E	Scotts	Kalamazoo.
Chesebro, C. C., Rural 3	South Haven	Van Buren.
Chittenden, Miss Ida L	Lansing	Ingham.
Clark, B. H	Vassar	Tuscola.
Coates, Edward	Beulah	Benzie.
Cochrane, A. J., Rural 1	Hesperia	Oceana.
Cole, H. L	Palmyra	Lenawee.
Collins, T. F	Grand Junction	Van Buren.
Converse, W. H., Rural 22	Augusta	Kalamazoo.
Cottrell, G. A	Milford	Oakland.
Crampton, A. E	Vassar	Tuscola.
Cross, Thos., Rural 1, Box 59	Detroit (Highland Park)	Wayne.
Daily, Wm., Rural 4	Benton Harbor	Berrien.
Davidson, C. M., Rural 1	Chesapeake	*Ohio.*
Davis, J. L	Grand Junction	Van Buren.
Davis, W. H	Perrinton	Gratiot.
Dean, R. F., Rural 3	South Haven	Van Buren.
Dean, W. H., 845 LaBell Ave	Grand Rapids	Kent.
Dempsey, E. A., Rural 2	Hesperia	Oceana.
Diedrich, M. J	Hickory Corners	Barry.
Dilley, V. H	Lacota	Van Buren.
Dowd, A. J., Rural 4	Hartford	Van Buren.

Name.	P. O. Address.	County.
Doyle, C. D.	Augusta	Kalamazoo.
Drake, Frank, Rural 3	Hesperia	Oceana.
Drake, G. S., Box 1201	Benton Harbor	Berrien.
Drake, Lincoln	Hesperia	Oceana.
Dyer, H. J.	Gregory	Livingston.
Eaman, B. J.	Benton Harbor	Berrien.
Edison, John M	Grand Rapids	Kent.
Enderly, Wm., Rural 3	Hesperia	Oceana.
Eustace, Prof. H. J	East Lansing	Ingham.
Ewald, E. W., Rural 3	Hartford	Van Buren
Ewald, F. J., Rural 1	Benton Harbor	Berrien.
Felt, Geo	Scottville	Mason.
Ferguson, E. W	Almont	Lapeer.
Field, Sarah M	Devils Lake	Lenawee.
Finch, M. G., Rural 4	Grand Rapids	Kent.
Fischer, B. C., Rural 4	Leslie	Ingham.
Fisher, Prentice	Rives Junction	Jackson.
Flansburgh, C. N	Jackson	Jackson.
Flory, H. E., Rural 5	South Haven	Van Buren.
Foster, A. H	Allegan	Allegan.
Fox, Adolphus S	Olinda	*Ontario.*
Franklin, A. H	Dearborn	Wayne.
Freund, Chas.	St. Joseph	Berrien.
Fuller, M. S.	Lawrence	Van Buren.
Garber, Otto R	Essexville	Bay.
George, Elmer W	Hopkins	Allegan.
Geysler, Frank, Rural 4	Watervliet	Berrien.
Geysler, Jacob	Watervliet	Berrien.
Gibson, John I., 157 LaGrave	Grand Rapids	Kent.
Girling, Geo., 108 Washington St	Chicago	*Illinois.*
Glass, T. B	Monmouth	*Illinois.*
Gleason, H. L	Hartford	Van Buren.
Godfrey, I. J	Parma	Jackson.
Golder, W. A.	Whitehall	Muskegon.
Gray, A. P.	Traverse City	Grand Traverse.
Gray, W. B.	Traverse City	Grand Traverse.
Green, S. A., Rural 2	Hillsdale	Hillsdale.
Gregg, O. I	East Lansing	Ingham.
Griffin, Geo. W	South Haven	Van Buren.
Gronso, D. J., Rural 8	Fremont	Newaygo.
Gunn, A. E	Shelby	Oceana.
Guy, J. M., 357 E. Main St	Benton Harbor	Berrien.
Hamilton, Harry	Bangor	Van Buren.
Hamlin, J. H., Rural 1	Bravo	Allegan.
Hankerd, Chas. J	Munith	Jackson.
Hankerd, Geo. P	Munith	Jackson.
Harr, B. R., Rural 2	Jackson	Jackson.
Harrison, J. J., Rural 1	Imlay City	Lapeer.
Harvey, Jos., Rural 8	Holland	Ottawa.
Hawxhurst, M. M., 95 Kenilworth	Detroit	Wayne.
Hemingway London Purple Co., 133 Front Street	New York	*New York.*
Hermance, J. F., Rural 1	Holton	Muskegon.
Herrick, Austin	Twinsburg	*Ohio.*
Hersey, F. D	Casnovia	Muskegon.
Hilborn, J. L.	Leamington	*Ontario.*
Hill, R. C.	Coldwater	Branch.
Himebaugh, A. D., Rural 3	Hesperia	Oceana.
Hindman, A. C., 438 Houseman Block	Grand Rapids	Kent.
Holben, Edward, Rural 22	Kent City	Kent.
Hosking, Jas. Jr., Rural 1	South Haven	Van Buren.

A good crop of Greenings on the Mark Randall farm near Glen Arbor. This orchard is on a hill that rises 300 feet above Lake Michigan.

Apricot tree in bloom on Frank Smith farm near Traverse City.

Name.	P. O. Address.	County.
Host, W. A., Star Route	Hesperia	Oceana.
Hunt, C. M	Eaton Rapids	Eaton.
Hunt, J. C., Rural 1	South Haven	Van Buren.
Hunt, L. C., Rural 6	Eaton Rapids	Eaton.
Hunter, L. R.	New Hudson	Oakland.
Hunziker, M. J.	Kent City	Kent.
Hutchinson, Marc	Fennville	Allegan.
Jacobs, G. E., Rural 18	Sparta	Kent.
Jager, Henry	Douglas	Allegan.
Jelly, John, Rural 9	Grand Rapids	Kent.
Johnson, Hugh	Almont	Lapeer.
Johnson, Lew, Rural 4	Hesperia	Oceana.
Johnston, J. C., Rural 2	Kibbie	Allegan.
Jones & Cranke	Grand Junction	Van Buren.
Keeler, Don, Rural 2	Parma	Jackson.
Keister, H. A., Rural 3	Bangor	Van Buren.
Kelly, Jos. L.	South Haven	Van Buren.
Kempster, W. C.	Coldwater	Branch.
Kennedy, Dan J.	St. Louis	Gratiot.
Kettle, Burt, Rural 2	Coopersville	Ottawa.
Kettle, Henry	Coopersville	Ottawa.
Keys, S. B., Rural 8	St. Johns	Clinton.
King, Jay	Parma	Jackson.
Kingsbury, Albro, Rural 3	Fennville	Allegan.
Kirby, E. J	Covert	Van Buren.
Kneibes, C. C., Rural 4	Watervliet	Berrien.
Kneibes, Geo. P	Watervliet	Berrien.
LaDuke, L. B.	Lawrence	Van Buren.
Lamb, Henry	Fennville	Allegan.
Lardie, Jas.	Old Mission	Grand Traverse.
Lawrence, A. P., Rural 2	Delton	Barry.
Lawrence, F. E.	Cressey	Barry.
Lawrence, Oliver C.	Hudson	Lenawee.
Leonard, E. C.	Bangor	Van Buren.
Light Draft Harrow Co.	Marshalltown	Iowa.
Lindsley, Geo. W.	Harbor Springs	Emmet.
Low, Geo. M.	Bangor	Van Buren.
Lymburner, H. A., Rural 21	Sparta	Kent.
Lyons, John, Rural 3	Fenton	Genesee.
Mack, Frank	Stanton	Montcalm.
Maguire, Roy, Rural 3, Box 49	Pontiac	Oakland.
Mahan, John	Hesperia	Oceana.
Mann, Don A.	Lowell	Kent.
Marsh, F. C.	Pontiac	Oakland.
Marsh, H. Lawrence	Manistee	Manistee.
Matthews, W. C., Rural 2	Grand Rapids	Kent.
Maurer, R.	Frankfort	Benzie.
Maynard, J. C., Rural 2	Grand Rapids	Kent.
McCann, David	Paw Paw	Van Buren.
McCaslin, Ezra, Rural 2	Bravo	Allegan.
McLean, Robt., Rural 2	South Haven	Van Buren.
McNeil, Geo., Rural 2	Hesperia	Oceana.
Mead, A. E., Rural 11	Battle Creek	Calhoun.
Mechem, Geo. B.	Fennville	Allegan.
Merritt, H. E., Rural 2	South Haven	Van Buren.
Methven, C. S.	Holland	Ottawa.
Metras, N. G., 261 Broadway	Benton Harbor	Berrien.
Miller, John R., 39 Chene St	Detroit	Wayne.
Miller, J. W.	Fremont	Newaygo.
Miller, O. J., Rural 2	Coloma	Van Buren.
Mills, S. C., Star Route	Hesperia	Oceana.

Name.	P. O. Address.	County.
Mitting, A., Rural 1, Box 54	Holland	Ottawa.
Mohney, Chas. E	Vicksburg	Kalamazoo.
Maloney, Vet S	Cheboygan	Cheboygan.
Moon, J. E	Battle Creek	Calhoun.
Moores, J. H	Lansing	Ingham.
Morgan, Samuel M., 1301 Ashland Block	Chicago	*Illinois.*
Morgan, Dr. W. P	Saginaw, W. S	Saginaw.
Morrell, R. E	Central Lake	Antrim.
Morris, J. W., Rural 1, Box 128	Fennville	Allegan.
Mulby, R. G., Rural 9	Grand Rapids	Kent.
Munro, H. A	Rockwood	Wayne.
Norton, S. W., 1420 Ashland Block	Chicago	*Illinois.*
Norton, Wm. S	Parma	Jackson.
O'Connor, Thos., Rural 1	Fennville	Allegan.
Oliver, D	Orchard Lake	Oakland.
Overton, M	Bangor	Oan Buren.
Owen, C. B	Hudson	Lenawee.
Pancost, C. E., Rural 6	Lansing	Ingham.
Pannier, Ernest A	Watervliet	Berrien.
Pease, F. D	Sparta	Kent.
Petteys, W. F., Rural 21	Shiloh	Ionia.
Pinkerton, Jay, Rural 1	Hesperia	Oceana.
Pitts, E. A	Beulah	Benzie.
Potter, H. V., Rural 2	Hesperia	Oceana.
Pratt, B. G., 50 Church St	New York	*New York.*
Prettyman, O. G., Rural 4	Scottville	Mason.
Prine, H. C., Rural 3	Parma	Jackson.
Procter, F. M	Fremont	Newaygo.
Pugsley, M. H	Paw Paw	Van Buren.
Pullen, Geo. P., Rural 1	Berrien Springs	Berrien.
Pullen, W. S	Hillsdale	Hillsdale.
Purdy, Geo. H	Mason City	*Iowa.*
Purdy, P., Rural 2	Fennville	Allegan.
Rambo, L	Bridgman	Berrien.
Randall, Mark	Glen Arbor	Leelanau.
Rasmussen, R. J., Box 416	Marlette	Sanilac.
Reed, P. A	Beulah	Benzie.
Reynolds, E. N., Rural 2	Hesperia	Oceana.
Reynolds, F. M	New Richmond	Allegan.
Rex Spray Co	Toledo	*Ohio.*
Rickenbaugh, D. P	Hudson	Lenawee.
Robbins, W. H	Bangor	Van Buren.
Robertson, Perry C., Rural 3	Albion	Calhoun.
Robertson, Wm	Fremont	Newaygo.
Rocher, Abel de	Berlamont	Van Buren.
Rottier, John, Rural 1	Fremont	Newaygo.
Rouse, F. O	Shelby	Oceana.
Sanford, F. H	East Lansing	Ingham.
Scamehorn, J. M	Bloomingdale	Van Buren.
Scattergood, Geo. K., Rural 4	Hesperia	Oceana.
Schenbeck, Jacob, Rural 4	Hesperia	Oceana.
Schindler, David, Rural 3	Hesperia	Oceana.
Schmeiding, C. T	Shelby	Oceana.
Sharai, Bert	Sodus	Berrien.
Shaw, E. E	Grand Junction	Van Buren.
Sherman, A. H	Homer	Calhoun.
Sherwood, Robert	Watervliet	Berrien.
Smith, Theron L	South Lyon	Oakland.
Smith, Y. K., Box 869	East Lansing	Ingham.
Spencer, A. G	Kibbie	Van Buren.
Stiles, Holden	Leslie	Jackson.

Name.	P. O. Address.	County.
Stinchfield, Chas.	Pontiac	Oakland.
St. Johns, Lewis E., Rural 2	Jackson	Jackson.
Stoddard, D. F., Rural 12	Kalamazoo	Kalamazoo.
Stone, A. G.	Niles	Berrien.
Stray, Geo. J., Rural 7	Coldwater	Branch.
Stuckey, C. C., Rural 3	Hesperia	Oceana.
Taft, L. R.	East Lansing	Ingham.
Taylor, Miss Grace, Rural 2	Fennville	Allegan.
Teel, Harry	Lansing	Ingham.
Thoman, Frank	Almont	Lapeer.
Thomas, G. H., Rural 3	Shelby	Oceana.
Thomas, R. G.	Three Oaks	Berrien.
Thomas, S. M.	New Richmond	Allegan.
Thompson, A. K.	Niles	Berrien.
Tice, B. L., Rural 8	Dowagiac	Cass.
Tompkins, S. B.	Old Mission	Grand Traverse.
Totzke, R. C.	St. Joseph	Berrien.
Tucker, Amos	South Haven	Van Buren.
Utley, Ralph, Rural 6	Fremont	Newaygo.
Van Norsdall, Fred	Three Rivers	St. Joseph.
Van Wingerton, Geo., Rural 1	Hesperia	Oceana.
Wachter, Wm., Rural 6	Fremont	Newaygo.
Wade, R. H.	Hudson	Lenawee.
Wakeman, Arthur	Bangor	Van Buren.
Walker, C. M.	Hesperia	Oceana.
Walker, C. V., Rural 6	Fremont	Newaygo.
Walker, Geo., Rural 1	Hesperia	Oceana.
Warner, F. E., Rural 5	South Haven	Van Buren.
Waterman, Dorr	Athens	Calhoun.
Weed, P. P., Rural 2	Fennville	Allegan.
Welch, H. G., Rural 2	Fennville	Allegan.
Westbrook, David, Rural 1	Hesperia	Oceana.
Wiedmann, Fred, Rural 6	Manchester	Washtenaw.
Wilbur, Geo. E., Rural 5	Hesperia	Oceana.
Wilder, L. E., Rural 2	Grand Rapids	Lent.
Willie, E. E., 1016 Main St	Mt. Pleasant	Isabella.
Willobee, A. M.	Old Mission	Grand Traverse.
Winne, A. E.	Bangor	Van Buren.
Winters, W. B., Rural 4	Hesperia	Oceana.
Woodin, L. M., Rural 3	Owosso	Shiawassee.
Woodward, Bart, Rural 3	Hesperia	Oceana.
Wylie, Orin, Rural 6	Shelby	Oceana.
Young, C. E	Rives Junction	Jackson.

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