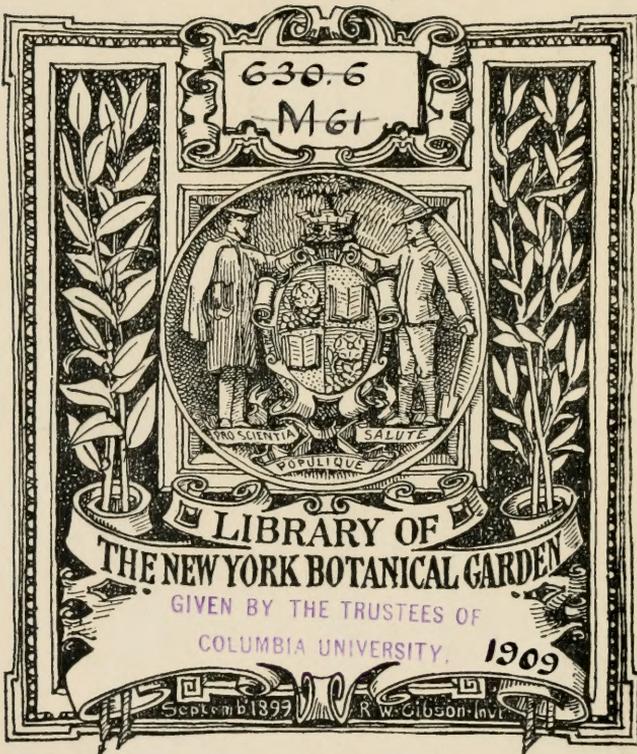
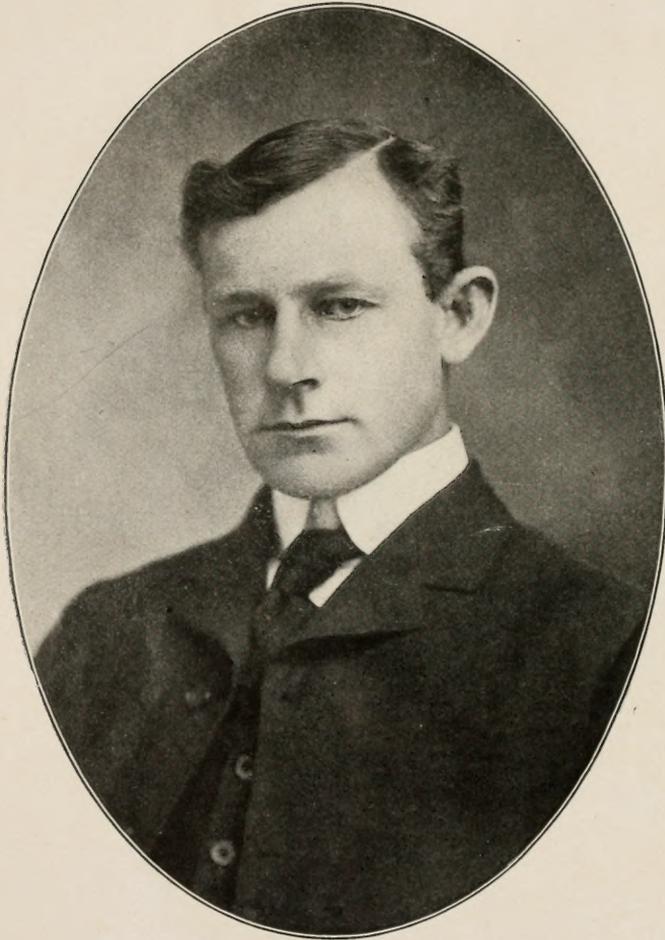


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PRESIDENT CHARLES B. COOK, OWOSSO, MICHIGAN
1907-1908

THIRTY-SEVENTH ANNUAL REPORT

OF THE

SECRETARY

OF THE

STATE HORTICULTURAL SOCIETY

OF

MICHIGAN

1907



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REPORT OF THE SECRETARY OF THE MICHIGAN STATE
HORTICULTURAL SOCIETY.

FENNVILLE, MICHIGAN, }
January 1, 1908. }

TO HON. FRED M. WARNER, *Governor of the State of Michigan:*

I have the honor to submit herewith, in compliance with legal requirements, the accompanying report of 1907, with supplementary papers.

Respectfully yours,

CHARLES E. BASSETT,

Secretary Michigan State Horticultural Society.

JAN 20 1909.



Edward Hutchins



O. S. Bristol



Benton Gebhardt



Vice President R. A. Smythe



President C. B. Cook



Treasurer James Satterlee



Prof. S. W. Fletcher



Secretary C. E. Bassett



T. A. Farrand

OFFICERS OF THE STATE HORTICULTURAL SOCIETY FOR 1908.

PRESIDENT—C. B. COOK, Owosso.

VICE PRESIDENT—R. A. SMYTHE, Benton Harbor.

SECRETARY—CHARLES E. BASSETT, Fennville.

TREASURER—JAMES SATTERLEE, Lansing.

LIBRARIAN—H. CHAMBERS, Lansing.

EXECUTIVE BOARD.

R. A. SMYTHE, Benton Harbor, 3 years.	S. W. FLETCHER, Agr'l. Col., 1 year.
O. S. BRISTOL, Almont, 3 years.	T. A. FARRAND, Eaton Rapids, 2 years
BENTON GEBHARDT, Hart, 1 year.	EDWARD HUTCHINS, Fennville, 2 years.

STANDING COMMITTEES.

FRUIT CATALOGUE—T. A. FARRAND, Eaton Rapids.

NEW FRUITS—L. R. TAFT, Agricultural College; EDWARD HUTCHINS, Fennville.

FINANCE—R. A. SMYTHE, Benton Harbor; O. S. BRISTOL, Almont.

ENTOMOLOGY—W. B. BARROWS, Agricultural College.

VEGETABLE PHYSIOLOGY—S. W. FLETCHER, Agricultural College.

LANDSCAPE GARDENING—THOMAS GUNSON, Agricultural College.

FORESTRY—CHAS. W. GARFIELD, Grand Rapids.

LEGISLATION—President C. B. COOK; Secretary C. E. BASSETT.



Prof. U. P. Hedrick
Horticulturist, Agricultural Experiment Station
Geneva, New York



Rev. George E. Rowe, Toastmaster



J. H. Hale
One of the World's Most Noted Horticultural Authorities,
Connecticut and Georgia

THIRTY-SEVENTH ANNUAL MEETING

Battle Creek, December 3, 4 and 5, 1907.

The thirty-seventh annual meeting of the Michigan State Horticultural Society, held in the auditorium in the city of Battle Creek, December 3, 4 and 5, is conceded by all present to have been the most enjoyable and profitable of any in the history of the society. Nearly every part of the State was represented in the attendance, besides delegates and visitors from 12 other states and Canada. The presence of such national authorities as J. H. Hale of Connecticut, W. H. Collingwood and Prof. U. P. Hedrick of New York and W. W. Farnsworth of Ohio added to the interest in the excellent program.

The display of fruit, mostly apples and pears, was large and the specimens were of unusual excellence. The competitive fruit judging and identifying by a dozen students from the agricultural college, with Prof. Hedrick of Geneva, New York as referee, resulted in awarding the following cash prizes: First, \$15, B. B. Pratt of Benton Harbor; second, \$10, F. M. Barden, Casco; third, \$5, A. L. Darbee, Caro.

The society business meeting resulted in the reelection of President C. B. Cook of Owosso, Secretary C. E. Bassett of Fennville, Treasurer James Satterlee of Lansing, Vice President R. A. Smythe of Benton Harbor and O. S. Bristol of Almont as a new member of the executive board in place of Geo. E. Rowe, who had served the two terms allowed by the constitution of the society.

The permanent fund of the society was increased at this meeting to \$5,000, which meets the requirements in the will of the late T. T. Lyon of South Haven.

It was with deep regret that the word was received that Prof. S. W. Fletcher, horticulturist at the Agricultural College, has accepted the position of dean of the Virginia experiment station, to take effect at once.

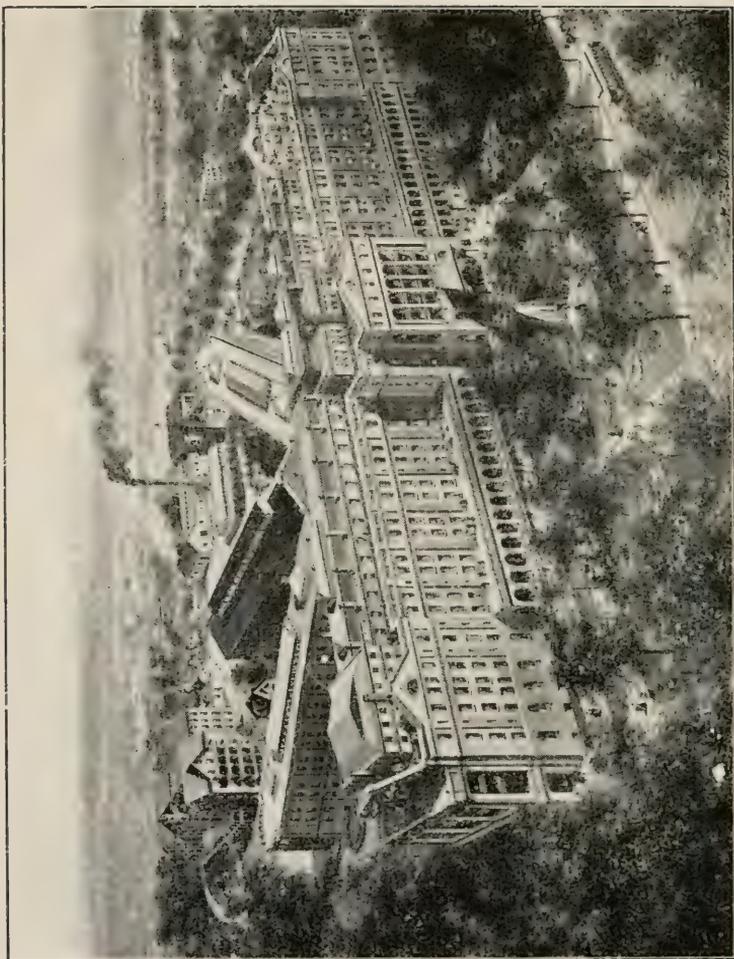
One of the delightful social affairs of the meeting was the banquet given at the sanitarium. The banquet tables were handsomely decorated with fruits and flowers—the crimson blossoms of poinsettias, alternating with mounds of red and white grapes, golden pears and rosy apples, while the menu reflected the principles of the institution—the return to Nature's products and exploited to the complete satisfaction of the guests their epicurean value.

MENU

Celery	Ripe Olives	Salted Peanuts
	Grape Fruit	
	Almond Bouillon—Bread Sticks	
	Apple Juice	
	Roast Protose Sage Dressing	
Potatoes Baked in Half Shell		
	French Peas Crabapple Jelly	
Nut and Rice Croquettes		
	Browned Sweet Potatoes	
Waldorf Salad		Cream Crisps
	Raspberry Nectar	
	French Floating Island	
White Cake		Cashew Nuts
	Orange Gelée	
Kumquats		Pears
Cornicheon Grapes		Muscate Grapes
Yogurt Cheese		Toasted Wafers
	NoKo	

Following the banquet, in which one hundred and fifty guests participated, a programme of toasts was responded to, the Rev. George H. Rowe of Grand Rapids, presiding as toast-master, introducing the various speakers in clever verse. In asking the guests to drink to the health of Dr. Kellogg he referred to him as the man who was doing so much to heal his fellowman. In his response, Dr. Kellogg said simply: "A doctor cannot heal. God only heals." But added that it was the object of the institution to help lift up, to restore and to comfort and that he took great pleasure in welcoming so many real men and real women to the institution.

"You represent by your choice of avocation," said he, "the real return to nature movement. Whatever there is to day in the world of real sweetness and beauty is in the country. The drift toward the city leads to degeneracy and disease; leads to more hospitals and more asylums. In inviting you here tonight we had a double purpose—to do you honor and to show you how good the products of your own fields are and how many of them are at their best 'first hand.' The world has grown too artificial in its matter of food. We neglect to get our food from its original sources. In two red apples there is 50 per cent more nourishment than there is in a pint of oysters. We take great pains to have our water free from typhoid germs and yet men eat oysters—who live on slime and are filled with typhoid germs. At a Masonic banquet a week or two ago, two men died and four may not recover, from the effects, I am told, of eating oysters. We are most inconsistent and unwise in our choice of foods. We do not use real 'horse-sense.'



Battle Creek Sanitarium, Where Annual Banquet Was Given

"There is nothing so welcome to a man as the news of how he can increase his efficiency. You farmers know that you study to get the most out of your land—to bring the best from your trees. You prune them, you fertilize them, you care for their beauty and their culture. Now, what you are doing for your trees we are trying to do for mankind—getting men in condition to do the best that is in them. The use of flesh foods greatly reduces efficiency—it is like throwing bolts and bars into a boiler—it chokes the fire. That is the reason that you find before you only the fruits of the field. We appreciate what you are doing to make the world healthier and happier."

J. H. Hale of Connecticut followed a humorous vein and told of incidents in the commissariat of the southern peach plantation, where the colored brethren demanded "hog and hominy."

W. W. Farnsworth of Ohio, a successful grower and shipper, drew an optimistic picture of the future of the horticulturist, if he but took advantage of the opportunities to improve that science, horticultural journals, government experimental stations and schools offered him. He called attention to the fact that shippers had too long neglected the art of packing the fruit attractively. "Follow the Battle Creek ideas and put your commodities up in attractive packages and you will have better results," was his advice. He paid a warm tribute to the profession of horticulture, saying it offered greater opportunities to develop mentally and morally than any other, that the workers should magnify their calling and place it on the pedestal where it belonged.

Herbert W. Collingwood, editor of the Rural New Yorker, recited an original poem, and told several pithy stories bearing upon the simple life.

Judge Wm. Prentiss of Chicago praised in glowing terms the field of horticulture, describing it as the "very poetry and music of farming and the highest and noblest of callings."

RESOLUTIONS.

Resolved, That we desire to express our appreciation and gratitude to the following: The Battle Creek Business Men's Association, who have cared for us so kindly and especially to their genial secretary, Mr. John I. Gibson, who has been untiring in his efforts for our comfort and entertainment. To the Michigan United Railroads and the Michigan Telephone Co. for business courtesies. To Dr. J. H. Kellogg and the Battle Creek Sanitarium Company, for the most excellent banquet and evening's entertainment. To the management of the Postum Cereal Co., for courtesies extended in conducting us through their model food plant. To the following gentlemen from sister states, who by their counsel and inspiration and very presence contributed greatly to the success of this meeting: H. W. Collingwood of Hope Farm, New Jersey; J. H. Hale of Connecticut and Georgia; W. W. Farnsworth of Ohio and Prof. U. P. Hedrick from the Geneva experiment station, New York.

Resolved, That this society use its influence towards securing a more liberal appropriation for the Michigan Agricultural College, for the salaries of the members of its faculty, that the present high standard of excellence may be maintained.

Resolved, That more attention be given to the advertising of our wares. Let us educate the people as to the value and importance of fruit as a part of their daily food, thus creating a greater demand for our products and also benefitting the people.

Resolved, That we appreciate the efforts of the Agricultural College in providing for the citizens of the state the splendid Short Course in Horticulture, and that we will assist in advertising the course and promoting attendance.

J. P. MUNSON, Kent County,
 F. P. SIMMONS, Wayne County,
 H. S. NEWTON, Oceana County,
 Committee.

CONTROLLING THE GRAPE ROT.

(PROF. L. R. TAFT, AGRICULTURAL COLLEGE.)

Although the disease known as the black rot of the grape did considerable harm in the southwestern part of Michigan some fifteen or twenty years ago, the injury greatly lessened and for ten years very little loss was experienced. During the last two or three years, however, the rot has reappeared, and in many vineyards located in the Lawton district the crop was practically ruined in 1905 and was even worse in the unsprayed vineyards in 1906 and in 1907. When it reappeared in 1905 it was found in comparatively few vineyards, but it developed in many others in 1906, and in 1907 very few vineyards within ten miles of Lawton escaped.

This disease is of a fungous nature and develops when in the presence of moisture. This accounts for the comparative immunity from the disease from 1892 to 1903, when the weather during the months of July and August was comparatively dry, and for the injury that has been experienced during the last three years, when the rain-fall in the section referred to was abnormally large.

Upon the leaves, the rot produces circular brown spots, generally from one-eighth to one-sixteenth of an inch in diameter. In the middle of the larger spots small black pimples after a time. The spots due to black rot can be readily distinguished from the brown spots caused by mildew, which have angular and irregular outlines. When black rot attacks the fruit the spots can be detected when of the size of a pin head. They are then of an olive green color. The spots quickly enlarge and gradually turn brown until the entire grape has become involved, when they change to a dull black and the grape soon shrivels and takes on a folded and wrinkled appearance. Later in the season, the entire surface becomes broken up into minute pustules, too small to be seen without a pocket lense. Each of these contain a number of sacs in which the spores carry the disease over the winter.

In the spring these spores escape and coming in contact with water upon the surface of a grape or grape leaf, they germinate, and entering the underlying tissues, produce a spot of black rot. Soon after these spots appear, numerous summer spores develop upon the surface and serve to spread the disease during the growing season.

The disease was very troublesome about twenty to twenty-five years ago in Missouri, Illinois, Indiana and Ohio, upon varieties of the Concord type, and as this was before much had been learned regarding spraying,

a very large proportion of the vines were torn out and grape growing was practically abandoned.

If during the next five years the weather in southwestern Michigan is similar to that experienced during the last three years, it can be stated positively that the grape crop will suffer even more than it has during the last year or two, as the disease will spread and apparently increase in virulence unless steps are taken by the grape growers to control it.

There is no occasion, however, for discouragement and it may even be found that the black rot of the grape will prove a blessing in disguise, to the vineyardist who gives his vines proper attention in the way of spraying, just as the San Jose scale has actually increased the net profits from orchards where it has appeared by forcing the owners to spray them. It would not be surprising if a continuance of the black rot would have a similar effect upon the net proceeds of the vineyards, if proper attention is paid to spraying. Benefits sufficient to more than equal the cost of spraying can be expected from both of the following causes: First, the spraying needed to control the black rot is the very best specific against mildew, anthracnose and other fungous diseases which not only seriously injure the grapes themselves, but by attacking the leaves, reduce the vigor of the vines and hence lessen their ability to produce fruit; second, it cannot be expected that every person will spray his vineyard and as the grapes upon unsprayed vines will be destroyed and the vines themselves will be dug out, if the loss continues for a series of years, the result will be a smaller crop of grapes and an increase in the price.

It is now about twenty-five years since it was discovered that copper sulphate was a sure specific against the black rot. This disease spreads from spores which winter over in the rotten grapes and leaves, and which germinate whenever they fall upon a drop of water upon a grape or grape leaf. If the foliage and fruit can be kept covered at all times with a thin film of copper sulphate, it will not be possible for the disease to get a foothold, and there will be no injury whatever from it.

From this it will be seen that it is only a question of spraying sufficiently often and thorough enough to keep the grapes covered. This is not theory, but is based upon the writer's experience with this disease more than twenty years ago in Missouri and upon experiments that have been carried on in various parts of Michigan for the last three years. The results thus obtained have, in every case, been substantiated by many grape growers who have practiced spraying under proper conditions. I venture to assert that every case of failure has been due to the lack of compliance with the condition mentioned above, which, as you will remember, was that the foliage and fruit be kept covered with copper sulphate continuously up to the time the fruit is harvested. While there has been a large amount of rot in vineyards that were sprayed from one to four times during the season, it is very certain that one of three mistakes were made. Either the material was not properly prepared, it was not applied at the proper intervals, or there was a lack of thoroughness in the applications.

MATERIALS FOR SPRAYING.

For the black rot of the grape, as for nearly all other fungous diseases there is no remedy equal to Bordeaux mixture, in its cheapness, efficiency and safety. For the earlier applications it will be well to use four pounds of copper sulphate, six pounds of stone lime and fifty gallons of water, or

4-6-50 formula, but after the first two sprayings a 3-5-50 formula can be used, and for use as late as August it will often be better to use a 2-3-50 formula, or to make use of soda Bordeaux mixture, which discolors the fruit less than the lime Bordeaux.

It is quite desirable to make use of stone lime rather than air-slaked or hydrated lime, as it remains in suspension better and has greater adhesive qualities. For these reasons, too, it is well to dilute both the lime and copper sulphate when mixing and to stir them well while they are being poured together. The addition of soap or glucose also tends to increase the adhesiveness of the mixture but has not made any marked difference in our experiments.

TIME OF APPLICATION.

No general rules can be given as to the time or the number of applications as both will vary in different seasons. The best way is to observe carefully the spray upon the vines and also the extent of the disease both in sprayed and unsprayed vineyards. To lessen the danger of infection care should be taken that none of the diseased grapes from the previous crop are left upon the vines after pruning, and it is a good plan to plow the vineyard before growth begins, taking pains to bury as much as possible of the leaves and rotten grapes upon the ground. From the fact that it can be done at a very slight expense, the spraying of the vines with a solution of copper sulphate (two pounds to fifty gallons), while the wood is still dormant is recommended. For this purpose the copper sulphate solution is better than the Bordeaux mixture as the latter has to undergo a chemical change to become soluble, before it forms an effectual fungicide.

The first regular spraying with Bordeaux mixture should be made just before the blossom buds open. If done at this time, it will be more effectual than if applied just after the growth has started. A second application of Bordeaux mixture should be given the vines after the fruit has set, when it is about the size of a small pea. As an insurance against the rot and as a remedy for the other fungous diseases, some of which are almost sure to attack the vines, it will always pay to make the above applications, but just how many additional applications can be given and the intervals that should elapse will depend almost entirely upon the climatic conditions and the prevalence of the disease. When the weather is wet and muggy, and particularly when the disease is quite troublesome in unsprayed vineyards, it will not be too much to make four more applications at intervals of about ten days. It will be well to spray once a week when there have been frequent heavy showers, although it might be possible to wait two weeks if the spray has not been washed off. This will make six applications of Bordeaux mixture and one of copper sulphate solution the maximum that is likely to be required, while three or four might answer in seasons when there is little rot. One should not make the mistake of waiting until the rot has appeared, as in many instances it has been found that failure to spray the vines just before the fruit sets may result in the loss of from twenty-five to fifty per cent of the crop.

THE IMPORTANCE OF THOROUGHNESS.

Even though the material is properly prepared, and applied as recommended above, the treatment will not be effectual unless the applications are sufficiently thorough to coat every grape and to keep the leaves covered. Thus,

if only one side of a grape is covered by the spray, it will be possible for the spores to germinate upon its surface and infect the grape. When one fruit in a cluster has been attacked it will require very thorough work to prevent its spread to the others that touch it upon various sides. Especially if the disease is troublesome, it is a good plan to spray the vineyard and then, as soon as one application has been made, to go over the vines a second time. If this is done, it will generally be possible to lengthen the time before the next application. In order to spray effectually, care should be taken that the growth is not too thick. When the vines are trained upon two wires, one above the other, it is well to have the lower wire about one-half way to the ground, and if many suckers are sent out from the vines, they should be rubbed off so as to keep the vines open. A little summer pruning just before spraying may also be necessary in order to open up the vines so that all of the clusters can be reached.

SPRAYING MACHINERY.

In order to spray vineyards cheaply and effectually, a good spraying rig should be used. While, if provided with proper rods, and nozzles, a barrel pump such as is used in orchards might answer for small vineyards, it will be better in the end to have a power vineyard spraying outfit. There are several that will do excellent work. A rig with a light gasoline engine can be used for this purpose, while vineyard sprayers made by E. C. Brown & Co. of Rochester, New York, the Spramotor Co., Buffalo, New York, the Wallace Machinery Co., of Champaign, Illinois, and the Niagara Gas Sprayer Co. of Middleport, New York, will, if properly handled, prove satisfactory.

From the extent to which the disease prevailed, especially in the Lawton district, last year, it is very evident that unless the season is less favorable for the rot than it has been during the past two or three years, and unless the matter is promptly taken up by the Michigan grape-growers, the crops in the sections where the disease has appeared will be of little value the coming year.

It will be possible to spray the vines properly at an expense of from \$5.00 to \$7.00 per acre, according to the number of applications required, and it is very sure that the benefit of the spraying will more than equal this sum in the freedom from other fungous diseases, to say nothing of the improved flavor of the grapes, even though the rot does not appear.

Last year the grapes in the vicinity of Lawton and Paw Paw were seriously injured by the late spring frosts and other causes, which resulted in greatly reducing the crop, but there were many vineyards which promised from fifty to seventy-five per cent of a crop, which were attacked by the rot and hardly a basket was picked from them. Had these vineyards been thoroughly sprayed, a good crop would have been insured, and at the prices at which grapes sold, the increased returns would have been sufficient to have paid for spraying the vineyards for twenty years.

While the price may not be as high in coming years, there is every reason to expect that next year and for several years to come, the virulence of the rot will increase and the only safe way is to spray. To the grape growers I will say that there is no middle course, "spray or surrender."

Mr. Farrand, Eaton Rapids: I recommend using the soda Bordeaux in the first stages of grape rot. I have used it, and it is a very strong fungicide. Soda Bordeaux, 5 ounces lime to 2 ounces copper; 1 pound of Babbitt's concentrated lye, or soda is what it is, and 3 pounds copper sulphate; 5

ounces of lime to 50 gallons of water. The soda Bordeaux I would recommend in preference to anything else for the last spraying of the grape, because it does not color the grape.

Pres. C. B. Cook: The next speaker is a man that needs no introduction in Michigan. He is a man we have known by reputation all our lives, many of us, and he comes to us as an authority on this subject, and so it is with a great deal of pleasure this morning we call upon Mr. J. H. Hale, of Connecticut, on the topic, "Replanting and Building up of Old Orchard Lands."

Q. I want to inquire if there is any way of controlling the rose bug about the grape?

Mr. Farrand: I have no way of controlling the rose bug only picking them off.

REPLANTING AND BUILDING UP OF OLD ORCHARD LANDS.

(J. H. HALE, CONNECTICUT.)

We tillers of the soil know and believe in the rotation of crops, and that the more thoroughly we can rotate the crops of a farm, the better results we will get. But orcharding and rotating the orchard with other crops is rather a difficult problem in one's lifetime, and we can't practice our best beliefs along agricultural lines in orcharding, for two reasons: One is, trees are of long life and require a long time use of the land to do their best; and the other perhaps as important reason is that not all our lands are suitable for orchard purposes; and when we find suitable orchard tracts, those are too valuable for orchard purposes to be given over to any other agricultural proposition, if we are in the orchard business ourselves.

I don't know why this subject was put up to me, except I am in trouble myself down home. I am in the peach business very largely, although I grow apples; and the yellows has been very destructive this past year, and I was gunning around the country to my various horticultural friends to know what they knew about replanting over orchards, where yellows had destroyed the peach trees, and because I asked some pertinent and impertinent questions along these lines, some of your Michiganders, or some of your ganders that have left and gone east, because we have got more geese down there, suggested this was a subject to talk on.

I know of no real good reason, if you are put right to it, why you can't grow any crop on any land continuously, because after we get off the rich virgin soils which are rich in all kinds of natural fertility, and where anything will grow without care, we are really manufacturers of agricultural products. The land is in a large measure the empty factory, with some of the raw material there, and what we take out of that factory must and will always depend largely upon what we put in in the way of seeds and plants and raw material and well directed labor; and, believing that to be so, I have always felt in my agricultural operations, and it has grown more strongly upon me as I have handled the soil more, that we could continuously crop the land with any particular crop if we would furnish the necessary elements that that crop took out of it. It might be better to rotate, but we could stay there with only one crop if we must. I have been planting some of our most

available orchard lands in the east, were old apple orchards in my boyhood days, and I have helped remove those apple orchards and replanted the same land immediately, or within a year or two, with peaches and pears and plums and apples, and the only serious difficulty that I have found are that there is some root rot that may disease your young trees when you first plant them, and there is always some slight danger of aphid. I have been "skeery" of the yellows. I know the secretary shakes his head; and you people up here in Michigan think you can plant right over again where a case of yellows has come out; but I have always been a little skeery of it, and I have had good reason to be. Upon the whole, taking all our fruits together, I have planted a good many acres—perhaps a hundred or more—where there have been various orchards taken out, and I have had my troubles; but, with the exception of yellows, I have not found it impossible to make a good orchard, and usually a better one than the old one. I would not want to put my best friend right back into a bed where we had taken out a dead smallpox patient; but I believe the room and the bed and everything can be so purified that that bed is healthful to sleep in again; but I think it wants care and caution, and every known remedy to be applied that will make healthy conditions. So about lands. Where we have had old trees or diseased trees or trees taken out from any cause, I would want to aerate that land; I would like to plough it two or three times, at every season I could; and I would subsoil it, if it is land that can be subsoiled; and I would want to add some organic matter to it by ploughing under of green crops and leavening up the land. If the land is fit to open up in winter so you can plough in winter, in February or early March, if I can get on there and turn it up again—I am a great believer in frequent turning of the land and purifying the roots by freezing; and it seems to me a purifying of the land is one of the essentials. One of my best peach orchards in Connecticut was upon a hilltop where we had had an apple orchard; nobody knows how old the apple orchard was. They were vigorous trees, but they had got away up yonder; they were trees too high to be handled economically according to modern methods, and they were of mixed and uncertain varieties. Those trees were taken out root and branch one fall. The land was ploughed and subsoiled thoroughly that fall, and it was again ploughed in spring. In midsummer it was ploughed again and sowed with cow peas. I perhaps was one of the very first men in the north to grow the southern cow pea. That was more than twenty-five years ago, and a heavy coating of cow peas were grown there. After the frost had killed them in the fall, the land was ploughed and seeded to rye; and in the spring when the rye was a foot or more high it was turned under again and the land sowed to clover, a good crop of clover grown, and ploughed under in the spring; and then, with a good application of chemical fertilizers, that land was planted to peaches; and I never had a more vigorous or healthy growth of trees; and it is just going out now at 18 and 19 years of age, and has been a healthful profitable orchard. But that was one kind of fruit following another. On another strip of land near by, where there had been an old peach orchard, and some native seedling trees; some eight or ten acres of those peaches interplanted with the apples: They were all taken out and the land treated much in the same way as the former old apple orchard, except there were two crops of clover instead of one, and no cow peas, and I have built up a most successful orchard there. Whether it is in spite of there having been a previous crop of orchard trees, or on account of better preparation, I don't know.

The fellow that has failed in developing the good orchard out of where there was an old one, is the one who knows where the difficulties and troubles are; and the fellow who has gone on and won, thinks he knows it all, and doesn't let you into the real truth of the game. And it takes a good many experiences and failures, and there are a whole lot of you in Michigan and in the east that are wanting to know what to do.

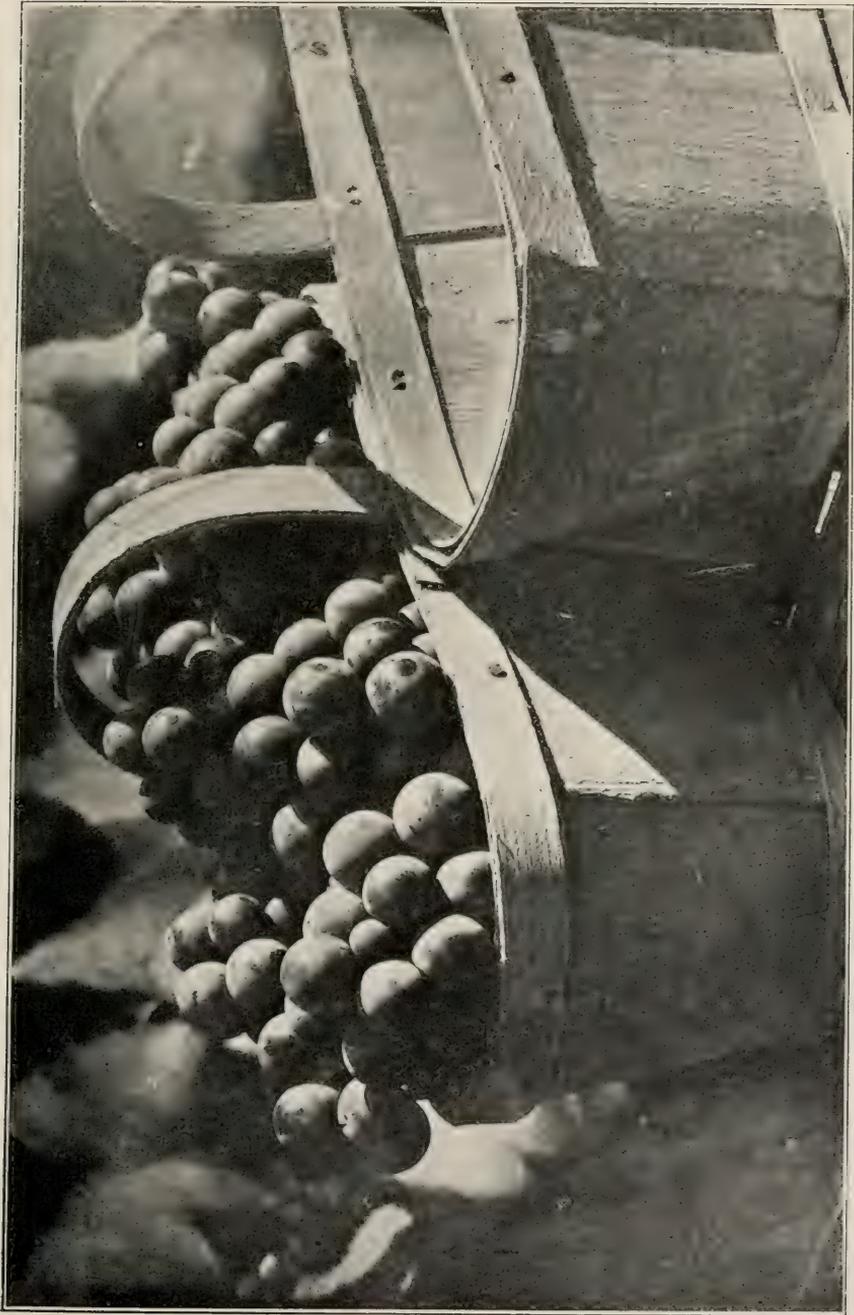
I have had experience in Georgia. My first hopefulness was inspired perhaps by a German neighbor in Georgia, who had one of the finest orchards I knew of down there twenty years ago, and it finally failed in various ways; there was a good many missing trees. He pulled out the trees, ploughed the land, subsoiled it, put on a crop of cow peas, and immediately planted it to peaches, and has made as fine an orchard as you will find anywhere in the South. He had sold the place; it was infested with San Jose scales; the trees nearly dead; the new owner concluded he better pull them out, and he did, and sowed a crop of cow peas there during the summer; the following winter they were replanted. He now has a splendid orchard. The third on the same land in 20 years.

So that in my own orchard in Georgia, I have taken up some 300 or 400 acres of orchards at 15 or 16 years of age, and have replanted the land. Some of them are now two and three years of age, and are coming along superbly. If you just plow the land over to stir up the subsoil and are not particular in getting the roots down into the new soil, there is not as quick a start as on new land. It does pay to give a little extra care and a little extra feeding to the trees—nitrogenous manure—and I find nothing better than nitrate of soda to stimulate a quick start. Once get a young tree started, and I have had no difficulty in growing a healthy apple or peach or plum where other trees had been before, except in the case of the yellows. I have had trouble with that, and I am out here to have you help me. I have written to some of you Michigan men, and I want some of you to help me. I need help to know how to grow a healthy peach tree on any land once infested by yellows.

I had an orchard some ten years ago—possibly ten, I won't be accurate as to the years, but ten or twelve, infested with the yellows so that perhaps 30 per cent of the trees had died, and it seemed best to pull the whole orchard. I pulled it out clean right after fruiting time in late September, and ploughed the land; in December I cross-ploughed it again. It happened to be an open winter—it was rather a gravelly or sandy piece of ground—and I was able to plough it again in February, and ploughing it deeper; in spring the land was again ploughed and a crop of corn planted thereon. In the meantime I had talked with some of you Michigan people, who said, "Certainly you can plant right over where you have had the yellows." So after being out of trees only one year I planted it with peaches; the trees grew vigorously and well. I planted on an adjoining new land half a mile away some of the same trees from the same nursery row. In two years these trees planted on the old yellows ground began to show signs of yellows; and we had to pull them out, and 90 per cent were actually gone with the yellows; and not a sign of yellows on the trees planted on the new land half a mile away. That made me sit up and take notice, either the conditions were absolutely different in Connecticut than in Michigan, or else you Michigan people were fooling me. I knew the trees were not. I kept that land free of fruit crops for four years, ploughing it always twice a year; ploughing under green crops, and growing various other farm products on the land, manuring it liberally with commercial fertilizers and with stable manure;



Grape Harvest in Vineyard of W. K. Munson, Grand Rapids
Baskets are without covers for local market. Good measure and uniformity guaranteed



Fancy Concord Grapes From "Vincroft Farm", W. K. Munson, Prop., Grand Rapids
Warranted same, top to bottom. Quality counts, especially in the home market

and four or five years ago I planted it again with peaches, and planted another lot of the same trees on another farm forty miles away. This last fall I have had to take out every one of those trees with the yellows. Now I don't know. I don't know what is the matter. Is it because there are some trees with yellows half a mile away that are doing that? Or is it something of yellows in the soil? Dare I plant that land over again? I am here to ask questions and to get advice, rather than to give it. It is a serious proposition. I have a large tract of orchard land—this original apple orchard that was made from the apple orchard into a peach orchard, that was taken out with yellows a year ago. The land in the fall of 1906 was ploughed thoroughly and well, and this spring it was ploughed again and sowed with cow peas and clover together; the cow peas have died down by frost, and the clover is a heavy mat upon the land. I expect to plough it next spring. The land would be worth a thousand dollars an acre to me if I dared plant it with peaches this coming spring, but I dare not. I have another tract of 22 acres, which I seeded with clover in the fall, and in the spring ploughed under again and has had cow peas the past summer, and it is in superb shape for replanting. I wouldn't mind planting apples or plums or pears there but I want to plant it to peaches; it is valuable peach land to me. Dare I do it? You Michigan men say yes.

I have taken up a new piece of land and planted it with trees and had them all go with yellows at the second and third and fourth years, when the same trees, away from what I call poisoned land, were healthy, and they are healthy yet. What shall I do about it? I don't know.

The large hill had been a peach orchard for eighteen years; and finally, many of the trees having gone out from yellows, a new piece of ground low down, which never had had peaches before, was planted with peaches. I don't know whether there was any wash from that land. It is the only thing I can conceive of that would bring the poison down there. Or is there any poison in the soil? My friend, your secretary, says no. I don't know. You see I am here asking questions.

I believe there is no trouble in getting fertility enough in any land to grow new orchards following old ones. No question about that. No question about getting the organic matter by growing green crops. No question about the aphid there; by liberal use of nitrate of soda you can grow roots enough to get away from those and get roots down away from them so you may get healthy trees. I haven't any doubt but you can grow strong, vigorous orchard trees of any variety on any land where you have taken out trees, whether they have been ten or twenty or a hundred years, or older. There is no trouble whatever. That is my experience. The only doubt in my mind is in regard to keeping free of yellows when once it has been in that soil.

I am a great believer in commercial fertilizer. Yes, I think I know, if I know anything; but my neighbors are in doubt about that, and I agree with my neighbors in some things. But I believe commercial fertilizers are the life and the hope of agricultural prosperity. I believe they are better for most of our trees and plants and vines than the stable manures. I believe what organic matter we want in our soils—and we do want it—can best be got there by the growing of green crops. And I think one of the great mistakes of every horticulturist, of every tiller of the soil, is that he does not keep more of the leguminous crops growing on his land. I believe all of us who have taken up land in this God-given country of ours ought to leave every acre of it better than we found it. It can be steadily im-

proving easily with the leguminous crops and chemicals that are given to us. I believe in subsoiling whenever and wherever it can be practiced; and yet in some soils it cannot be done; and in some gravelly, sandy subsoils, it would be of no value. But in building up a new orchard the one thing to be sought is to get a quick jump on the tree the first season it is put in the land. If you don't get a good *go* to your tree the first season, pull it up and start over again, or don't start there. Don't hope for any later growth to make up for the lost first year. Get it the first season sure. In the first place, make up your mind you are going to get it, but get it sure, without any question whatever.

After all, nearly all these problems are summed up in one of Kipling's poems:

"Things never yet created things:
Once on a time there was a man."

He might have added, "or a woman." But somebody must be back of the job. It is the man that has faith in the soil, faith in the trees and plants he handles, faith in his God, and faith in himself, that wins out when the other fellow will fail nine times out of ten.

DISCUSSION.

Mr. Charles Wilde: I would like to ask how you apply the nitrate of soda? On the surface? And at what times?

Mr. Hale: In any ploughed land I always apply a little in the spring soon after planting time, on the surface; hoe it in, work it in. Only a little at a time as nitrate of soda is wonderfully rich and powerful.

Mr. Charles Wilde: How much to a tree?

Mr. Hale: Not over a quarter of a pound at any one application to a newly planted tree. You would supply this perhaps the first of May or the middle of May in this latitude, and again the middle of June, and again by the first of August; and if there is any *go* in the tree it will show it, and it will show it after the first year also. I have been astonished at the results of using nitrate of soda after the first year. It is supposed by many if you don't get it in in a few minutes it is gone forever but this is a mistake.

Mr. Hutchins: Do you have any difficulty with winter killing with that kind of growth?

Mr. Hale: Well, I didn't say that kind of growth—I said good vigorous growth. We had one freeze in the fall a number of years ago that nipped a good many fruit trees that were growing liberally, and we have had one winter perhaps in the last 20 years—34 below zero we had one year; and our most vigorous young trees were injured then, although none of them were killed entirely. I don't like to stimulate the growth of a tree much after the first of August. Let it grow and mature then through August, September and October. But there are so many more trees die from lack of growth than from over growth, that you don't need to be very much scared about winter killing.

Q. I would like to ask in connection with what Mr. Hale has said about jerking out of the young tree that did not get a good start, if he pulls out all those that get injured during the summer by the instruments of cultivation? If they get a bad scar on one side, do you take that out and replant it next year, after the first year's growth?

Mr. Hale: I want to assume that instruments of cultivation are not

instruments of torture. I am as careless as you are, and my men are a good deal like the rest of you. If a tree is scarred, we keep watch of the trees scarred, and go right along and cut with a good sharp knife the rough bark and paint them over immediately. That is the rule. And ordinarily you can scar a tree or a human heart everlasting, and if you treat it well afterwards it will heal up and things go along pretty well. (Applause.)

Mr. Greening: Of course, Mr. Hale, you make some exceptions to a poor growing season, don't you? For instance, like this year? We have had a very poor growing season in the north, and I think the condition has prevailed likewise everywhere in the world, and the trees that were planted last spring have no doubt made the poorest growth this year of any known in the history of the nursery business.

Mr. Hale: I suppose that is a sort of nurseryman's plea for his trees not doing as well as they ought to. I sympathize with you, Brother Greening. I have been there myself. But this is no joke. Why of course, conditions of the season, you have got to judge by the conditions of the season; but a poor growing tree that is poorer than the rest in a poor growing season is one that ought to be taken out. And yet if a tree makes a very poor start even on account of the season, it is many times better to invest another dollar with the nurseryman. You see that will help your business along. I suggest you let him pull them out. If you don't get a tree or a calf or a boy started right, right down from the ground floor, it is hard to lick them into shape. And so I am emphatic on start.

Mr. Van Wagoner: A tree that is partially winter-killed, is it advisable to replant?

Mr. Hale: What do you mean by partially winter-killed?

Mr. Van Wagoner: The limbs frozen back. The body is all right.

Mr. Hale: If the body and roots are all right, make a new top. Don't bother about that.

Mr. Greening: This question of filling up the soil and renovating the soil in old orchards is one of greater importance than I believe we can possibly appreciate. During the time I attended the fair at Benton Harbor this fall I had many of the fruit growers come to me rather discouraged along the lines of planting new orchards where the old ones had died out. One gentleman told me that he had planted last spring a number of thousand peach trees, and a portion of these were planted where an old orchard had stood, and the balance of it lapped over on to soil that had not been used for orchard purposes before. The trees on the ground where the old orchard was nearly all died, and the trees on the new ground, with very few exceptions, all lived, although he told me that more than 95 per cent of the trees had lived and made a good growth while the others had died. I asked him what was the trouble, and he explained to me that he thought it was the aphid.

Now I believe that soil from which old orchards have been taken must have time to recuperate. I believe that soil should have rest at least for two or three years, that green crops should be ploughed under; and I know no better experience along that line than one I had myself on my own grounds at home. Now a tree will take a certain fertilizing element out of the soil that no other plant will take up, and what it takes out has been a puzzle to me. For instance, a crop of apple trees grown, followed up with a crop of pear trees—I am speaking now of nursery work—with an interval of one year, during which time we ploughed under a new crop of cow peas, then again followed up with a crop of cherry trees, we found that the soil had been badly impoverished. Instead of our letting the land lie two years

and ploughing under for two years in succession such crops as Canadian peas and cow peas, this land had been fertilized with stockyard manure, and heavily too; but for some reason we were unable to deposit in that soil the element that was taken up. Consequently I am of the opinion that soil should have some rest. This question is one that is very important, for the reason that we have had the period of orcharding here in Michigan so that the soil has been actually impoverished to some extent, and the way to build it up is a question that I can't answer, and a question that is very important at the present time. I believe that conditions are different here than they are with Mr. Hale. I think that our climate is different, and the consistency of our soil is different; but what needs to be done to build up this land is a question to me, unless it is, as Mr. Hale says, using green crops and letting the soil rest.

Mr. Benton Gebhart: I would like to ask Mr. Hale whether he has used the potash and phosphoric acid freely the first or second year in replanting those peach orchards where old orchards have been taken out with the yellows? I have practiced this method of fertilizing heavily with hard wood ashes and we made a success in planting right in. I have orchards now of four to five years of age, and trees planted where there were 30 to 50 trees went out in a year on an acre, and I have not discovered a single case of the yellows.

I have also used liberally of both potash and phosphoric acid in all my planting.

Mr. Hale: I am glad to hear you say that. It gives me hope. Whether it gives me faith or not I don't know. I have always been a liberal feeder of potash.

Mr. Halstead: How deep were they plowed?

Mr. Hale: Every one thinks he plows deeper than he does. A man who thinks he ploughs 8 inches deep usually gets about 5. I think that we plough about 8 inches deep, and subsoil about 8 inches more; twice 8 would be 16, and I guess about 11 or 12 inches, to get right at actual facts. When you have broken up your ground 12 inches deep you have done so much better than the rest of us do that you better be satisfied I think. We try to do a good deal more than that, but I don't think we ever get as low as we think we do. Perhaps we better call it a foot.

Mr. Munson: I would like to ask Mr. Hale if he has ever had any trouble with the aphid in planting trees soon after an old orchard?

Mr. Hale: Oh, yes, we always have the aphid; but by a liberal use of nitrate of soda, stimulating the trees to the very rapid growths, the roots run away from them. I think you can find aphid on the roots of young trees in any old land.

Mr. Munson: Has any one here tried the using of tobacco dust in that? And how much, if they have? I have had more trouble with the aphid than anything else in planting over old land.

Mr. Hale: Using tobacco dust or tobacco stems from the tobacco factory is one of the choicest fertilizers you can get. Our tobacco men in the Connecticut Valley buy it by the hundreds of tons and use it as their choicest fertilizer. It is the best form of potash they can get. It won't hurt the roots, and it stimulates the tree.

Q. Do you put that right next to the roots?

Mr. Hale: Oh, yes, if in fear of aphid.

Mr. Munson: Have you ever tried nitrate of soda on nursery trees?

Mr. Hale: Certainly and always with success.

Mr. Munson; Have you seen any good results? Our soil is a heavy soil. Have you ever tried it on heavy soil?

Mr. Hale: On all soils. I never saw a place where nitrate of soda would not make trees grow. The trouble is, it often grows them too big and luxurious. It grows them almost too fast and should only be applied early in the season.

Mr. Greening: We made a practical test. Took a number of rows, using nitrate of soda and working it in. On some of the rows we did not use it, and we couldn't see the difference. The trees were just as big as ever. There was a good crop of trees.

Mr. Hale: You had fine trees anyway?

Mr. Greening: Yes. How much would you use?

Mr. Hale: Our nursery trees we have used 100 pounds at an application, and given sometimes three or four applications in a coarse growing season; but 200 to 400 pounds is an enormous application per acre.

Q. You follow it up several times, do you?

Mr. Hale: Oh, yes. You don't want to put it all on at once.

Q. Do you make this application all over the ground?

Mr. Hale: Just immediately around the tree the first year. After the first year, broadcast, on everything. The first year, around the tree.

"AFTER," IN THE FROZEN DISTRICT.

(SUPT. F. A. WILKEN, SOUTH HAVEN EXPERIMENT STATION.)

From the title of the subject you might think this is a talk on Alaska or some place like that, but it is only a crude talk on the case of freeze-out we got along the lake shore last year. The freeze came the 10th of October, and it has temporarily hit us pretty hard. It has killed most of the peach trees and Japanese plums and pears, especially pears and apples, especially in the low places where they made a strong growth; and it has killed back most of the small fruits. As a result of that, our farms there are being left, and the transportation companies have shortened their accommodations and cut their seasons short. But outside of the temporary embarrassment, I think the ultimate result of this freeze will be good.

The freeze itself has of course given us lessons. There is never anything that happens that does not give a lesson; and it has impressed upon us some important things that have been spoken on already. The main thing it impressed upon us was the importance of location for peach orchards. The only orchards that were left untouched by the freeze were those in the most desirable locations, and they were on the northwest slope, and generally were the highest point between them and the lake. Where there has been an elevation higher than any have been the trees were more seriously damaged.

Another thing, the importance of fertilizers, was impressed upon us by the freeze. Trees that did not receive enough fertilizer of course were killed, where their stronger brothers were left untouched. Very often we saw in the same neighborhood, in almost the same conditions, with just better care in the way of fertilizing—one orchard would be in good condition and the other would be killed. The stronger trees could stand the effect of the freeze better. Too many, it is known that when they do fertilize,

use only barnyard manure. It will tend to make the tree grow to wood too much; and it is considered best to add a little muriate of potash and phosphoric acid. The barnyard manure makes the tree grow too strong and prevents it from hardening up. Trees of that kind were some of those most seriously attacked.

It was especially noticed that pears and apples that were on lower ground that was rich in nitrogen made a good growth, probably a little over the average. Many of the pear trees that were on somewhat low ground, leaved out well in spring, and were apparently in good condition as far as external appearances were concerned, but toward the end of summer the leaves had reddened long before it was time for the fall coloring, and in a short time the whole orchard would be colored. I have seen whole orchard's leaves just as red as they could be; and upon examination the head of the tree would be in good condition, but just above the snow line (we had about six inches of snow) the bark was girdled with a band of sap wood as black as coal, and the tree was literally choking to death.

Japanese and European plums were also affected that way. Japanese plums were most all killed, except in good locations.

A hedge on the northwest was of great benefit during this freeze. Where orchards had protection from the northwest, many of them were saved. This was especially noticed at our station, where we had hardly any trees killed except a few of the peaches. The younger peaches were killed. Japanese plums were saved, with the exception of Red June and the Satsuma. The Abundance seemed to stand the freeze better than any of the others.

One peculiar thing at the station about the freeze was that the Pecan which is a southern tree and grows well with us, but never bears as it is probably too far north, it came through the freeze in good condition. The Japanese Walnut did not do as well, although it always bears well, its entire top was killed. It seemed peculiar that a southern tree should stand the freeze, while the Japanese Walnut should be killed back.

The small fruits are only temporarily disabled. Most of the raspberry plantations were cut back and are in good condition for next year's crops. The gooseberries and currants were treated likewise and will be in good condition. The grapes are most all frozen back to the snow line; I have seen too many cases where they were neglected and the sprouts allowed to come at the bottom without any care at all. The trunk should have been cut back to the snow line and the sprouts allowed to come out and all but the stronger sprouts cut off after they had started well. The side shoots of this remaining shoot were cut off so as to give it all the opportunity to grow up to the wires again; and after it has grown long enough it should be tied up.

It seems to me the effect of the freeze in general, the good effect, the ultimate effect, will be that it will rid us of a lot of the real estate orchards that have been set down on the low land and anywhere regardless of location to sell. The country was boomed as a peach belt and people put peach orchards everywhere in this belt. Strangers would come from the city and other places who did not know very much about fruit growing nor where a peach orchard should belong, and they would find them most generally where they ought not to have been. The good ones were generally held on to; the others were sold; and it hurts the reputation of a country to have orchards like that, to have people come in and make bad work of an orchard, to give it poor care. It makes a slovenly looking place. But I believe the ultimate effect of this freeze will be to wipe out these localities. It will diversify

the crops. There will be less peaches and people will go into small fruits and apples more. The peach trees will be kept in the locations for the best peach ground, the high ones with the west and northwest slope. The slope is very important I have noticed. I have seen some places where the slope was just slightly to the east on one side of the road, and on the other side the slope was to the west; that on the west had a crop probably three times as often as the one on the eastern slope, and the slope was not very great either. The matter of location cannot be too thoroughly impressed upon the fruit growers in the lake shore district.

Fertilizer: It is good to start your trees fast, but, as I said before, too many use only barnyard manure or clover crop and turn it under. I have seen trees, especially peaches, treated that way with clover and barnyard manure that would grow so fast that every spring they would have two-thirds or three-fourths of their growth killed back, and later the bark would crack and the tree would be in poor shape and be subject to yellows and other diseases.

It is folly to think that the freeze killed all the scale, or nearly all of it, It has killed it on the trees that were killed, of course, and a great portion of it on the other trees; but there is plenty of scale left; and it is folly for township boards to prevent their commissioners from making a general inspection of the orchards. Now, I think, is the principal time to make a good inspection of the territory, while the scale has been checked some, and to get the growers to spray.

The freeze in one way has given us the benefit by killing the scale. The scale was getting rather serious. There around South Haven about 90 per cent of the trees were infested. Now it will give the growers a chance to get ahead of it. It may in time be the same as before, as probably a great many will not spray. But it is hoped that the sluggard, the lazy man, will be kept out in the new order of things. Then the scale can be kept in check and the fruit belt be better than ever. (Applause.)

The President: Mr. Wilken has put this subject well before us. Probably our eastern brother here has learned more along this line than almost anybody else, so I am going to ask him to give us a little of his experience.

Mr. Hale: I don't know, Mr. President, what special experience you refer to. I have had so many of them; with the southern negroes that they all look sort of nice to me now.

The freeze in Georgia in 1899, the middle of February, after our trees were in bloom and we had had a temperature of 80 degrees for more than two weeks, at the warmest part of each day—came a freeze and they dropped down to four below zero. I was north at the time, but as soon as I could pack my grip (perhaps ten minutes) I started for Georgia. Arrived down there next day, and everybody was mourning the loss of the fruit crop. That didn't worry me at all, because I knew it wasn't but 365 days until next year; but the trees did worry me a good deal, and I made examinations and found the tops were practically all dead or dying, would die; that on only the northeast side of the tree was there any live bark or any that showed much of any life—a little strip on the northeast side of the trees. It looked as though the trees were absolutely gone, but I thought it was worth trying, and I got every pair of pruning shears and saws on the place, and telegraphed to Philadelphia for a lot more, and in a few days I had sixty men in there among the tops of the trees taking the tops all off except where there was a branch occasionally that showed chances of life. We left some little bit of the top and started pulling out the brush; in the meantime, about two

hours after this topping had begun, I was driving down one of the avenues of the orchard, and a negro, who had formerly been a slave on the place and had never been off it, one of our best and most faithful men, stepped out on the avenue and stopped me. He says, "Cap'n, I'se powahful sorry for you for this loss. You know, Cap'n, I'se here when you put dem fust little sticks in the ground." He says, "I remember when you fust planted dem fust little sticks in the ground, an' foh five yeahs we see de money comin' out dat winder eb'ry Sat'day night. De Lawd know where it come from; but it comes fum somewhere. Den you get some good crops, and you go 'long, and eb'rybody prosperous; and den dere come dis great frost. I thought it was bad 'nuff when yo' done lose de crop; but now I see yo' done lose de trees; cut se tops all off. I'se ben talking to de boys 'bout it. We'se sorry for yo'. We don't wanter go off dis place. I'se talked it over with de boys, and we all wants to hab yo' lower our wages one-half, and we'll stay with yo' 'till dis orchard comes into bearing again."

Think of men, getting 60 and 75 cents a day, coming and voluntarily offering to cut their wages in two because they were sorry for you! That is sympathy that wins. And I said to the man then, "There will be never any lowering of wages. That sort of spirit will make these trees live. They have just got to live and pay these wages, so cheer up and keep at work."

We took out the brush; and put on fertilizers; and we shook up the orchard with culture as it was never shook up before, big new tops were grown on those old butts in one summer and the next year's crop was the largest and most profitable we ever had, and I tell you that old colored man's spirit and the loyal help of all those helpers had a lot to do with it. The Creator of all good things never goes back on work of that sort.

Q. What is the best treatment for young apple orchards, that were killed to the ground in the October, 1906, freeze, and have thrown up from one to eight sprouts above the graft? Will it pay to leave a young tree that is dead one-half way around the body?

Prof. Fletcher: It will depend, I suppose, upon the age of the trees in the first place, and also upon how seriously they have been injured. I cannot tell you—Mr. Hale wouldn't want to tell you I know, whether it would or would not pay. But we can say this, that the older the trees are the less likely it is it would pay to keep them. To make an off-hand guess. I should give it as my opinion, only as my opinion, that trees over two years planting, which have been injured as seriously as this states, and which had thrown up these suckers, it would not pay to keep. But if the trees had been only planted one or two years, and one of those sprouts above the graft was stalwart and smooth and promising, it might pay to keep them. But the weight of my opinion would be strongly in favor of getting new trees and starting from the ground up. Trees cost little; a few dollars an acre buys them. The care and attention you give the trees costs ever so much more. So one would be reasonably safe, I think, in saying that it would almost pay to get new trees.

Q. Would it pay to leave a young tree that is dead one-half way around the body?

Prof. Fletcher: I don't think it would. I am pretty safe in saying it would not. If there is a small wound around the body, that can be healed up; but any injury like a freeze extending over any length of the body, half-way of it, I would not think it would pay to keep the tree. In other words, I think that you should err, if you err at all, on the side of getting new trees, because trees weakened by the freeze as seriously as these seem to

be from the question, there is always a great doubt as to whether they will recover. I rather take the chances on young trees. If Mr. Hale does not agree with that, I would like to hear his opinion.

Mr. Hale: My opinion is that you gave a most excellent opinion, a good answer. The only thought that came to me was, these trees that had sprouted away down to the ground, if they were perfectly healthy bodied, were lower down than we would start in any other way; and if the body which they sprouted from was absolutely sound and whole, and they were all right, I would leave some of them for a few low-headed trees or bushes, as we have got to have in our apple orchards in the future. We are going to eliminate the trunks of apple trees anyway when we get on to our job; and if nature has made a start, I think I would try a few of those trees that way.

Mr. Simmons: Five years ago this last fall I had a tract of about 28½ acres I wished to set to apples. I could only get one-half of it ready, and I set that half in the fall, and I had splendid success with the trees. Next summer they all lived and made a splendid growth. Next fall I said, "I will set the remainder of the apples in that orchard and have the work out of the way before spring." So I set those trees, banked them up 16 or 18 inches all the way round. We had quite a hard winter that winter, and it killed almost all those trees right down to the bank; they sprouted up next summer. Of course I let them alone next spring; I didn't do anything to them. They sprouted up all of them nearly after taking the banking away, but they didn't look good to me. That fall I took them all up, reploughed the ground (I left a few), and next spring I reset that orchard, the half that didn't live. Every one of those few trees which I left are black-hearted that died from the freeze. It is not safe, in my opinion, to leave any trees that have been killed, up to one or two years of age, with the expectation of getting anything of any value out of them.

BORDEAUX INJURY OF THE APPLE.

(PROF. U. P. HEDRICK, GENEVA, NEW YORK.)

Mr. President, Ladies and Gentlemen: It is indeed a pleasure to meet with the Michigan State Horticultural Society again, for it has been three years since I last saw the members of this society in session. I have been out of the State for that time, but have not lost track of the horticultural industry in Michigan.

I have heard with great pleasure some of the successes and many regrets of the great disaster last year in your peach region. I only trust you are still of good heart, and the losses caused by the great freeze will in time be repaired.

In leaving New York a few days ago I saw the president of the Western New York Horticultural Society, Mr. Berry, and he wished me to bring to this society from the Western New York Society the heartiest greetings, and this I do with great pleasure.

I am sure you will all be glad to know that fruit growers in New York have had a splendid season, that the apple crop has been an enormous one, that the prices have been the very best, and that in all respects the fruit growers of New York are in good spirits. It was my pleasure to attend a

fruit growers' banquet—the Orleans County Fruit Growers' Banquet—a few months ago, at which there were nearly two thousand fruit growers present. Some came in automobiles and fine carriages, and they were all happy and pleased and in good spirits; as I talked with them I found many of them had anywhere from 1,000 to 10,000 barrels of apples at \$3 and \$4 a barrel, with peaches and plums and other fruit this year; they were rolling in wealth. It made me want to become an actual fruit grower; and I am sure you who have gone through some of these prosperous fruit seasons in Michigan in times past can rejoice with these New Yorkers who are rejoicing in a prosperous season this year.

Your secretary has asked me to talk this afternoon on Bordeaux injury. It is not a subject that appeals to me, and I am afraid it is not going to appeal to you here, because there is nothing constructive about it; it is, in a way, sort of destructive; and besides, it is simply technical; and so I ask you to bear with me for a brief period while I discuss this matter of Bordeaux injury.

You have been hearing so much about so many good things about Bordeaux mixture and the necessity of spraying and the relative value of Bordeaux mixture and any other spraying solution that can be used, that I suppose it is a matter of some surprise, and it is a matter of regret to all to know that Bordeaux mixture is capable at times of doing considerable injury. It is not to be wondered at, however; it is only 15 or 20 years since we began spraying at all, and we know comparatively little about the effects of mixtures that we have to use upon fruit; and there are a good many minor details that have never been worked out. When you come to think we scarcely know what the chemical composition of Bordeaux mixture is, and that it changes with weather conditions and the manner in which it is made, and all that, it is not to be wondered at that varying conditions may and do cause some injury.

Then, too, when we first began the use of the Bordeaux mixture there was some doubt as to whether it would do any good, and with most fruit growers a lick and a promise was sufficient, and a dash of Bordeaux mixture was all that the trees got, and there wasn't much chance for injury in the early days of spraying; but as time went on and fruit growers began to see that they could control the fungi of the various fruits by the application of Bordeaux mixture, they began to put it on rather more plentifully, and with the advent of the power sprayers and the greater use of this and other mixtures, some injury began to show from the too great use of this mixture in particular.

From the very first, from the first workers, the first man to demonstrate the value of Bordeaux mixture noted some slight injuries that came from it on certain fruits. For instance, it has never been possible to spray peaches with any great degree of safety; it has never been possible to spray Japanese plums with safety; and there have always been some injuries on sweet cherries and on the quince; and some slight injuries have been noted by all workers on apples and pears; but seemingly within the last five years the injury has become very considerable. My attention was called to it about six years ago when spraying at the Michigan Agricultural College, and I began some experiments there to determine just what Bordeaux mixture or spray injury is, and how it can be prevented. The experiments were not carried on largely, however, and I could arrive at no definite conclusions as to what caused the injury, nor how it could be prevented. Upon going to Geneva in Western New York two years ago last August I found that was one of the things worrying the apple grower more than any other one thing. A

canvass of the state undertaken that fall showed about 70 per cent of the men who had sprayed, while they had controlled scabs, had injured their fruit, some so greatly that they refused to spray with Bordeaux mixture; they preferred to run the risk of injury from apple scab and other fungi rather than to use the Bordeaux mixture. We began the next year a set of experiments to determine whether or not this mixture could be used without injury, and under what conditions the injury did most damage. Before that, however, I undertook a complete survey of the whole subject. I wrote to several hundred apple growers in New York asking to have their experience. I wrote to the horticulturists in every experiment station in the United States; I corresponded with men near the coast of Europe where apples are grown; I wrote to the Japanese; I wrote to New Zealand, and everywhere where Bordeaux mixture has ever been used, asking for the experience in the use of this mixture. I thought by thus taking a broad survey of the subject I might obtain some clews as to what the conditions at least were under which trees suffered most; and from this survey I did obtain clews, starting points which were invaluable in planning the experiments which we undertook last year.

Before I go further, I suppose I may as well briefly describe this injury that occurs to apples, not mentioning that which occurs to other fruits, for it is the apple we are most concerned with; there may be some here who have not observed it. On the fruit of the apple it first manifests itself early in the season as small black dots, sometimes brownish dots, on the sprayed surface of the fruit; that is, part of the fruit that you see is most sprayed; as the season goes on, these spots multiply; when the fruits are half-grown the spots begin to coalesce and run together; the cells of the epidermis of the apple split and the fruit becomes badly russeted, and sometimes much malformed and greatly reduced in size, and the general appearance of the badly injured specimens is that of a cracked-open Flemish Beauty pear that we so often see when badly affected with the scab that attacks the pear and the apple. The fruit is not only reduced in size and malformed, and thus injured in appearance, but its keeping quality is seriously injured. We found from actual experiments in both cellar and storage work that the breaking open of the epidermis by the spray allows the escape of the moisture from the apple, so the fruit becomes mealy, and germs of decay set in the injured fruit; it does not keep nearly as long as the sound fruit. On the foliage yellow spots appear, brownish spots, very dark yellow, almost brown at first. These eventually become almost black and the whole leaf turns yellow, and much of the foliage drops in severe cases, so that often in a well sprayed orchard a quarter and even half of the foliage lies on the ground. Of course this means the fruit does not attain its full size and the crop is thus crippled, and the tree growth so weakened that buds fail to set for the succeeding crop, so that very material injury is caused to the tree as well as to the current fruit crop by this injury. The blossoms are sometimes badly injured if spraying is done—and it never should be done of course—while trees are in blossom, and often the blossoms drop so that no fruit sets whatever.

There are several other agencies that cause similar injuries. For instance, the frost; a heavy frost soon after apples set, which causes the russetting of the fruit. This frost injury is very similar to the Bordeaux injury. So also the work of the blister mite, a small mite which gets under the epidermis of the apple or into the epidermis, and causes an injury similar to the Bordeaux injury. So, too, one or two fungi at certain periods of the growth

of apple scab causes an injury similar to that which I am discussing. And spraying with the arsenite sometimes causes such injuries, and spraying with lime alone will sometimes produce russeted areas and cracked-open fruit, as in the case of the real Bordeaux injury. So that there are other agencies which may malform and injure fruit somewhat as does the Bordeaux injury. But the real Bordeaux injury can be told by all who have once had their attention called to it, it is so striking and so individual. Its characteristics are so peculiar that, once it is known, one ever after recognizes Bordeaux injury.

In our work it was found certain sorts were almost immune to this injury—Northern Spies, Kings, Russets; the Alexander is still another, and we were not at all troubled with many other varieties from spraying with Bordeaux, while other sorts were very susceptible. Unfortunately for us in New York, the Baldwin and Greening are very susceptible to Bordeaux injury, so it is almost impossible to spray and control apple scab and not do considerable injury to those two sorts.

As to the way in which the injury is caused, it is pretty difficult to say. As I said in the beginning, Bordeaux mixture changes in its chemical composition, after being applied, under the action of the sun and water and moisture, and it is hard to tell just what chemicals are set loose and how the action does take place; but it is supposed that the lime and the copper sulphate are disassociated and the copper sulphate becoming an acid, eats the tissues, kills the cells, and carrying these dead cells as the live cells grow about them, the epidermis becomes ruptured and split open, and the russeting comes from this dead tissue—the action of the growing tissue about this dead tissue, just as, if you injure the tissue of fruit in any way; for instance, rubbing of the fruit against a branch, or the action of frost or any other agency whereby cells die and become centers from which living tissue must part, tearing open the epidermis, we get this russeted appearance of the fruit.

Coming now briefly to the experiments carried on at our station last year; we devoted ten acres in our experimental orchard to this work, keeping several men at it nearly all summer. We were determined to find out just exactly, as nearly as possible, what conditions, at any rate, caused the trouble; and in order that we might have all conditions, we secured the cooperation of 25 fruit growers in different parts of the State, hoping thereby to secure the different effects of all weather conditions.

In all these experiments we had, within the one large experiment, four distinct experiments:

First, to determine for a certainty whether or not Bordeaux mixture does cause this injury. So that one part of all the experimental plots was devoted wholly to this one end; leaving checked trees to see what the effects of Bordeaux mixture would be on neighboring trees, and the lack of it on trees not sprayed.

Second, part of the experiment was to determine what effect wet weather had upon Bordeaux mixture; so that we devoted a considerable number of the experimental orchards to plats in which the Bordeaux mixture was applied either during or just before or just after a rain.

The third part of the experiment was to determine the value of the excess of lime. In my correspondence with horticulturists all over the country the preceding year I ascertained that a great number of fruit growers held that by adding an excess of lime they could prevent any of this injury—perfectly sure that one needed only to add double or treble the quantity

of lime commonly recommended, and we should have no injury. We use equal quantities of lime and copper sulphate, and twice as much lime as copper sulphate, three times as much lime as copper sulphate, and four times as much lime as copper sulphate.

And still a fourth experiment was to determine whether we could control the apple scab by using a lesser quantity of copper sulphate.

I don't want to go into the details of these experiments. You would not be interested in them, and besides they are published in a bulletin which all can have from our station. I only want, in summing up, to give you the results obtained, and make an application of them to your conditions.

Taking up the first of the experiments: It became apparent from the very start there was no doubt but that Bordeaux mixture and Bordeaux mixture alone caused this russeting of the fruit. It began to show within two days after applied to the trees, began to show on fruit and leaves. On the other hand, on the checked trees there were no traces of it whatever. So that we were very sure that in all our experiments, not only on the station ground, but in all the cooperative experiments, it was fully demonstrated the cause of this peculiar russeting of leaves and yellowing of foliage was due to the Bordeaux mixture and to the Bordeaux mixture alone. There were no arsenites in the mixture at all, and no substances, so it could only have been the Bordeaux mixture.

As to the second experiment, the influence of wet weather: It became apparent almost from the start, too, that wet weather was the great unfavorable condition for such using. Within a day after the trees had been sprayed, when sprayed just before a rain or during a rain, this injury began to show; while, when trees were sprayed during sunny weather or weather that would permit the mixture to dry upon the fruit, almost no injury was shown, and this injury became cumulative as time went on. There seemed to be a total disassociation of the copper sulphate and of the lime if the mixture was applied during a wet time. This was true, to some extent, of sprayings made in the afternoon or evening preceding dewy nights, nights in which much dew fell; showing that even dew could cause a disassociation of the lime and of the copper sulphate.

With regard to the value of an excess of lime: In all the experiments (there was not an exception) it was found that the excess did not prevent the injurious action of the copper sulphate. The mixtures in which we used an equal quantity of copper sulphate and lime were as free from injury as those in which we used twice or treble or four times as much. So that I am now sure, and I feel that the apple growers in Western New York are all agreed that there is no value, no particular value, in adding an excess of lime to Bordeaux mixture; it is as good a mixture with equal quantities of lime and copper sulphate as it is with any greater addition of the lime. Two interesting facts came out in this experiment. One was that in wet weather the action of the copper sulphate in controlling the scab was a little better with an excess of lime; and the other was that in the dry weather spraying, the beneficial effects of copper sulphate in controlling the scab were lessened with the application of lime; they just offset each other. So we could see no benefit in recommending at any time—not being able to predict the weather—an excess of lime for Bordeaux mixture.

The outcome of the last of the four experiments, that of determining the value of different strengths of copper sulphate, ought to be pleasing to you, inasmuch as copper sulphate is becoming more and more expensive. We found we could control the scab just as well with three pounds of copper

sulphate and three pounds of lime in the Bordeaux mixture as we could with twice that amount: 6 and 6, or 5 and 5, in 50 gallons of water always. In fact, there was so much less injury when we used the less amounts of copper sulphate that our station is now recommending for Bordeaux mixture for apples and pears and the quince, 3 pounds of copper sulphate, 3 pounds of lime, and 50 gallons of water. When peaches and plums are sprayed, of course considerably less amounts than this must be used; and there is no need of using a stronger Bordeaux mixture than that which I have just named.

Now, to just sum up in a word, then: If we are to spray our fruit trees—and all must concede that we can't grow good fruits without spraying—in spite of the fact that Bordeaux mixture will do injury, yet all fruit growers who have had experience still hold that Bordeaux mixture is the sovereign remedy against all fungi, and the only one we have. Many experiments in different stations are now being carried on to see if we can't find some fungicide and not injure fruit; but I fear, from my own work, we shall always find that any fungicide that is strong enough to destroy the spores of apple scab will also injure the fruit more or less. So the problem is to so spray as to destroy the scab and do as little injury as possible.

We recommend, then, from our station, from these experiments, that the weak solution which I have given of Bordeaux mixture be used; that it be sprayed in moderation; the trees should not be drenched until great quantities of it run off, and yet every part of the tree should be covered, foliage and fruit; and that the trees be sprayed always in dry weather. We used to say, "Spray rain or shine," and if there were only a few hours of dry weather to permit the Bordeaux mixture to set on the leaf, that was all sufficient. But I fear we shall have to change that. We shall find it is greatly to our advantage both in saving the fruit from injury and in checking the scab to spray in dry weather.

And lastly, there is no benefit in adding a considerable excess of lime; it clogs the pumps; it is harder to put on; in a case of dry weather it may somewhat detract from the value of the mixture; and, taking it all in all, there is no value in adding any considerable excess of lime in making Bordeaux mixture.

I have run through this experiment very hastily, and I have not given you the details; but I shall be glad to answer any questions or go into the matter of the spraying engine. I only hope that in thus telling of the defects of Bordeaux mixture I have not caused any man to think that if it is going to hurt his fruit he will not use it another year. On the contrary, you can't grow fruit without spraying; and don't think because there are some drawbacks to the use of Bordeaux mixture that you can get along without it. On that I want to make myself clear. I don't want any one to accuse me here of finding fault with Bordeaux mixture or advocating its disuse. It is not used nearly enough, and I want to emphasize over and over again the fact that it must be used more and more if we are to grow good fruit.

DISCUSSION.

Mr. Bishop: Would it not be a good plan to spray the trees early with the stronger solution of Bordeaux mixture before the foliage starts?

Prof. Hedrick: I have not gone into that matter of the proper sprays for the apple tree. In Western New York they now spray for the most part three times: Just before the buds open or begin to swell, with a fairly

strong solution of Bordeaux mixture. As Mr. Bishop suggests, you can make that as strong as you like, adding to this mixture of course the proper arsenite. A second spraying is given just after the blossoms drop; that should be put on very carefully, and must not be strong. It is this second spraying just as the small fruits are forming that does most of the injury. The third spraying is given two weeks after the second one, and much injury may be done in this third spraying, if the season is a very wet one; and if the fruit growers have a large crop it is now the practice to spray a fourth time; and in some seasons they spray five times; and this year I knew men in some parts of Western New York, who had a large setting of apples, to spray six times, in order to make sure that their apples were all free from scab and from the codling moth. I should say that three times is the practice with the average fruit grower in Western New York. Would recommend the other applications be made in exceptional seasons or when there is an exceptional crop of fruit which the grower wants to save in its entirety.

Mr. Stearns: What do you say in regard to the addition of the lime when you use the arsenite? Would you use more lime then?

Prof. Hedrick: No, I think not. The common practice of spraying the—I believe our fruit growers in New York are coming more and more to use the arsenate of lead, and that does no injury whatever. But when Paris green or soda or London purple are used, equal parts of copper sulphate and lime will give sufficient excess of lime to offset any injurious action of the arsenite. Our growers are using a very strong solution of arsenate of lead, but it is expensive. The advantages are that it never injures the fruit. The arsenite of soda sometimes does; and Paris green sometimes does. It is very easily applied. It mixes splendidly with water or Bordeaux mixture; and best of all, it sticks on everlastingly; you can't wash it off; rains will not wash it off; and that is the great advantage. And the codling moth are sure to get it. But it must be used of a strength requiring a considerable quantity of the substance, and the cost is such that many fruit growers—only a man who is growing the best fruit feels he can afford it; 2 pounds to 50 gallons of water; some growers use 3 pounds to 50 gallons of water; and inasmuch as it costs anywhere from 9 to 14 cents a pound, according to the kind and quantity you buy, it is twice or three times as expensive as the arsenite of soda, and nearly twice as expensive as Paris green or London purple; but its advantages are such that if one is sure of a good price for fruit and has a good crop of fruit, it is well worth trying.

Mr. Post: I would like to ask if spraying early with lime and sulphur will take the place of any of the Bordeaux mixture for fungicide?

Prof. Hedrick: Yes, sir. On our station grounds all through Western New York, here and there, we are badly troubled with San Jose scale, and all who have that must use lime and sulphur; and all who do use it do away with the first application of Bordeaux mixture and let the lime and sulphur take the place of the first application of Bordeaux mixture, and we are well satisfied that lime and sulphur is practically as good a fungicide as the Bordeaux mixture.

George Tucker: Then we must continue to spray with Bordeaux mixture in order to hold the scab in check. After the scab is big as the end of my finger you can't control it. The only time to control apple scab is to spray the blossoms just before the blossom—just the minute the apple blossom begins to show scab; don't wait until it gets a stem on it. But when the little stem just begins to appear and the blossom opens enough so you can

see the pink the least bit, take your paraphernalia and go into the orchard and get to work.

Mr. Simmons: I have discarded the stone lime entirely; I don't slake any more lime myself at all, only for the lime and sulphur spraying. I think the results are just as good with the hydrate of lime, and it is so much more convenient.

Prof. Hedrick: I think there would not be any difference between the two kinds of lime. If you can't get a good grade of lime, then I suspect the hydrate of lime is to be preferred; but when you can get a good stone lime, one that slakes without leaving any sediment, it is cheaper and fully as effective as the other.

Mr. Halstead: You would recommend the August spraying for the codling moth?

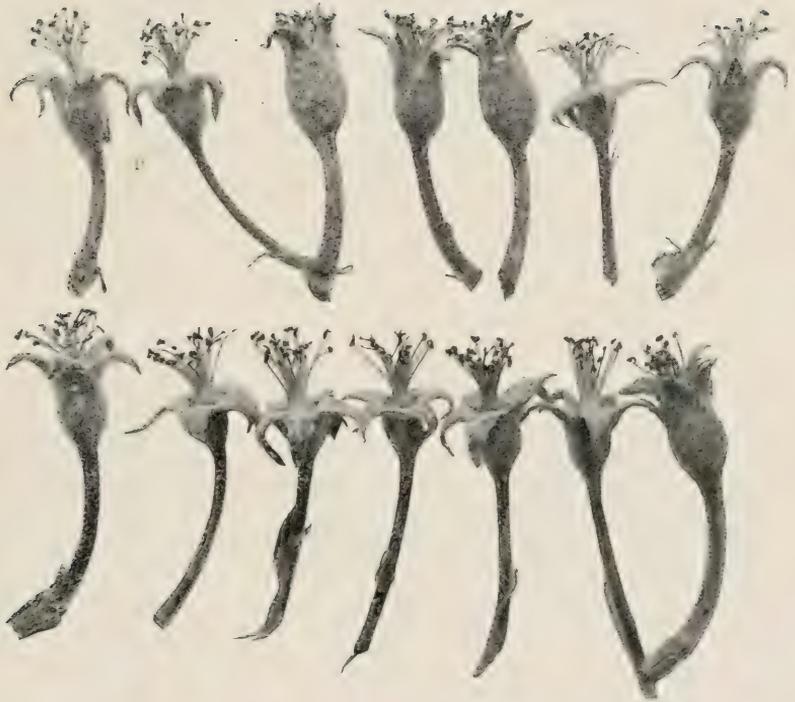
Prof. Hedrick: That is getting out of the discussion; and yet, had I a good crop in either Michigan or New York or any other of the states in this region, I should surely spray as a matter of insurance in August. I believe that the second brood of codling moths come at least once in three years, if not oftener. I would put in the copper sulphate, because there are some fruit blotches and fungi that come on late; and I would spray with a weak Bordeaux mixture and some arsenite in August, had I a good crop of fruit; especially if the season were early. If the season were a very late one, I might change the procedure by not having a second brood of codling moth. Last year in New York the second brood did far more damage to apples than the first brood. So that man who did not spray in August lost great quantities of fruit. You can't be arbitrary about this matter of spraying. A man has got to know why he sprays and how the different cells act, and know something about the life history of the fungi and insects he is attempting to kill, and then use his judgment.

Mr. Greening: Would you recommend a difference in strength of the Bordeaux mixture for different varieties?

Prof. Hedrick: There are some sorts, such as the Ben Davis and Hubbardson, and all the Russian kinds, as Wealthy and Duchess and Alexander that are not badly attacked with scab, and I think I never would spray Duchess for scab; I don't believe the fungi ever do enough damage; and so with the Wealthy: I doubt whether it is worth while to use the Bordeaux mixture on the Wealthy for scabs. We do make a big difference on the different varieties. I have in my bulletin a whole list of them we tried experiments on, something like sixty kinds, but I cannot give you offhand a list of these varieties that you need and need not spray for scab. There are some sorts that are not injured by the Bordeaux mixture, while others are badly injured, so that the variety makes considerable difference. Yes, that is another thing that the successful fruit grower must take into account.

Charles Wilde: Have you ever carried on any experiments when you used an arsenite with Bordeaux mixture, whether you used lead, Paris green, or lime in this combination? I used all three with the Bordeaux mixture. Without the Bordeaux mixture, there is no question but arsenate of lead is the best; but when you use it with the Bordeaux mixture I have not been able to find any difference, if I only put enough in; it seems to do the business. Have you had any experience on that line?

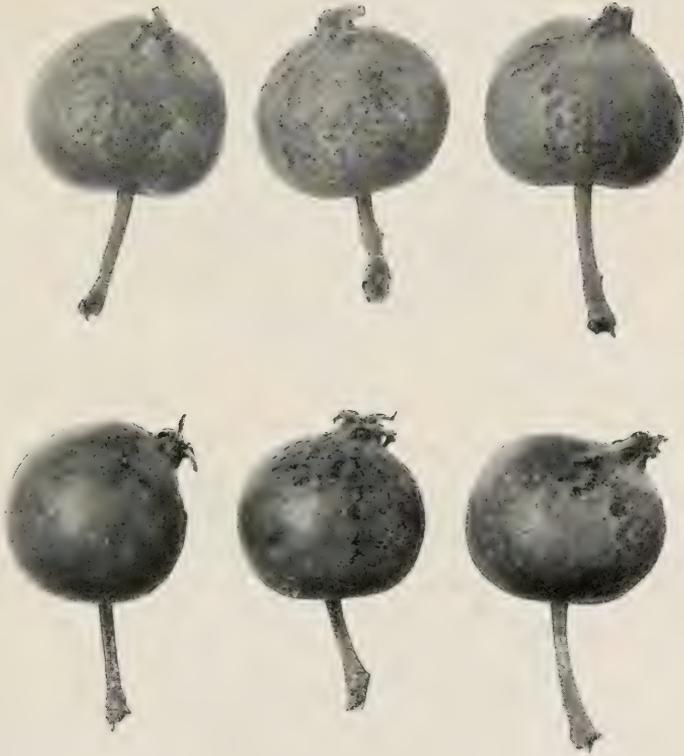
Prof. Hedrick: We had no definite experiments on our station ground with these different arsenites; but in our cooperative experiments over the state I suppose we used all of the different arsenites. I can't give you the details now, but so far as the injury is concerned to the fruit there is absolutely



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Bordeaux Injury on the Apple

Plate 1.—Size of fruit when first sprayed on May 31; upper row, Baldwins; lower row, Greenings



Bordeaux Injury on the Apple

Plate 2.—Size of fruit and russeting and malformation from Bordeaux Injury on June 18, shortly after the last spraying; upper row, Baldwins; lower row, Greenings

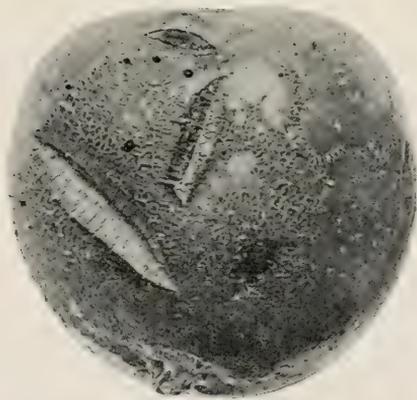


Plate 3.—Severe Bordeaux Injury of Half-Grown Baldwin Apples



Plate 4.—Teat-like Malformations on Ben Davis Apple Caused by Bordeaux Mixture

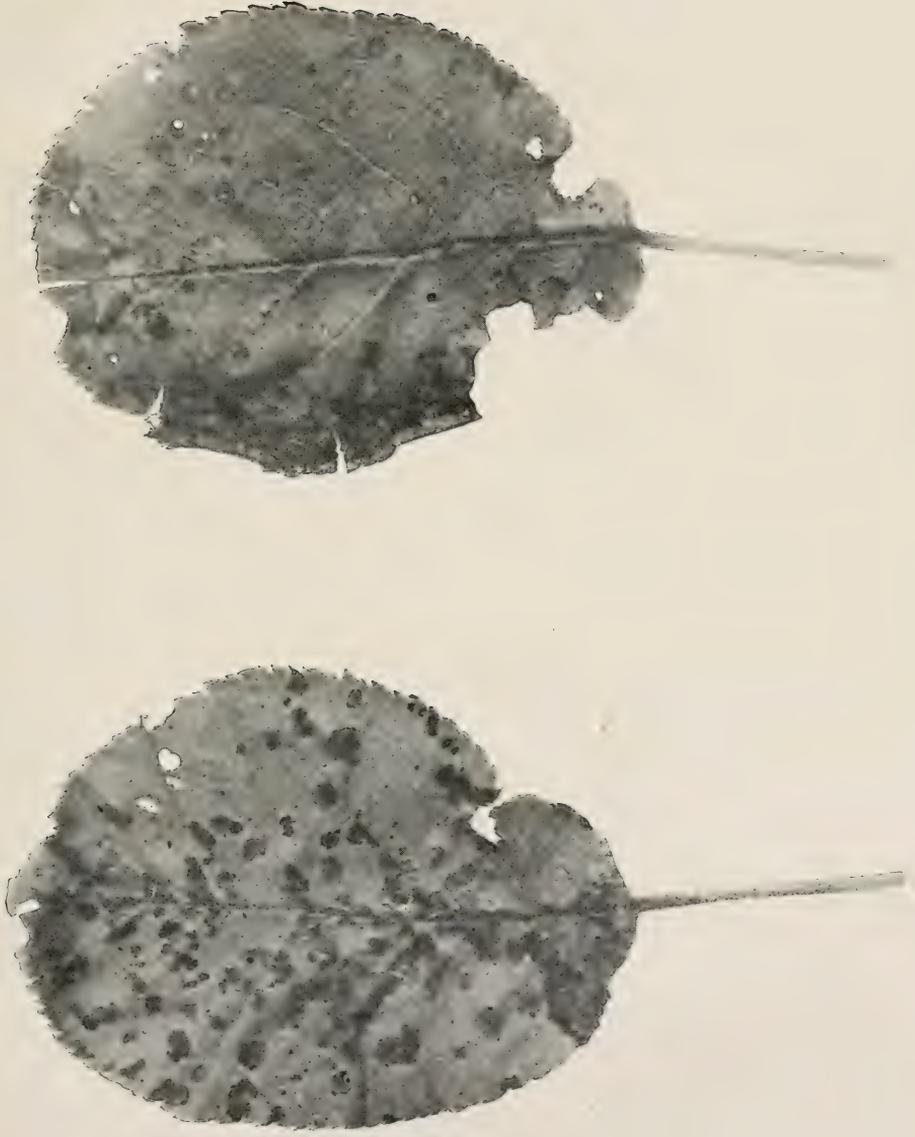
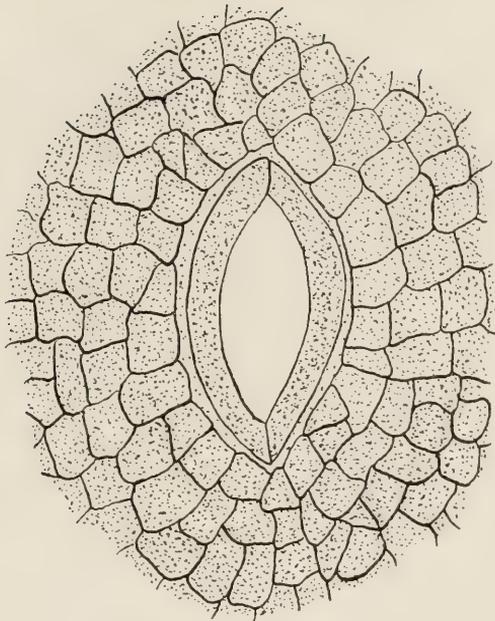
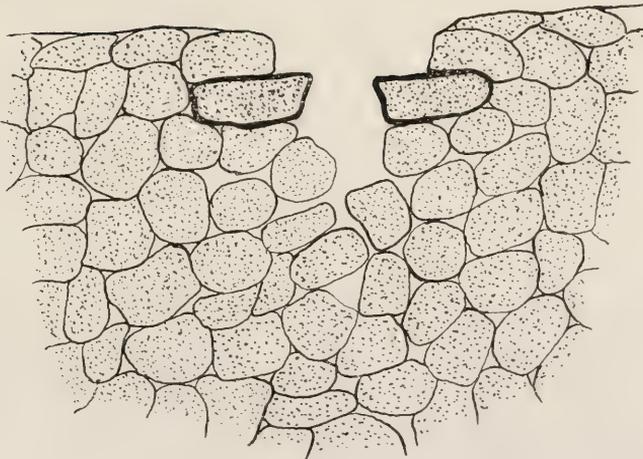


Plate 5.—Character of Dead Spots on the "Yellow Leaf" of the Apple Caused by Bordeaux Mixture



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Bordeaux Injury on the Apple

Plate 6.—Structure of Stoma on young Greening apple: 1, surface view; 2, cross section

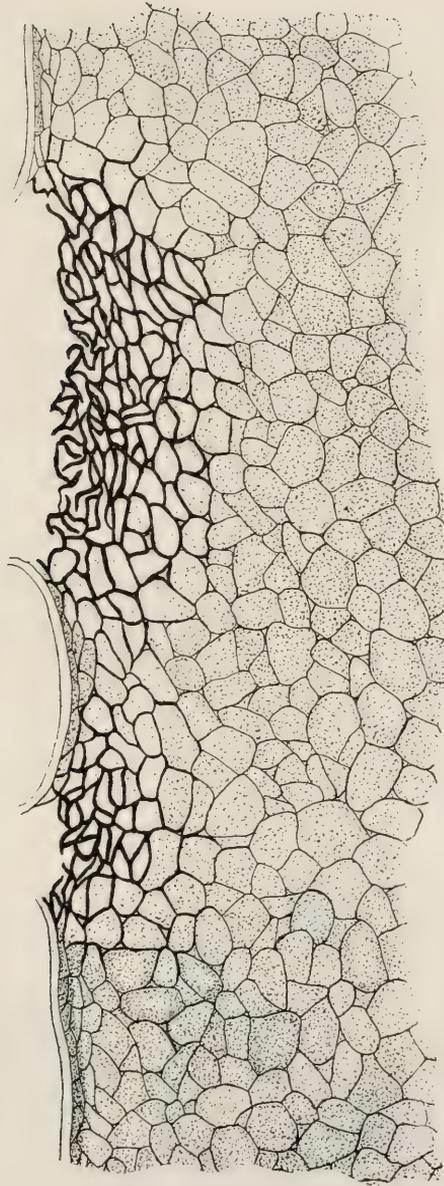


Plate 7.—Section Through Bordeaux-Injured Portion of a Baldwin Apple, Showing Ruptured Epidermis and Dead, Corky Cells

no difference, whether you use the arsenate of lead, the Paris green, or arsenite of soda, or whichever one, no difference at all. We think the results are better with the arsenate of lead, because of its better sticking qualities, and because it spreads out better.

Mr. Post: I think the Professor recommended three sprayings. With the conditions as they were this year, wouldn't it be better to defer that spraying until late? People don't usually spray four times.

Prof. Hedrick: If you are sure of doing a very good job the second time, and you are only going to spray three times, I would prefer to use the third application late in the season; I would prefer to do that in the average year. But suppose you have a wet season, long continued rain; then I am afraid you would find it to your advantage to use the third spraying early in the season.

Q. I would like to ask Mr. Hedrick if he has noticed that the Bordeaux mixture delayed the season of ripening? Of course we don't expect very much fruit—nobody does—without the Bordeaux mixture; and it might be hard to tell by leaving trees unsprayed—there might not be any fruit at the end of the year to tell whether they were ripening ahead or behind; but I notice where the leaves of the trees were continually kept white during the summer that the apple was late in ripening.

Prof. Hedrick: We didn't notice that, and we had a good many different plats, trees side by side, sprayed and unsprayed. I am glad to have my attention called to that, and I should like to notice it in the future; but I don't remember in any of our experiments having seen anything to lead me to think spraying would delay the ripening.

Q. I would like to ask if you don't recommend the first spraying to be applied to the apple trees before the blossoms are quite all dropped? In my experience, the growers who had the largest crop and the least scab were those who sprayed their apples before the blossoms had all dropped; and those who had waited three to four days after the blossoms dropped had a large dropping of fruit and more or less scabby apples. My orchard was sprayed with lime and sulphur, and not sprayed again until just as the blossoms were dropping; when two-thirds of the blossoms had dropped, I went out into the orchard and picked a few stems to see whether they were setting good or not; I submitted them to microscopic examination and found the scab fungus just starting. I immediately began spraying with Bordeaux mixture. The consequence was I held the fruit all on the tree. Some of my neighbors who did not spray until the blossoms had all dropped, lost two-thirds, and some cases nine-tenths of their apples.

Prof. Hedrick: It is against the law to spray while trees are in blossom.

Q. Not without you spray with Paris green.

Prof. Hedrick: Oh, well, a man would not want to spray with Bordeaux mixture and not Paris green. That is the very time you put Paris green in to catch the codling moth. You want to get the poison in the little calyx cups. You need to spray just as soon as you possibly can after the blossoms drop, especially if it is a late season.

Q. If the season is late, the scab grows fast. In late seasons we must spray earlier than in ordinary years.

Prof. Hedrick: In orchards where there are several varieties it is often necessary to spray some of them while they are in blossom and violate the law to that extent. But I should never advise any one to spray while the trees are in full blossom, and never advise any one to spray with Bordeaux mixture alone.

Q. I have sprayed while the trees were in full bloom, and quite extensively while they were in full bloom; I didn't have any Paris green, nor I didn't want any. Before I came to this meeting I talked with Mr. Statler, who carried the banner of the state for a long time. He said the best success he ever had was spraying just before they bloomed, and following it up even until they were in bloom, and finishing up while they were right in bloom. He said he was going to do that next year; that the best year he ever had was when he did that.

Q. I would like to ask if there is any danger of killing bees by spraying just when the blossoms are dropping; that is, when one-half or two-thirds of the blossoms have dropped?

Prof. Hedrick: I think not. I think the bees prefer to get on the blossoms as soon as they open.

Mr. Mullen: Over near Lapeer, those that omitted the fall spraying this year, although it was a late year, lost very heavily by the codling moth; and the loss has been very heavy there where the trees have not been sprayed in August for two years.

Prof. Hedrick: We shall have to come, I fear, to a spraying in early August as a yearly practice; have to do it as a matter of insurance. I feel sure of that.

Dr. Brunson: With all due deference to the man from New York, I would say I sprayed with the lime and sulphur, and having read and heard it was not necessary to use that Bordeaux mixture before blossoming, I let that go, and am sorry; I had quite a lot of scab.

Dr. Brunson: Three times after the blossoms dropped. I believe it is necessary; that is, where we have more scab than they do to spray directly before the blossoms come out, if we are going to be sure of getting ahead of the scab. In Western New York, where they have sprayed more and longer than we have, and have not so much scab, maybe then the lime and sulphur will do; but where they have not done so for a good while, and have a good deal of scab, I am sorry to say I lost a good deal of money by not spraying previous to their coming out. I think Mr. Crane will bear me out; and there are a good many down in our neighborhood who believe that to be the case.

Mr. Crane: Mr. Statler told me that was the great mistake he made, that he sprayed with the lime and sulphur, and thought he might omit the spraying just before the blooming, and so he did; and while his has been the banner apple orchard, there were many orchards better than his this year.

Mr. Crane: If we are following this thing enough to know what we are doing, we ought to know what we are spraying for. I put the question to Prof. Taft, and I asked him if he knew where the winter spore was that made the occasion for the summer spore, and where found? "Yes," he said, "you could see it through the microscope." Where did you find it? "Plenty of them on the dead leaves on the ground and around." Did you ever find any on the tree on the bare wood? He stopped and hesitated a few moments. He says, "I must confess I never have found any on the wood." Now what are you spraying the bare wood for, if you never found them? What are you trying to kill? You are trying to kill the winter spore that would only become the active spore in summer; and if you can't find it on the bare wood what are you trying to kill it there for?

Prof. Hedrick: You are getting this into plant pathology, and you haven't taken it far enough. We don't spray to kill the winter spore on the apple

tree. The spore has gone through one of the stages of existence and has produced some of the summer spores on the different form of the same fungus, and that has covered the trees easily; in the spring it has gone through some of its stages of growth.

Q. Mr. Taft and other professors in the college have made the statement that by applying the copper sulphate in solution of 3 pounds to 50 gallons of water, sprayed on the bare wood would destroy the winter spores. He has made that statement in public. If that won't do it, we want to know it. We don't want to spray the bare wood to kill something that is not there; and if it is there, we need to know it will kill it. Will it kill it if it is there?

Prof. Hedrick: The winter scabs, apple fungus, are found only on the leaves, and that on the leaves will be found the seed from which comes the disease on the fruit late in the spring; but from the scabs very early in the spring come the summer spores. On the early spring spraying we kill the early spring spores, not the winter spores.

WORDS OF GREETING.

Mr. C. G. Woodbury, of Purdue University: I feel rather delicate about interrupting this discussion here. I think much more good might accrue to the society from hearing some other thoughts from other gentlemen on this spraying proposition than from anything I might have to say.

I will say, however, I am very glad to be here. I am sorry I must go so soon. My lot is cast in Indiana now, but I am formerly from Michigan; Michigan was my home, and I feel at home in any meeting of the Michigan Horticultural Society. It always does me good to get back whenever it is possible for me to do so.

I was in the northern part of Indiana. I knew this meeting was to be here at this time, and I seized the opportunity to come up for one day's session. I wish I could stay during the whole meeting, but I must go back to my adopted state now tonight and be at the meeting of the Indiana Horticultural Society tomorrow morning.

I shall take pleasure in carrying the greetings of the horticulturists and fruit growers of Michigan to those of Indiana, and I am sure they will be very glad to hear from you and know what a fine program is going on up here.

The conditions down there are not materially different in many ways from the conditions up here. The October freeze of last year in the northern half of the state especially results in just about as serious problems to our fruit growers as it has to you. In the southern part of the state it did not hit us quite so bad of course. The conditions of the crop this year, of all horticultural crops, especially of apples, are very similar to the conditions in the fruit belt in Michigan. That is, a scattering crop; in some orchards, a good crop; in others near by, none at all. Those of us who compete for apples in Indiana this year, however, are getting very good prices for them. Some of our apple growers are selling their crops for five dollars a barrel; and some of our peach growers, although the peach crop is very light, their crop netted them \$3.75 a bushel in some cases; and our melon men—southern Indiana is a great melon country you know—numbers of them made \$200 an acre or more on plantations 30 to 75 acres in size. So that, for the most part, although we met with some reverses, we are not discouraged. And I want to say right here that I am very glad to see the spirit that the fruit growers in the fruit belt of Michigan are showing with respect to the October

freeze and reverses they have met with the last year. I see no evidences of discouragement or despair, but all the good that that freeze accomplished is being sought out and advantage is being taken of it in every way possible; and I am very glad no discouragement has resulted.

I take with me the heartiest greetings of the Michigan Horticultural Society to the Indiana Horticultural Society.

Telegram received at this point as follows: "Heartiest greetings from the Minnesota Horticultural Society in annual session. F. W. Latham, Secretary."

On motion, which was seconded and carried, the secretary was instructed to forward the heartiest greetings of the Michigan Horticultural Society to the Minnesota Horticultural Society.

SUMMARY OF RESULTS OF EXPERIMENTS IN HORTICULTURE AT THE MICHIGAN AGRICULTURAL COLLEGE.

(PROF. S. W. FLETCHER.)

1. POLLINATION OF KIEFFER AND BARTLETT PEARS.

This work has been in progress for six years. During this time experiments have been conducted in New York, West Virginia and Michigan. Experiences have also been gleaned from all over the country. The first point taken up was whether Bartlett or Kieffer is able, under ordinary commercial orchard conditions, to set a crop of good fruit without any other pollen than its own. During the six years over a hundred thousand flowers of each variety have been enclosed in bags to prevent cross-pollination. Whole trees have also been covered with netting or sheeting. The blossoms so enclosed have been self-pollinated by hand, to be sure that pollen reached them. This wholesale self-pollination has shown that neither Bartlett nor Kieffer set fruit well with their own pollen, as a rule, although in some parts of the country both varieties set fruit perfectly with no other variety near. Much depends upon the soil, the climate and the health of the tree. Moreover, it is probable that there are strains of Bartlett and Kieffer that are self-fertile and strains that are self-sterile; why should not this point be influenced by soil, climate, etc., just as much as the size, color and quality of the fruit, and habit of growth of the tree? The conclusion is that in planting a large commercial orchard of Bartlett or Kieffer it is best to plant a certain proportion of some other variety blossoming at the same time to insure cross-pollination. Small orchards of Kieffer or Bartlett and even many large orchards, especially if they are in a fruit-growing region, will usually set fruit satisfactorily because insect visitors bring pollen from other trees. Our experiments have shown that the wind does not carry pear pollen from tree to tree, because it is too sticky. We have made many thousand of crosses to ascertain what varieties may be set to supply Kieffer or Bartlett with pollen. Anjou and Lawrence have been most satisfactory for pollinating Bartlett, and Kieffer has done excellently whenever it blossoms with Bartlett, as it does two seasons out of three. For pollinating Kieffer we have had best results with Anjou, Lawrence and Bartlett, although Garber is most commonly used.

We recommend that every fifth or sixth row of a commercial orchard of Kieffer or Bartlett be one of these pollenizers.

2. PEDIGREE STRAWBERRIES.

Eight thousand plants of five varieties, set in the spring of 1906, are being used for this work. The plants came from R. M. Kellogg, Three Rivers, Michigan, and M. Crawford, Cuyahoga Falls, Ohio. Each plant has been subjected to the closest scrutiny, a record being kept of its habit of growth, resistance to disease, number of runners thrown out, hardiness, number of blossoms, fruiting habit, productiveness, character of berry, number of berries, total weight, and other points that are of importance in the commercial value of a strawberry plant. Each plant was allowed to set but two runners, and the three were considered as one plant in taking records. Selection has been made for two points:

1. *Productiveness.* (a) The 50 plants of each variety bearing the most fruit by weight. (b) The 50 plants of each variety equally vigorous as the above bearing the least fruit by weight.

2. *Season.* (a) The 50 plants of each variety bearing the earliest fruit. (b) The 50 plants of each variety bearing the latest fruit.

Runners have been taken from these several sets of plants. These are planted and similar records will be kept of them as of the parent plants. The selection will be continued for at least five generations. The object of the experiment is to determine how much variation there is between different plants of the same variety and whether the variety can be improved in some one point, as in productiveness or in lateness, by propagating only from the most excellent plants, instead of from the bed at large; in other words, of how much practical value is "pedigree"—or more properly *selection*—in the propagation of the strawberry.

As we have fruited but one generation of plants, nothing can be said about pedigree, but we can say much about the variation within the variety. As we have kept a minute record of each one of the 8000 plants, our attention has been called to the fact that there are great differences within the variety. Thus plant No. 3 Dunlap produced $22\frac{1}{4}$ ounces of fruit (161 berries), while plant No. 95 produced 11-16 ounces of fruit (9 berries). Plant No. 50 Sample produced 19.3-4 ounces of fruit (108 fruits), while plant No. 94 produced no fruit. The latter was "blind," although apparently as vigorous as No. 50. Likewise we found plants of Gandy that ripened their fruit a week later than other plants of Gandy. All this variation could not have been caused by differences in the soil or care, for every effort was made to give all uniform culture. Some of it, at least, must have been due to heredity. The practical fact before us is this: here are certain plants in a field of strawberries that are bearing three times as much as the other plants, or excel in some other important respect. Will it pay the grower to propagate from these superior plants alone, just as it pays the dairymen to weigh and test the milk of each cow in the herd, so that he can eliminate the deadbeats? When forcing strawberries in pots in midwinter, I have noticed that many plants, even those that are vigorous and lusty, come "blind," producing little or no fruit. Is the commercial grower of field strawberries supporting many blind plants by the profits from his productive plants? To what extent will it pay him to recognize the individuality of plants, making a single plant the unit in propagation, not the variety? These questions cannot be answered except by years of painstaking records of individual plants and their progeny, in which we have made the barest beginning.

3. KEEPING FRUIT IN COLD STORAGE.

In this experiment we attempted to secure definite data as to the extent to which careless handling injures the keeping qualities of fruit. We all know, as a matter of experience, that careless handling does make fruit rot faster in the cellar; but just how much? The experiment has run for three years, and several bushels of apples have been used in each case. Briefly summarized, the results were as follows: Spy apples were picked carefully by hand and put into storage without bruising. Another lot were picked similarly, but merely poured into a barrel roughly, as many farmers still pour apples. By April first, 21 per cent of those carefully handled had rotted, and 81 per cent of those poured into the barrel. Apples picked carefully, but carted three miles to town on a springless wagon, had 88 per cent rotted by April 1st, as compared with the 21 per cent of standards. Scab spots and worm holes not only disfigure the fruit, making it unsalable, but such fruit rots much quicker than sound fruit. If the stems of winter apples are pulled off when picking, the fruit does not keep quite as well as fruit with stems on. Spys picked early kept much better than Spys picked late. These points emphasize anew the importance of handling very carefully fruit that is to be stored.

4. BLIGHT PROOF POTATOES.

Of the several hundred varieties of potatoes that we have tested for blight resistance during the past 4 years, the following have been most resistant to late blight: Midsummer Dakota Red, Mills, Sir Walter Raleigh, Late Blightless, Twentieth Century, Invincible. None of these are blight-proof, but they are more so than most varieties. By selection and crossing we are working to improve them in this respect.

There was but little late blight at the college this year, but even so sprayed potatoes yielded 34 bushels more per acre than unsprayed, which gave a profit of about \$10 per acre for the work, counting the cost of spraying at \$1.00 per acre for each application.

5. VALUABLE SEEDLING FRUITS OF MICHIGAN ORIGIN.

At the last meeting of this society I urged that we pay more attention to local seedlings, for among them are most likely to be found the future commercial varieties of our State. During the year I have received samples and have photographed and described over fifty varieties and unnamed seedlings of Michigan origin. A number of these I have no hesitation in pronouncing decidedly promising, especially the Gibbs, Chesebro, Pitton, Mears, and Schoolcraft apples, the Mark-Chili, Markham, Mears, Gold Mine, Highland Beauty, Davidson, Gebhardt and Welch peaches and the Pringle Damson plum. I think this society should encourage the owners of these seedlings, and others yet undescribed, by awarding prizes.

6. PATENT SPRAYS FOR THE SAN JOSE SCALE.

There should be put on record the experiments of Mr. C. G. Woodbury, formerly of this department, now Assistant Horticulturist of the Indiana Station. While with us he made a very thorough trial of the various patent sprays for the San Jose scale, in comparison with the lime-sulphur spray. The work was done both in the fall and in the spring, and over 400 trees were treated. I give his conclusions:

"The results which were secured with the soluble oils do not warrant such a flattering report concerning their value as has been given by some experimenters. With one very thorough application of the oils about 90 to 95 per cent of the scales were killed. Scalecide was the most satisfactory of the soluble oils. The disadvantage of Kil-o-scale was the heavy brown precipitate which forms in the containing vessel on standing. Scale Destroyer was fairly good, but did not form an emulsion as readily as Scalecide. Scale emulsion was entirely unsatisfactory. Scalespray, while making a fairly good emulsion, fell below all the others in efficiency. As a class the soluble oil sprays have the advantage of easy preparation and solution; they have the disadvantage of being washed off the tree by the first rain. This proves to be a serious drawback only when the application of the spray is succeeded almost immediately by rainfall. Unlike the lime-sulphur wash, the effect of the soluble oils is almost immediate, so that a repetition of their application is unnecessary unless the rainfall occurs within a few hours.

Of the two ready-made lime-sulphur sprays used, Horicum was more satisfactory than Salimene, because of the greater ease with which it is prepared. The material goes into solution very rapidly, stays in suspension well, is adhesive and conspicuous on the trees. Salimene while apparently similar in composition, is much thicker. About fifteen minutes stirring is required to dissolve it and it settles rapidly.

The Tobacco-potash-whale-oil soaps have no apparent advantage over the lime-sulphur washes or the soluble oils. On the other hand, they have the disadvantage of requiring a considerable amount of time and hot water in their preparation, and the necessity of making the application while the material is still hot.

In all of the so-called patent preparations mentioned, the item of cost has been considered, for the reason that these sprays are most suitable for use in a small way, where only a few trees are to be treated. Under such conditions a few cents difference in cost is immaterial. Where a large number of trees are to be treated, the lime-sulphur spray has no superior."

I would add to his conclusions my belief, from subsequent experience, that while it is safest to recommend the lime-sulphur spray now, the time will soon come when the soluble oil sprays will have been so far perfected and cheapened that they will replace lime-sulphur in most cases.

DISCUSSION.

Mr. Post: I would like to ask if you have noticed any bad results on the trees from the oil spray?

Prof. Fletcher: There is no question but the lime-sulphur is more beneficial to the tree than the oil.

Mr. Post: Yes, but the other way, did the oil sprays actually injure the tree any?

Prof. Fletcher: We had no trouble with injury from the oil spray. I want you to see, if you are interested, all those sprays. There are samples of them over there; also samples of lime-sulphur, one of which was not boiled long enough, which is one reason why some of you have not gotten good results with lime-sulphur; there is also a sample of it when boiled long enough.

Q. I would like to ask Prof. Fletcher the results with the Rex lime-sulphur solution. They make great claims for it. Claim it is the same thing as the lime-sulphur we use—got the same strength, only it is chemically prepared so much better. What were the results?

Prof. Fletcher: It is not to be compared with the fresh mixture, home made, and is not as good as the oil spray properly prepared.

Q. We use 15 pounds of sulphur to 20 pounds of lime, and have found that satisfactory, and I think the experiments of other states have proved it is not safe to go below that on the sulphur side.

Mr. Perry: I used this last spring 30 pounds of sulphur and 40 pounds of lime to 150 gallons of water, and my experience this last spring was that it was as effective; but I would not say that it would be in the future. I think it is well worth investigating. It is easily applied.

Prof. Fletcher: I doubt if you can go below 15 pounds of sulphur to 50 gallons of water with good results.

Q. What is the difference in the fruit if it is cross-pollinated?

Prof. Fletcher: You get no difference in the fruit the first year when you pollinate the Bartlett with the Kieffer for example; you get a straight Bartlett. The cross is in the seed.

Q. Does it make any difference in the fruit itself?

Prof. Fletcher: Because the pollen is more acceptable to the pistils, it makes a larger fruit, but does not affect the color or quality; it affects the size, but not the quality.

Q. I would like to ask if you have had any experiments to show whether Bartlett pears would fertilize themselves from other trees of the same variety; that is, if there was a number of pears, whether they would fertilize better than in a single one.

Prof. Fletcher: I think there are strains of Bartlett which are self-fertile and others which are self-sterile. An orchard containing different Bartlett pears from different sources would be more likely to fertilize each other than Bartlett trees all obtained from the same source.

Q. What is a pedigree plant?

Prof. Fletcher: What is a pedigree animal? It is an animal of which you know the history or the parentage. A pedigree plant is one that you know the plant from which it came, and the plant from which that came, and so on, and what they have done. A pedigree plant is one of which you know that the ancestry from which it was propagated have been excellent individuals; it is a line of descent.

Mr. Crane: Do you think any trees are liable to become sterile where they were continually propagated from the nursery?

Prof. Fletcher: I think trees continually propagated from the nursery are liable to become less fruitful, but I would not want to say they would become sterile. I should always prefer to go to bearing trees, of course, in propagating nursery stock.

Mr. Whitten: I am in the strawberry business. I don't grow pedigree plants. I don't go back on selection, that is all right, but don't call them pedigree strawberries.

Prof. Fletcher: He is all right about that. The point he makes is, selected plants, but not pedigree plants; plants that are selected because of their superior value. I use the term pedigree because it is in such common usage that people know what it is. But "selected" is the better term.

Mr. Hotchkins: There is a point in the selection of strawberry plants I wish the Professor would explain. It may have an important bearing on this topic. I have understood it is the case that runners taken near the parent plant are liable to be more fruitful than those two or three stages away; that those taken farther away from the parent plant are more liable

to go to runners and not be so fruitful as those taken near the plant. Have you made any investigation along that line?

Prof. Fletcher: I have not gone far enough to show that. We are taking runners, though, both before the plant is fruited, and after, and will compare. The theory has been held by many that fruitfulness weakens the plant; that if you take runners after the strawberry plant is fruited they will not be as productive. We are taking runners before the plant is fruited, and after, to compare them.

Q. Mr. President, it seems to me, without giving the matter very much thought, that most plants are taken before the parents have fruited. Take for instance, the bed planted last spring, that has not fruited, but has set runners. Next spring, ordinarily the plants for setting new beds will be taken from that plantation. And that I think is the general custom; runners are usually taken before the plants are fruited. It is not common to take plants from an old fruiting bed to make a new bed.

Prof. Fletcher: I think that practice is wrong. I can see the great advantage of it from the nurseryman's point of view. It is just the same as taking buds from a nursery row, isn't it? I believe if carried out a long while that will seriously reduce the productiveness of those plants.

Q. It is the universal practice I believe.

Prof. Fletcher: I know it is; but I don't think it is a right one. I believe every two or three years we should go back to a bearing parent plant, as the best nurseryman do with fruit trees.

Q. Have you any authority, or any experiment, or any record anywhere, for the statement? It is all right to make a statement, but is it a theory or is there any authority in regard to it?

Prof. Fletcher: There was an experiment in which they took strawberry plants and set them out, but instead of letting them fruit the next year took up some of them and set out new beds; next year the same; keeping that up for nine years, I think, never allowing them to fruit. At the end of nine years they allowed some to fruit, in comparison with the descendants of the original stock, which had been allowed to fruit meanwhile, and they found a most decided difference. I don't know what the number of that is, but it is in one of your bulletins.

President Cook: We would like to hear from Mr. Hale on the subject of strawberries.

Mr. J. H. Hale: Mr. President, you will get me in a muss if you get me talking on this subject. I have been growing strawberries ever since I was six years old, and now as I am both a grandfather and a grandmother, I think have reached years of maturity if not judgment.

I have been growing plants for sale like the rest of some of you Michigan nurseryman, and we want to get all the plants we can to the square yard; the more and better ones of course we can get the more we can sell them and get the money for them. I am going out of the strawberry business now, so far as the berry growing is concerned; but I am thoroughly satisfied from over 40 years of growing strawberries that you can get more fruitful plants on the whole to take them from plants that have already fruited; you won't get as many plants. I know the old Wilson strawberry, which I grew for a great many years—it ran out with a great many people; I found that whenever I took plants from an old fruiting bed, cleaned out the bed after fruiting; fertilized it thoroughly and got some new plants growing, and took those and made my new fruiting bed. I didn't get as many runners on my bed the next year; I didn't make plants I could afford to sell for less

than \$6 or \$8 or \$10 a thousand, but I had plants that gave me fruit. More and better Wilsons than other growers could or did not get when taking plants from non-fruiting beds.

Take a strawberry catalog of today, take one of ten years ago, one of twenty, thirty, forty years ago—every ten years 90 per cent of varieties are practically all wiped off the list; there are new ones there; they tell you the old ones have “run out.” They run out with runners that never have had a chance to fruit largely, in my own belief. And I say if you want to keep up the bearing quality of the strawberry, get your plants from bearing beds; that will cut out us nurserymen; you won’t buy any of us, because we can’t afford to sell them to you from such beds at less than \$8 to \$10 per 1,000. And so you will buy the plants from the fellows that will sell them the cheapest; and cheap plants can only be had from non-fruiting beds.

President Cook: Would you restrict the fruitfulness for those mother plants?

Mr. Hale: No. If they overbear they won’t make plants at all. But if you can get a few plants from one that will overbear, from my experience—not carefully conducted experiments, but from the general experience of a fruit grower of year in and year out, for a good deal more than forty years—I would say the best plant you can get from the plant that will fruit the most is the best.

Going back to the nurseryman’s tree: The propagating from the nurseryman’s row is all wrong, from the man who grows trees for fruit; but how many of you here will buy the trees from the nurseryman who will propagate from the bearing tree, and pay the price he will charge you? None of you. So you go to buy from the cheap nurseryman. It is all wrong; but the buyer of the trees is to blame for it because you want that which is the cheapest, not the best.

Mr. Post: We get around that all right. We buy those cheap trees and then top work them.

Mr. Hale: That makes a lot of work and seldom fully satisfactory.

COMMERCIAL APPLE CULTURE.

(J. H. HALE, CONNECTICUT.)

Mr. President, you seem bound to have a Hale of a time. (Applause) I wish that subject had been proposed a little differently almost—“the awakening of the apple” would be a good text to talk upon, because while the apple is our oldest and our best fruit, we are just beginning to awaken to its possibilities as a food supply and a foundation for a good living, and possibly an ample fortune on many of our American farms—no fruit that can compare with it in its surety and permanence of value.

The apple came into this country in the early days, certainly in New England our old Puritan ancestors planted their first apple trees for the purpose of getting something that would make drink, rather than food; and I imagine that a large number of the early apple orchards in Michigan were planted as much or more to fill the cider barrel than the family food supply. But within recent years the consuming public at large steadily have been appreciating fruits of all kinds, and the demand for fruits as food

has grown away beyond the conception of the most of us, and the apple is beginning to take its proper place. It is the one all-the-year-around fruit supply that the family in village or town may have, or that the land owner, the farmer who has suitable lands may have to offer on the market the whole year around. No other fruit can approach it in that particular, its long keeping qualities, its ability to be handled in more ways than any other fruit product can, its beauty of late years, that is, as we have learned to improve it, thereby adding very greatly to its distinction and demand everywhere. So that the apple as a great commercial crop in America is just beginning to take its place. That you have not appreciated it in the past is plainly evidenced to one who travels across your state as I do occasionally two or three times a year, along the line of two or three of your main lines of railway, and see the tremendous neglect of your apple trees. The God of nature has been wonderfully good to you to allow you to set trees in the land and then, without any apparent care whatever, give you as much good and wholesome food as does come from those apple trees; and if you will awaken to the real possibilities of the apple, I know of no commercial interest, either agricultural, horticultural, or in any other of the commercial walks of life, that will offer as good rewards for intelligent, patient labor as the handling of the apple tree.

Now I have not come here with any fixed address or any fixed plans of telling you how to handle the commercial apple orchard. You are a lively lot to ask questions I notice; so I imagine whatever we get out of this talk will be when I have a chance to "sas back" to some of your questions more than in any other way. But I have made a few notes here of some profitable branches of the subject which I want to touch on. Speaking of your lack of care of apples—I mean the general lack; not of the members of this society who care for them thoroughly and well, but of the general care of apples, which holds true in New York and New England and all over this great country of ours. It is because the apple is so wonderfully responsive to just being put in the soil that it takes care of itself. I often think when I see the way the apples are handled, that the men with apple love in their hearts and apple brains in their heads are lacking, a good deal as the old darkie on my place in Gorgia told me a few years ago.

A Thomas E. Watson come over there—who was afterwards candidate for vice-president on one of the great national tickets; he came over there and made them an address; he was a very able and good man, and talked three hours, and told stories, and stirred them up about the Populist Party and what it might do for them. The next day they were down about the barn at the noon hour discussing his lecture, telling of the stories he told, and repeating some of his arguments, when one of the old darkies, who was wiser than the rest of them, says: "Oh, suah, yo' niggahs don' want to lose yo' heads an' go off after this Pop'list Party. You'se gwine vote de Republican ticket if yo' want to; or better yet, vote the Democrat ticket with you'se friends an' neighbors; they are the men that pays de taxes. Yo' vote fo' dese Pop'lists an' yo' done git in trouble. De way dat Tom Watson talks, dem Pop'lists has done walked off anyhow." The darkies all laughed. I had to go away at that point. Later I said to this old darky: "I heard your advice to those folks, but said one thing that I didn't quite understand. When you said the Populist Party had walked off, what did you mean?"

"Don't yo' un'stan' dat, Cap'n? I'se heard that when folks is queer, they say they'se done walked off."

What do you mean by that?

He said, "Cap'n, I don't know as I can make you understand."

I assured him I would do my best to understand.

"Yo' know de Good Book say dat de Lawd He make man out of de dust of de earth."

I admitted I had heard that story.

"Yes, Cap'n, but yo' know if de Good Book do say dat de Lawd made man out of dust of de earth, He couldn't make him ouf of dry, dry dust like dat, if de Good Book do say so. An' de story is dat He made men out of wet dust and He set dem up against de palings for to dry, and then de Lawd go about He other business. By an by He done come back to put brains in dem, and some of dem done walk off before de Lawd got back.

That is what that darky says makes the Populist Party. I have made up my mind there are a good many land owners done walk off before the Lord got around with apple brains and apple sense, or else they would not neglect the apple as they do and would take better care of it because of its wonderful results when properly treated.

In Michigan, New York and New England the apple is a long-lived tree. In the central and middle and far west, where they are growing apples and planting large acreages, the trees come into quick bearing; in five or six years they are bearing freely, and in eight or ten abundantly, and in twelve to 15 they are fading off the face of the earth. An apple tree in Michigan is good for forty, fifty, sixty, and I suppose a hundred years. You have any quantity more than forty years old; and in New England we have them—I have had 15 to 20 barrels per tree off trees seventy years old. It is a great advantage to be able to own land and live in a climate where the conditions are such that the apple tree when once established and cared for will last much longer than the life of the man who planted it.

We can best afford in these fruit localities to give the apple the best land we have, the choice of the very best land upon our farms, provided its elevation or rolling condition is such as to make it desirable for high class fruit. I would not take our low land valleys, but high rolling land suitable for apple culture. We can afford to give the apple our very best land, and we can afford to give it the very best of care and feed and attention. If the apple growers in other sections of the country can afford to do things only half well, we certainly, with the trees so much longer-lived, can afford to do it as perfectly as we know how, and as others may teach us how. So that now is the time and here is the place for the development of the new modern apple orchard to its very highest state of perfection.

The apple wants, just as thorough soil preparation as for any other fine crop. Too many apple orchards are planted out in rough fields with just a moderate hole dug for the tree and the tree put in and allowed to make as reasonably fair fight for life as it may. But you can afford to take new lands for the apple orchard, and give it the most thorough preparation of ploughing and of subsoiling and of feeding and a thorough working in every way to get it ready for the young tree at the very start.

Then, again, you want to start with good trees. Too often when you get converted to apple planting, you always want to plant in a hurry; that is the American way of it; so you are apt to buy the cheapest trees you can find, nearest at hand. But if you can plan a little further ahead than tomorrow, an ideal apple orchard can best be made from trees two or more times transplanted before they go into the orchard. Whether the nurseryman can afford to do that, or whether you will be willing to pay him for doing

it or not, is a dollar and cents question between you and the nurseryman. But if you can buy a tree one or two years of age, and cut them down and prune the roots well, and plant them out in the nursery row, the trees perhaps a foot apart in a row and rows six feet or more apart, and feed them thoroughly well, and train them into something of the shape you want, and grow them there a couple of years, and then dig them up, top and root prune them, and plant them over again and grow them another two years in the nursery, you will have the ideal trees for making an apple orchard, and you won't put in any poor trees where you always want a good one. That means thinking four to six years ahead to get your apple trees in line. The finest apple orchards I have seen in America, in a small way, have been built along these lines, and I practice it myself to some extent; and I am well satisfied there is no use in fooling with trees out in a lot 40 feet apart each way, when for the first few years you can take care of them on a few square rods instead of acres.

We have come to the day of low-headed trees. There is no question about that, our trees must be down near the ground where we can get at them. There are so many things necessary to the production, to the manufacture—I used that word manufacture this morning, and I want to use it again, and you have got to continue to use it when you think about the manufacturing of fruits; this process must go on right under our eyes and under the touch of our fingers, and the easier we can get the tree and the plant where we can look at it and where we can handle it over and put it into shape, the more economical will be our production; and the one great item that enters into all production in America is the labor. I don't know as the labor problem has hit you here in Michigan; but can you get all the good help you want, at a moderate price, any time you want it? If you can, it is the only part of America that can do it. No, the labor problem in the orchard is a serious one, and I can't afford to pay men \$1.25 or \$1.50 a day to climb up a 20-foot ladder to spray or to prune or to thin or to harvest fruit, when they can do four to eight times as much standing on the ground. It is the expense account that must be kept down if we are to make a profit in any manufacturing business. I heard a traveling man on the road say yesterday there was no profits made in selling goods; it was in buying them; the profits made in business now were in your buying. Now you are buying apples, in a way, before you can get them to sell you have got to buy them from the land; you have got to furnish trees labor and materials and fertilizers, and every other expense that enters there production, and every penny you can cut out and yet increase the quality and quantity of production is the profitable penny to you.

So, then, our trees must first be annually pruned. I won't go into details of pruning trees, but they must be annually pruned, to a greater or less extent; they must be annually sprayed, as the good professor has told you here, at least three times; I would say probably the fine apple grower of the future will make it six or eight times. Some people like to cut it down to twice, most of them to once, and some never do it at all; but the profitable apple orchard of the future is going to be sprayed six to eight times; and if the tree is down close to the ground it can be sprayed most economically.

Saturday, before I left home, I had two men with knapsack sprayers—not power sprayers; well, it was Italian power; but, “by the power of Mike Kelly,” it was good! They were eight-year-old trees, but they were low-headed and close pruned; and the most economical thing for us to do at that time was to give those men knapsack sprayers and let them go out there

and do the spraying; and my man told me Saturday night there had been two days, and a half, had finished 21 acres, two of them, with two knapsack sprayers. Twenty-one acres planted 30 feet apart. But they couldn't have done it if they were away up high head trees. That would have required the use of power sprayer two hours and three or more men at greater costs.

Then we come a little later, and we are going to thin the fruit. The apple will all have to be thinned. We are going to have apples that will bear like your Warfield strawberries. Any apple tree that is thoroughly pruned, fed, sprayed and well cared for will set more fruit than it can bring to perfection. Therefore we are to thin our apples, leaving only the best to mature, and if it is near the ground the cost has been reduced enormously on that item, and when we come to harvest our apples we are going to pick them two to four times over to get the entire crop when each apple is at its best. We are not going to let the first matured ones tumble to the ground, and the second matured ones tumble to the ground; but we are going to intelligently and harvest our apples as they mature upon the tree, and be a month in picking the apples from the orchard or a single tree. You don't pick your peaches all at once, do you, Mr. Secretary? You don't pick your tomatoes when they begin to ripen, and say, "Hurrah! the tomatoes are ripening," and let the first ones rot, and half through the tomato season pick the entire crop rotten, ripe, half ripe and green altogether. No, you pick every other crop under the sun as it comes to maturity. When it comes to the apple, it is one grand grab of the midst of the crop. The commercial apple grower of the future is going to pick his trees from two to four times over. That means work, but it means much lessened work if it is a low tree.

So I don't like to see the apple orchard of the future stand more than 12 feet above the ground at the very highest. I know trees in Michigan that have bodies 12 feet high, and branches up beyond, where it costs too much to harvest the apples.

Some talk of planting dwarf apples. Some of you professors down east have got the disease, haven't you? There is considerable talk that we are going to dwarf apples. I have watched the dwarf orchards, and I don't think we are going to plant dwarf apples to any great extent; but I do think we are going to dwarf our standard trees and cultivate them and prune them and shape them, continually holding them down, and when we have got them to about the bearing size we want them, by a severe root pruning partially, and partially by good sharp summer pruning, we are going to shock them into a semi-dwarfness and keep them where we want them as bearing trees. I know that can be done both by the summer pruning and by the root pruning process, that will stimulate fruitfulness. I believe we want to crowd our apples into as rapid growth as possible from the time they are planted in the orchard until they come to a bearing size. Then if we want to let them go to grass or want to slow them up, there are many ways we can do it, and that will stimulate fruitfulness. But I do believe in the thorough culture in the early years of an orchard's life. I believe it should be thoroughly cultured and liberally fed; preferably I would use chemical manure to stable manure, but if I had not the money to buy the chemicals, and the stable manure was handy, I would not be stingy of that, and I would keep most liberal cultivation going during the early months of the year, early in April and through May and June, and after that, seed it down to some crop. Early cultivation each year—and you cannot begin too early in the spring—fast growing and early maturing of the apple; wood

each year, and when the tree gets to its right size, a shocking into semi-dwarf will throw it into the heaviest kind of fruitfulness.

The question of spraying, what for, when and how you have had touched upon here today most thoroughly; no use going into that again only keep improving on your methods.

The question of feeding is an important one, because my own experience as grower and the handling of commercial fertilizers, or the growing of fruits with commercial fertilizers entirely for more than forty years, has convinced me you can affect quite largely the color and the texture and the quality of your fruits by the fertilizers you give them, from liberal applications of phosphoric acid and potash, and especially potash on the character of soils you have very much in Michigan; in your lighter soils, unquestionably the liberal use of potash will add greatly to the color of the fruit. By studying we find that the land what will go in one section will not work in another; and I believe it is every grower's duty to become an experimenter, all the time finding out what his trees and plants want, and giving it to them as well as he is able, and thus he will get the greatest results.

The free, open-headed style of tree that will let sunlight in to nearly all the apples is essential. And of course the case of spraying is not to be left out of account at any time in pruning, from the early planting of the trees.

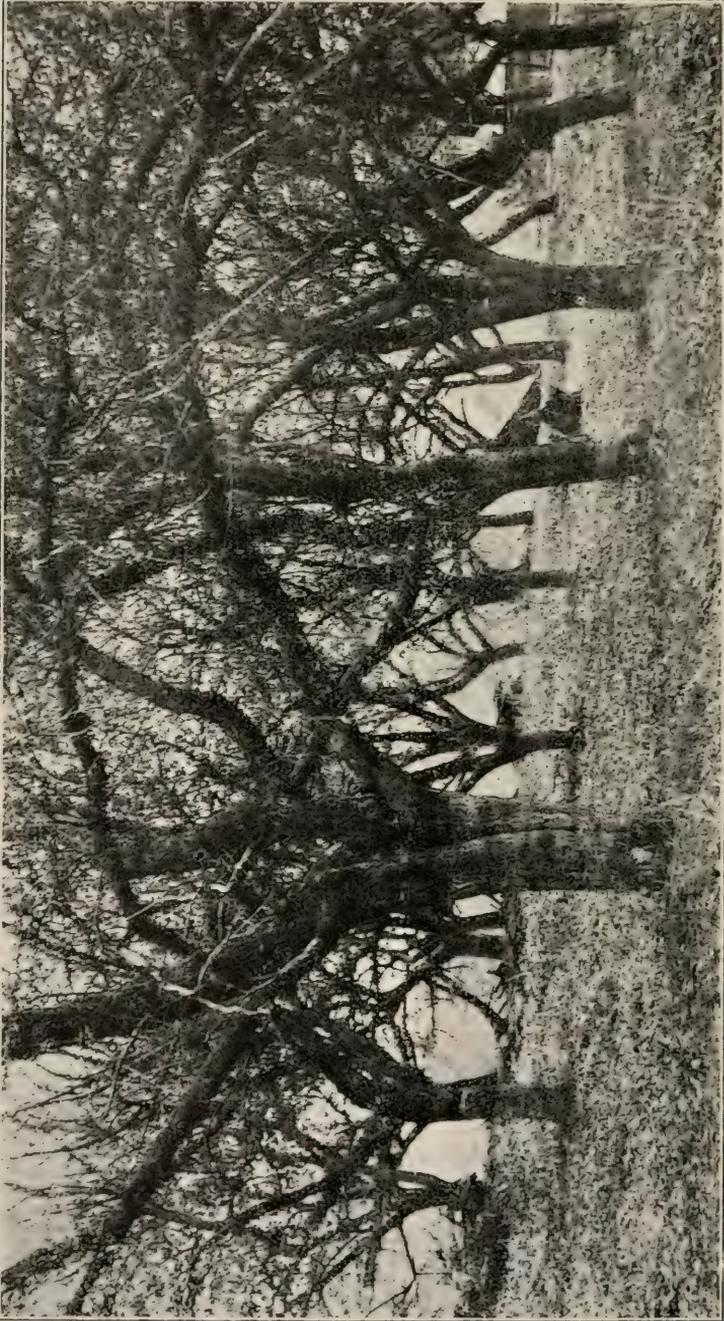
If I were to emphasize any one particular essential on the final development of any kind of the tree fruits, there is nothing, seems to me, that has ever paid me as well, particularly in plums and peaches, and in a more moderate way in apples—no one thing has paid me so well for the labor invested as that of *thinning* the fruits so there might be a proper distribution upon the tree of what were left, taking off all the indifferent specimens. I know there are farmers and fruit growers, and you have got to differentiate between them who will laugh at any hint of apple thinning to improve the product. I think the apple growing of the future is going into the hands of specialists, and I don't believe the average farmer with 25 or 50 or 100 apple trees on his farm can afford to keep them there; or, if he has them there, will he find any market for their poor product that will pay him. He has got to grow better apples or else buy better apples of his neighbor. But you talk to the average farmer in Connecticut or Michigan about *thinning* his apples, and he will say it is absurd to thin the apples. "Why, it costs enough to pick them in the fall, let alone thinning them and throwing them away!" If you are growing the ideal apples that the people of the world want now and in the future and are willing to pay for, you will have to do these things. Of course these fancy stories about Rocky Mountain and western apples selling at \$3.50 and \$4.00 a box out there, and selling at \$3.50 to \$5.00 a box by the carload in the eastern market, are all very pretty tales; but the great body of American people won't buy and can't buy large quantities of apples at those prices; but they can buy millions of barrels of apples at a price that will bring profitable returns to the man who will deliver the goods, and the one that has the most beautiful apples will get the most profitable market; and I can assure you it will be high enough to give a good profit to the man behind the gun in doing it.

The handling of apples. I was interested in what the Professor said in relation to those apples that were carefully handled and those that were roughly handled: Eighty per cent went down in decay in a given time where they were just poured into the barrel, where only 21 per cent went down where the same apples were carefully placed. Just think of that! Think of that! We are looking for good investments; we have got a little

surplus money we think we can put somewhere where it will pay 8 or 10 per cent; we think we have got a soft snap; and then think of the 80 per cent thrown away in the handling of those apples! For greatest profit the apples wants the most careful handling, careful picking, careful placing in the basket, immediate going to the packing table, not to be dumped in a pile in the orchard but to go to some packing table, where by hand they are carefully assorted into proper grades and packed in whatever package they are going to market in; if it is going immediately to market, then moved on by the best means of transportation you have; if it is a winter product, not going to be sold right away, put it immediately in cold storage. Never go to bed at night with any apples out in the orchard that have been picked that day. Put them in cold storage, if you are after the profits; if you are not, why dump them in a pile and leave them there to sweat out, or leave them there a few hours or days or weeks. Experiments I have made convince me no grower of high grade fruit that he hopes to put on the market a little later on can afford to have it out of cold storage an hour hardly after it is off the tree, plant or vine, if he wants the highest results.

Every horticultural community, and every agricultural community for that matter, should have a cold storage. Most of your farms are not large enough so you can have them individually; but you can get together. Every other class of men but farmers have to pull together or go down. Farming is such a glorious good business that you can live in spite of it. There is no other business that would stand up under the terrible neglect that agriculture has. That proves to me it is a great business. Get together on this cold storage matter and have a cold storage warehouse, so that your fruit may go to it every night when you have finished packing, and then you can lie down and sleep with a clear conscience and good bank account, and if you want to go fishing for a month you can go, because your apples are where you can handle them properly later on.

These are just a few general suggestions as to commercial apple culture. I believe these things from the bottom of my heart. I have not felt them in the past as strongly as I ought. The trouble is with the apple business, we don't any of us get the fever early enough in life. You talk to the young man here today of 20 or 21, and tell him of the possibilities of 10 or 25 or 50 acre apple orchard in Michigan, and the question he will ask pretty soon will be, "Let me see, when may I look for cash returns?" And you tell him, "Well, you will have to wait ten years it may be." Ten years! That is a long ways off to a boy of twenty-one, and he goes into something else. He will get a clerkship in a store where he can get six or eight dollars a week right away. At thirty-five or forty, ten years doesn't look so far away; but it is a good ways off; until he gets past forty he doesn't realize what a short time ten years is. And my observation of the apple situation all over this country is, that the majority of apple orchards are planted by men over fifty years of age; and the men with real pluck and courage going into the apple orchard business are often past sixty, and some past seventy; and I know one past eighty starting a big apple orchard. What is ten years to a man of eighty? But the chance is for the boy, for the young man. And if you will take some of your dad's apple land, or some of her dad's apple land, and plant it with the kind of apples that will grow in Michigan, and give it the care and attention you will have to give somebody else's business if you sell out your time to them, there is a glorious chance for you right on many a Michigan hill, many an American hill all over this great country. But don't think that you are "going west to grow apples;" that those "Oregon



A Typical Close-planted, Diseased, Unprofitable, Sod Apple Orchard of Michigan



A Loaded Tree in Orchard of J. H. Perry

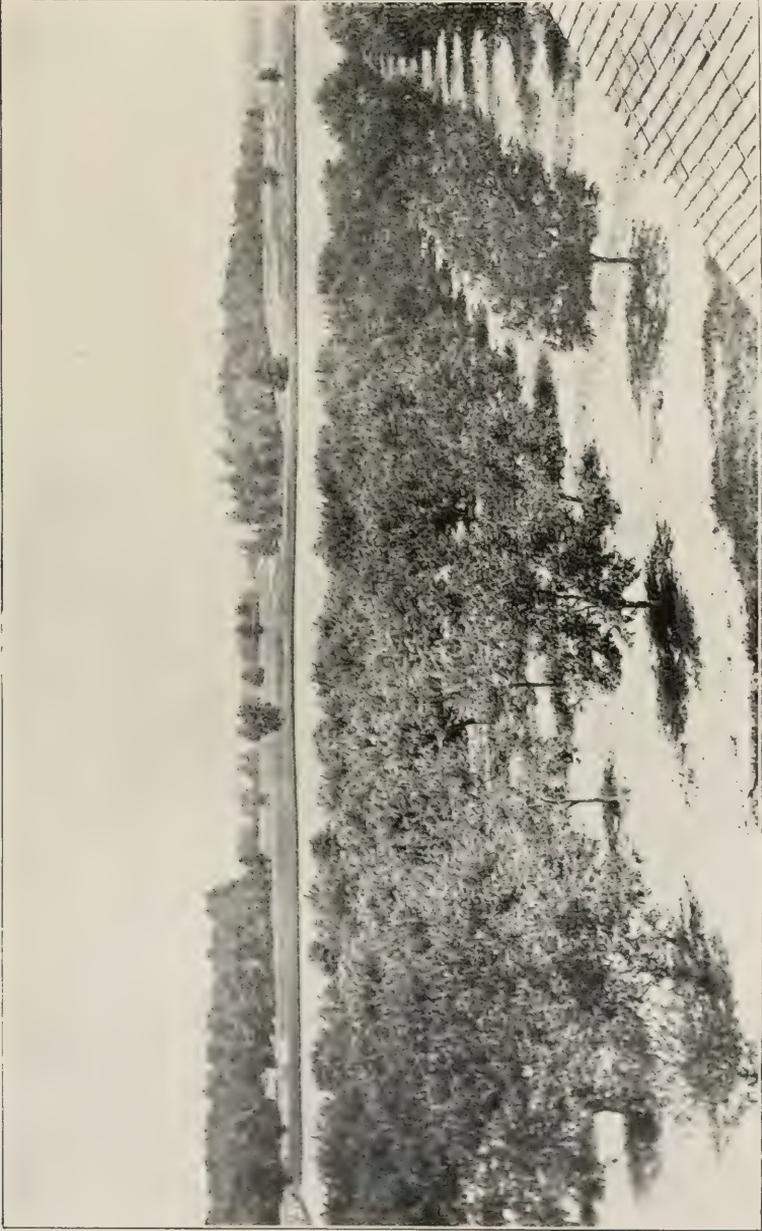


Apple Orchard of J. H. Perry, Goodison, Cakland County



Offered for Sale in Grand Rapids

Is it any wonder that many people are eating oranges and bananas in place of apples? The remedy is to produce first-class fruit and then market it so carefully that it will reach the consumer in a perfect and inviting condition



Profitable Young Orchard of A. M. Bullock, Lareer

apples," that those "Idaho apples," those "Colorado apples," or those "apples from Missouri" or somewhere else are the apples to grow, and that they are the ones you are going to make money on. Wherever you are fairly well located, just look around about your own home place. There is a glorious opportunity there, and my experience in life is that most of our best opportunities are right close at home, if we will only open our eyes and see them. (Applause.)

DISCUSSION.

President Cook: Regarding root pruning, will you give us a little light on the subject as to how and when?

Mr. Hale: I will tell you how I got on to that trick some years ago. I had two Yellow Bellflower trees in a very rich, fertile spot, that were growing very rapidly, reached some 16 or 18 years of age, and had never fruited to amount to anything. We were obliged, in digging a ditch to drain a swamp, to go within six feet of those trees and cut down twelve feet; so we cut off all the roots on one side of those trees. It was done in midsummer—July or early August; I imagine early August, but it doesn't matter particularly. Those trees bloomed freely the next summer, the first time they had ever bloomed freely, they bore a tremendous crop of apples. They never made much of any more tree growth but have always been fruitful and that shock to those trees gave me an idea that shocking to a greater or less extent was a good thing for apple trees that were growing rapidly and not fruiting. I have since had vigorous growing trees at 8, 10 and 12 years of age that were making trees and not fruit, and I have tried a rougher plan of putting in a very big four-horse plough and breaking up the land away down deeper than we usually plough, putting in a heavy subsoil plough and of course breaking and tearing the roots and no doubt injuring them. Unquestionably roots ought not to be pruned that way, but in every instance it has checked tree growth and stimulated great fruitfulness; and that is the way I worked it. I feel that it injures the tree; I know that it weakens the tree; I am quite confident that the tree won't live as long; but what I want apple trees for is for apples, and not for growth and beauty of wood. And so from several experiments of that kind I am satisfied that this plan will check the tree growth and will stimulate early fruitfulness. Therefore I say crowd the growth of the tree early, and grow trees just as fast as you can grow them by early summer and spring cultivation, not by late fall growth; and when you get them to the size you want break up the roots in that way or some other in midsummer.

Then again, I have practiced a good deal of summer pruning with my peaches. I feed the peaches pretty liberally and grow them pretty fast and get the wood so big and heavy when they are three or four year old trees that I have tried summer pruning with them. I have gone right in and thinned out a great many of the surplus short, entirely in July where from three to five feet in length—thinned out perhaps half a dozen from around inner part of tree; and then I have taken the others and cut them off from one and one-half to two feet; I have taken others and gone in a little earlier, along in June, and thinned out the surplus branches and punched off the others to stop an upward growth, and I have shocked those trees so they have never grown to as big size as trees not so pruned. They get right into the game of peaches; that is what I am playing with them for, and they get right into the game and give me what I am after. That has led me to try the same in summer pruning on six, seven or eight year old

apples, and wherever I have pruned them heavily, stopped their growth in summer, I have at once stimulated fruitfulness of the tree and also checked tree growth. Now for the beauty of the tree, an ideal great big apple tree, I am all wrong; but for a tree down where I want it, one that will bear apples and be of a size I can handle, for the tree and its *fruit*, that is what I get by summer pruning.

Prof. Fletcher: Just one caution with reference to summer pruning, that I think Mr. Hale meant to bring out: that is, it is not a general practice, like spring pruning, for all trees; but is only for trees that are growing very vigorously. I have seen whole orchards of apples on the Pacific coast ruined by summer pruning. Trees which are growing very vigorously can be checked and thrown into fruit by summer pruning; but if trees are not growing fast you are likely enough to seriously injure them. So one has to use great judgment.

One other thing; he has mentioned the neglect of apples in Michigan; and I think we may well take his word with shame. If you will examine the figures on the wall you will see that Michigan has gone from fourth place in apple production in 1890, to seventh place in 1900, and where she is now I do not know. You will also see that during the last 50 years we have been practically at a standstill as regards the number of bearing apple trees. In peaches we are first; but in apples we are sadly behind. I think we may well devote considerable time, Mr. Chairman, to the importance subject of brushing up our apple industry. I think we ought to be ashamed for the condition into which it has fallen.

Q. I would like to ask Mr. Hale if he doesn't think that if an orchard that has been under high cultivation and grown very vigorously as an apple orchard, were seeded down, if that would not have a tendency to stop that?

Mr. Hale: Yes, sure.

Prof. Hedrick: I will try and tell you in just a moment the results of some experiments that have been carried on in New York in regard to the real values of sod mulch and tillage. About 1900 Mr. Grant Hitchins, near Syracuse, New York, grew a crop of beautiful apples. Mr. Collingwood, of the Rural New Yorker, and Mr. Johnson, of the American Agriculturist, saw this beautiful fruit, heard Mr. Hitchins' story of how he grew it, and immediately began to advocate the sod mulch method of taking care of apple orchards; advocated it for all conditions. The experiment station in New York, and, for that matter, nearly all experiment stations are advocating and have always advocated tillage as the best method for taking care of the average apple orchard, or any other kind of orchard; and when thus challenged by these newspapers as to the value of tillage for orchards, and being pressed by the newspapers to show any definite instances or give any results or experiments, they were unable to do so; and Prof. Beach at the Green station immediately started two experiments, one on the farm of Mr. Grant Hitchins and one on the Octor farm. I can give you the results of the Octor orchard. We have had four crops in the Octor orchard. I may say the Octor orchard consists of ten acres of Baldwins, not a tree missing, thirty-five years old, wonderfully fine trees, as good trees as can be found of that age in Western New York. Several trees in the orchard this year bore ten to thirteen barrels to the tree. The orchard was divided into two plats, five acres tilled and five acres sod mulch. Sod mulch treatment consists in cutting the grass, allowing the grass to grow as high as it will and cutting it and throwing it around the trees, or throwing it on the ground. The first year the sod mulch trees gave a slightly larger yield than the tilled; the

second year the tilled plat gave the greater number of barrels of fruit; the third year the tilled plat bore 530 more barrels of fruit, while the sod mulch plat bore only 210 barrels of fruit: more than double the quantity of fruit on the tilled orchard than on the sod mulch plat. This year again we have had nearly double the quantity of fruit on the tilled plat that we have on the sod mulch plat. In dollars and cents this year we have taken from the tilled plat a little over \$1,200 and from the sod mulch plat of five acres, a little less than \$600; so that we have, while we have doubled the yield we have doubled the amount of money that we have taken from the two plats. By the way, those figures give you an idea of what ten acres of apples can do; and when I tell you our experiment station pays the lessor \$1,000 a year for this ten acre orchard, and that they pay \$500 a year for taking care of it, \$300 for supervision, and \$200 for labor, for ten years, you will see what an apple orchard is worth, even when half of it is grossly mismanaged by the sod mulch system.

You can tell the difference as far as you can see the trees. A half mile from the orchard you can see that the tilled trees have the greener foliage and are making the longest growth; the annual growth is double on the tilled plats that of the sod mulch tree. This particular orchard is, as I say, in the heart of the western New York apple region, and is typical of all that great region.

In the Hitchins orchard—and I am not so familiar with the figures there—the conditions are different. His orchard is on a sloping hillside and underlaid with an impervious subsoil, so there is always water there; in June, if you attempt to dig a post-hole in the Hitchins orchard, you will strike water; and it is owing to this fact that Mr. Hitchins, I think, has the success he does from the sod mulch trees; and there are orchards where with this unbounded water supply sod mulch will do. And then again, on the steep hillside farms that wash through cultivation, sod mulch will do there; but for the commercial apple grower I am very sure that the tilled orchard is the thing in Western New York. Mr. Collingwood is here, and I am going to ask him to tell what he saw in that orchard.

H. W. Collingwood: It does not take long, you know, to tell what you don't know—or it takes a long time would be closer to it.

Prof. Hedrick said I have been what we call a mulcher. For reasons which seemed to me good, I thought it was better for me not to cultivate, to plough, and harrow and till the ground around my trees. I must confess that after I saw that orchard as Sough Cross I never was so thoroughly tempted to go home and plough up the orchard as I was then. But after I got home I began to think that thing over a little closer; I made up my mind I would let my orchard go as it was a few years longer. Now I think that Prof. Hedrick with his Geneva Experiment Station has, in conducting that experiment, done a wonderful service to the people of Western New York. There can be no question about it whatever. They have demonstrated, in my judgment, absolutely beyond any question that if a man is getting on now with high tillage, he ought to keep right on doing that; that it would be a great folly for a man who was getting good results under high tillage to seed down that orchard. Asked whether that proves to a man who has a sod orchard that he ought to plough or cultivate, I think something more is needed. I think the station should take into consideration an orchard now in sod; I think they should take some old sod bound orchard—which represents, as I believe, the great majority of orchards in Western New York I think the station should take an orchard of that kind, plough up half of

it and give it the most intense culture possible; I think they should spend the cost of that tillage in fertilizing, and put it on the other half of the orchard, and cut the grass which grows there and leave it on the ground. In other words, gentlemen, it is always a more forcible illustration to see improvement than it is to see degeneracy. No human being can go through that orchard that Prof. Hedrick has been talking about, without being impressed with the fact that the tilled part is far superior to the other; the growth on the trees would average four or five inches of new wood; the growth on the sod mulch would barely equal one inch—half an inch I think would come closer to it. A man with good spectacles, or a telescope, twenty miles away, in viewing that orchard could tell where they stopped tillage. But I don't think that is exactly the point anyway. You seed down any orchard, however good it is, and the first tendency would be for the grass to grow and take away plant or moisture from the tree. You have to put fertilizer on that grass in order to make it compare with the tillage.

Prof. Hedrick: We did part of it.

Mr. Collingwood: I believe that will help the experiment. I went home and I looked at my old rough hills all covered with rocks and stone walls, and I noticed that the very best trees on my farm are just like a lot of trees in that experiment that are on a stone wall. I think Prof. Hedrick will agree with me there are a dozen trees in the orchard which are growing within comparatively few feet of a stone wall, that are just as good as any he has in the tilled portion. Am I right, Prof. Hedrick?

Prof. Hedrick: Yes.

Mr. Collingwood: I think so. Those trees have not been cultivated, and evidently there is something in the soil under that old wall that makes the tree grow and makes the fruit grow and gives it high color. Those of us who have two-thirds of our ground covered with rock—I have three miles of stone wall around my farm—I may say that, going there and comparing the cost of tillage with the cost of the other sod, made me go home and think I would plant all the trees I could along my stone walls and let them alone. But there is one thing I am going to do, and I wish I could get fifty men in this audience to go into a club with me—is to take 400 peach trees planted in the sod, that have not been ploughed or cultivated; I am willing to plough half of that orchard up and handle it just exactly as Prof. Hedrick will say. I have got an orchard of 500 apple trees, and I will try to do the same thing with that. Not one of those orchards have ever been ploughed, mind you. That is different from yours. I will plough half the orchard up, and I will put the cost of the tillage in fertilizer on the other half, and cut the grass; I will do the same with the apple. I think a lot of us ought to get together and not leave the burden of this experiment on this one station. Mr. Hale will do it; he will seed down several acres of his peach orchard; yes, he will.

Mr. Hale: I don't dare to be a fool, when I know better.

Mr. Collingwood: All right. I think one of the best experiments we could have would be to make a universal experiment. Let us ask Prof. Hedrick to make out a schedule for handling that half of that orchard, and let us go right in and rip up that sod and do just as he tells us. Let us put fertilizer on the other side, cut the grass and leave it around the trees, and report from year to year. I think that would show something, because it would scatter it all over. I have come to the belief that this matter of mulching is largely a matter of sowing, and perhaps a matter of variety. If we had a very wet sowing, with natural water running out of it, springs

there, very wet in the spring—now by mulching, the grass will be there growing up and taking part of that water out of the soil, and I believe mulching would be a good thing for it. On a very dry soil or in a dry season, I must stand convinced that on the typical soil of Western New York they have got me on the sod mulch. There is no question about it. When you go and see an apple that size (showing an apple) and another one bigger than my fist, on trees growing in that way, and absolutely no difference in the world that you can point out, except that half of the orchard is tilled and that half of the orchard was not, it will convince everybody but a blind man, and I don't know but you would convince him if you could take him through the orchard. I think, however, as I say, that that experiment does not show it all, Professor. No, I think not. I should like to have others try it. (Applause.)

Mr. Post: I have been experimenting on this line a few years, and Prof. Taft has been up there a few times, and there is one thing you have not hit on exactly, either one of you, I think, and that is, working half the ground. I presume Mr. Hale will make fun about that, but I don't care, you know, and he will think it is kind of half doing one thing or the other. I leave a strip—part of my ground is hilly, some of it is not so hilly; part of it is quite steep; it is good soil, a dry soil; it is not that damp soil; it would not do to leave that in sod right along; it would all dry up in the hot weather in the summer. I can go through and plough that all excepting a strip, for instance, from four to six feet wide; it won't wash. I won't cut that sod all out of there, but I will break it up; I won't leave it in sod then; I will reverse it and plough it the other way; but I will leave a strip there; and I will say that my orchard this year is just as thrifty as it ought to be; it is just coming into the bearing age, about fifteen years of age; and it was growing too rapidly and I seeded it down one year and left it there, and it checked it a little, and I had about 5,000 bushels off it.

Mr. Simmons: I will tell you where I think you all make your mistake. In starting out, instead of mowing your grass twice or three times each season, you let that grass mature.

Prof. Hedrick: We mow it twice.

Mr. Simmons: And you fertilize it? You have to make up for what you kill.

Prof. Hedrick: We fertilize parts of both plats clear across.

Mr. Simmons: I think that is a great mistake many make, in letting their grass mature, and mature seed, and that draws heavily on the land. I am not a sod mulch man, and I feed cattle in the winter, and we draw all the manure we can get and I buy all the straw stacks I can buy and all the poor hay I can buy, and I put it in my orchard, and I will say I am having fair success in that way; although I think where you have not sufficient fertilizer, that cultivation is the great thing, and this year especially, with the dry weather we had; if we had cultivated, I think we would have got larger sized fruit by it; though our apples, it is almost impossible to get a color on the face of the red apples that is satisfactory to the buyer, by cultivating them.

Mr. Briggs: We have two acres of orchard that has been in sod mulch for thirty years. The past year I returned all barnyard manure to it. It is now in mulch, and has been right along. It has borne very heavily; is I think forty-two years old. These two acres this year brought in \$750 an acre. I suppose that by cultivation it would have brought in \$1,500. Our young orchards we have sod mulched. We started them that way, and they

have been ever since, and they are not on wet land at all, but on rolling land, and they have done remarkably well every year.

President Cook: There has not been anything said about the varieties that this young man, or this old man, or this middle-aged man shall set out in this Michigan orchard. If it is a proper time and place, I would like to have that discussed. Question No. 2 on the program is called for.

Q. Name four of the best varieties of winter apples for commercial orchards in southern Michigan, including two early bearing sorts. Four for northern Michigan?

Mr. Scudder: I do not know just exactly what I would suggest, but my opinion would be that I would stick to the old standard varieties, although for early bearing apple I think the Wealthy is an apple that comes very early; and the Wagner is another. I would plant Northern Spies for southern Michigan.

Mr. Halsted: A great many people are planting Jonathan, Spies, and Rhode Island Greenings, which are the three principal varieties at the present time.

Mr. Hutchins: There are a number of best varieties, and I do not know as there is any one best variety. There are advantages and disadvantages. The Spy is one of the best varieties, but it is a shy bearer. The Greening with me is one of the best varieties, but a good many people do not like it; it is a regular bearer, does not over-bear; the fruit is good size; and it has a reputation in the market, and it sells. The King is a good variety, but there are objections to that. The Wagner is a splendid variety, but there are objections to that. They all have their advantages and their disadvantages. While there are a number of them that appeal to me, if I should advise you to plant them, you would probably be disappointed and curse me for recommending them so highly.

Q. I would like to ask about the Grimes Golden. Is that a success?

Chas. Wilde: In Kent county I think Grimes Golden is one of the best bearers we have. It stands ahead, I think, of most anything we have as a nice winter fruit, unless it is the Jonathan; but the color is a little against it, on account of it being a yellow apple. It is certainly very hardy and a wonderful bearer. The Northern Spy is probably the best market apple in this market of any I know. I have trees that are over 50 years old, and bearing as well as they ever did. The Shiawassee Beauty is a fine apple; bright red, a fine eating apple, and a very nice looking apple.

It is a late fall apple. Norton's Melon is one of the finest flavored apples we have; nice color, and good size; hardy tree. Probably the Jonathan and Northern Spy are the two best market apples that are well known at the present time. The Grimes Golden is better known, and if better color would be one of the best.

A Member: Some speak of the Steele Red, but I suppose the Red Canada is the proper name. They crack so it makes it almost impossible to get perfect apples of the Red Canada; and they are very shy bearers in Calhoun county.

Mr. Bassett: Give them the same care as Mr. Halstead and Mr. Simmons, and they will be all right. If you do not spray, you cannot raise any kind of an apple.

Mr. Simmons: If you come down with us and let us show you how to take care of those Steele Red apples, we will show you how. We can sell those Steele Red apples in the fall when the Greenings and your Baldwins have no market at all. You can sell them for a good round sum.

A Member: The Grimes Golden in the southwest part of Michigan is not a very marketable apple. It bears very heavily, but is not salable in southwest Michigan. I think Chicago is a good market for Grimes Golden. There seems to be quite an agitation about this Steele Red. A great many people get it in their heads to set out an orchard of Canada Red. If you have a sandy soil or red clay subsoil, and some limestone with it, and set out some good hardy variety like Tolman Sweet or Ben Davis, and top graft, you will have the most perfect orchard. Under other conditions you will not.

A Member: If I were going to top graft Steele Red, I should work through a Northern Spy.

Mr. Halstead: In eastern Michigan, in Henry C. Ward's orchard at Pontiac, he has about 200 acres in one block; and, as I understand, every other row is Wagner. His Wagners are bearing very well at a young age; they are not a large tree, and they are irregular shaped, unless exceedingly well cared for. In regard to filling, of course to get the best benefits of an orchard we must set them at a proper distance and let the fillers go in time.

A Member: At Grand Rapids we set out one-third Northern Spies, and then I put out some Baldwins and Greenings; I think there would not be much room left for anything else. Steele Reds do not seem to do as well in the Grand Rapids region as in the eastern part, where they are well treated. Grimes Golden are good when known better. I have about three dozen families in that city that want them.

President Cook: Jonathan, Spies and Greenings, the old, old timers, seem to stand right by. I think to those three we ought to add a good early apple, and that is the Duchess. It is an early bearer, a good seller every time, and I am more and more pleased with the Duchess.

A Member: I have a word in favor of the Baldwin. It is the best market apple we can raise in this part of Michigan. The shippers rather have it than anything else. It is certainly the best bearer we have.

Question No. 10: Shall we grade strawberries while picking, at the packing shed or not at all?

President Cook: I do want to change that just a little bit. I should say unless you had conditions of market which rendered it impracticable, grade them while picking. I should say if you were catering to a better market and want to get the best prices, by all means grade them. If you are going to an early market, and are hastening off the berries, I would say most emphatically do not grade them at all; but the only way to get the first class prices out of a good grade of strawberries is to grade them and grade them carefully. If the strawberries can be picked while in the pink of condition, it is all right to grade them at the tent; and one or two or three persons can grade a lot of strawberries and do it right. But if they get just a little bit ripe, then the pickers better grade them. You will get a lot better returns in that case by grading in the field, each picker his own judge, except as we are able to advise with them occasionally and keep them working to one uniform standard just as far as possible.

Mr. Hetzel: The last three years we attempted to grade strawberries in the field while picking, and every year we have abandoned it because we found there were nearly as many grades as pickers. We had the pickers to grade them, and had others to grade them afterwards. There are some pickers that grade strawberries all right, and there are others who never will learn to do it, at least I do not believe they will.

President Cook: If you are so fixed that you can keep those people

that learn to grade strawberries, and get the strawberries picked by them, and fire the other fellows, you are all right.

FACTORS AFFECTING HARDINESS OF THE PEACH.

(PROF. U. P. HEDRICK, GENEVA, N. Y.)

The peach affords a striking example of a plant undergoing acclimatization. In the wild state, this species is endowed with a constitution fitted to endure the heat of climates almost subtropical. Under domestication it is gradually becoming inured to climates far to the north of its habitat and so cold that at first it could not have lived in them. It may be that this change is somewhat due to acclimation in which the plant is naturally or spontaneously becoming habituated to cold, but the peach can now grow in colder climates than formerly chiefly because of the efforts of man to secure this change in the species. What are the means by which man can aid in acclimatizing a species or a variety to a climate at first injurious to it?

I have made two efforts to find some explanation of the varying behavior of peach trees during freezes and frosts, working at the problem from the standpoint of the horticulturist, and the information obtained in these investigations, show some of the means by which man is helping to acclimatize the peach and by which possibly other species might be acclimatized. In the spring of 1905 I addressed letters to about 100 of the best peach growers in Michigan asking for their experience as to the hardiness of the peach in tree and bud. In the spring of 1907 about the same number of letters were addressed to peach growers in New York. This paper is a brief review of the answers obtained. In making these investigations I have visited the orchards of many of my correspondents and have noted the condition of the trees under consideration and have a personal knowledge of many of the conditions discussed.

The factors considered in the investigation fall under two heads.

1. Cultural treatment which increases the ability of the individual tree to withstand cold.

2. Variations in the species favorable to greater hardiness to cold.

In presenting and discussing the information obtained, I shall advance few or no theories but shall simply set forth the facts that have been reported to me.

1. The factors of environment and of cultural treatment noted as affecting acclimatization are as follows:

I. INFLUENCE OF SOIL AND HARDINESS.

It is usually held that trees are hardiest on sandy, gravelly or stony soils. In the peach orchards of Michigan the growers consulted held this to be the case almost without exception. But in New York the kind of soil seems to make but little difference providing it is warm and dry. If these two factors be favorable peaches seem to thrive in any of the soils of New York. The difference in opinion between the peach growers of Michigan and New York arises from the fact that the great belt in which peaches are grown in the first named state has a sandy soil and growers there have scarcely

tried the peach on clays, loams or shales upon which some of the best orchards in New York are located.

But this point is made clear; *the peach must have a warm, dry soil* to secure the greatest possible hardiness inherent in the species. Only in such a soil can trees make a strong, firm, well matured growth that seems to be conducive to hardiness.

Many growers in both states speak of the desirability of a gravelly subsoil to secure a hardy tree. Such a subsoil seems to be conducive to the warmth and dryness of roots and it is probable that so far as hardiness is concerned it matters little whether this subsoil be overlaid with sand, gravel, loam, clay or combinations of these.

II. DOES THE AMOUNT OF MOISTURE IN THE SOIL IN WINTER AFFECT THE HARDINESS OF THE PEACH?

The evidence as regards this point is clear. Either extreme of moisture—excessive wetness or excessive dryness—gives favorable conditions for winter killing. A wet soil is conducive to sappiness in the tree and also freezes deeply. Severe cold, especially alternating with warm weather or accompanied with dry winds, causes evaporation of water from trees and if the soil be so dry as not to furnish moisture to replace the evaporated water, harmful results ensue. Several experiences were given in Michigan in which trees were injured far more from winter freezes in a dry than in a wet soil. The statement was made by several growers that twigs and buds which are more or less shrivelled in winter from lack of water or lack of maturity are almost invariably winterkilled.

III. WHAT EFFECT DO FERTILIZERS HAVE ON TREE GROWTH AND HENCE ON SUSCEPTIBILITY TO COLD?

It has always been held in theory that fertilizers with any considerable amount of nitrogen, as barnyard manure, cause trees to make a heavy, rank, soft growth susceptible to freezing. The majority of the peach growers consulted in this investigation still hold that such is the case, but a very considerable number of them, and among them some of the best growers in the two states, hold that trees are *more likely to suffer from cold if underfed than if overfed*. Their experiences indicate that vigorous, vegetable growth in early summer can be made of great service in counteracting cold, and that half starved trees, or those which have been allowed to bear too heavily, are apt to suffer most from freezing. Fertilizers properly used do not, in the experience of these growers, necessarily induce a rank, soft growth. By using properly balanced fertilizers, by stopping cultivation at the right time, and by judicious pruning, it was maintained that the growth could be kept firm, the top of the tree compact, and the branches well set with buds, *all conditions favorable to hardiness*. Practically all of the growers report that late fall growths are susceptible to winter injury of both wood and bud.

IV. DO COVER CROPS PROTECT TREES FROM COLD?

There were no conflicting opinions on this point. Growers who had planted cover crops, and nearly all had, were agreed as to the value of this method of protecting trees from winter freezing. Many individual cases were cited of orchards having cover crops surviving this cold winter or that when nearby orchards without the covering crop holding a muffler of leaves and

snow were killed. The peach growers in the two regions consider the cover crop the most effective treatment of their orchards to avoid winter killing, holding that they protect the roots from cold, cause the trees to ripen their wood quickly and thoroughly, and to assist in regulating the supply of moisture.

V. ARE SEEDLING TREES HARDIER THAN BUDDED VARIETIES?

Seedling peach trees are popularly supposed to be hardier than budded varieties. Most of the correspondents in this investigation state that such is the case but none give reasons for the supposed greater hardiness of the seedlings. The statements made are in no way convincing and the greater hardiness of the seedlings can be proved only by carefully conducted experiments. Two hypotheses should be tested in determining whether there is a difference in hardiness between budded and seedling trees: 1st. Budding may decrease hardiness. 2nd. Seeds for the stocks of the budded trees come from the south and these may produce more tender trees than would northern grown seeds from which seedlings come.

VI. IS THERE ANY DIFFERENCE IN HARDINESS BETWEEN LOW-HEADED AND HIGH-HEADED TREES?

All growers in both states prefer low-headed trees claiming that both trunks and branches are more often injured in high-headed trees. Buds, however, often survive on the higher branches and not on the lower ones. The reasons vouchsafed for the difference are: The effects of winds in drying out the wood of high-headed trees; low-headed trees are usually most vigorous; and lastly, better protection to the trunk from the sun and hence from sunscald, one of the effects of freezing and thawing. Attention is called by several growers to the fact that buds on high-headed trees usually suffer less from spring frosts.

VII. ARE WINDBREAKS A PROTECTION TO TREES OR TO BUDS?

There was much difference of opinion. From the experiences given it seems that the value of a windbreak depends largely upon the topography of the land. A windbreak so situated as to form still air can only be detrimental so far as cold is concerned. So planted as to deflect or cause air currents they become of value in keeping off frosts. More often than not, however, it was claimed, they seriously check atmospheric drainage and the damage by frost is increased. Another disadvantage is, should the windbreak be to the north, the buds on the trees thus sheltered are forced and are therefore more liable to injury by late frosts. The testimony was for most part unfavorable to windbreaks.

VIII. WHAT DEGREE OF COLD WILL KILL PEACH TREES?

There was a most surprising uniformity in the answers to this question. Nearly all of the correspondents set 20° below zero as the temperature that will kill the peach tree under normal conditions though some had known them to withstand temperatures of from 20° to 30° depending upon the condition in which the trees went into winter. The following are the conditions unfavorable to withstanding cold and about in order of the frequency in which they are mentioned: Lack of maturity of wood; lack of protec-

tion of roots by snow or cover crops; poor soil drainage; overbearing in the preceding crop; lack of vitality from ravages of insects or fungi; and the susceptibility of the variety to cold.

IX. WHAT DEGREE OF COLD WILL KILL PEACH BUDS?

From the answers to this question we are forced to conclude that much more depends upon the condition of the buds than on the temperature, assuming of course a temperature below zero and not greater than 25° which seems to be the limit that peach buds can stand even under most favorable conditions. The chief factors influencing tenderness of buds are: Maturity of buds; variety; and the time at which the buds of a variety finish their resting period and become ready to grow. Some of the factors influencing temperature are: Lay of the land; proximity to water; stresses of changeable weather; altitude, latitude, and currents of air.

X. ARE TREES FROM NORTHERN NURSERIES HARDIER THAN THOSE FROM SOUTHERN ONES?

Many opinions were expressed but few men had grown trees from different latitudes under such conditions as to answer the question fairly. The answers were in no way decisive and the question is still an open one to be settled only by direct experimentation with trees of the same varieties from north and south grown under identical conditions.

II.

The following variations in the species are favorable to hardiness:

I. DOES THE CHARACTER OF INDIVIDUAL TREES HAVE ANYTHING TO DO WITH HARDINESS?

Answers to these questions were very indefinite and often conflicting. It was held by some, and with a fair show of experience to confirm the contention, that trees naturally high-headed with few branches, long, spindling trunks, branches and twigs, have soft wood and are therefore more susceptible to freezing. On the other hand, that individuals having naturally short bodies, a goodly number of branches starting low, with short-jointed wood bright and clear when cut, and thickly set with buds, were the least easily injured by cold. One tree of a variety may be supposed to be slightly more hardy to cold than another through inherent variation but whether such hardiness can be detected through the character of the growth would have to be determined by carefully conducted experiments and can hardly be proved by such observations as my correspondents are able to make.

II. ARE THE SMALL-GROWING VARIETIES WITH COMPACT HEADS HARDIER THAN THE FREE-GROWING SORTS WITH LARGE HEADS?

Practically all growers say that the compact growing sorts are the hardiest. As would be expected the small headed varieties are those with the least succulent wood. The following varieties are named as being the most compact growers and hence hardier than the average: Hill's Chili, Crosby, Gold Drop, Barnard, Kalamazoo, Triumph, Wager and FitzGerald.

III. IS THE WOOD OF SOME VARIETIES MORE SUCCULENT THAN THAT OF OTHERS MAKING SUCH SORTS SUSCEPTIBLE TO COLD?

Every experienced orchardist or nurseryman knows that there is a great variation in the texture of peach wood. Some varieties have a much more succulent growth than others grown under the same conditions. Succulency of growth is in some cases a well marked varietal character and one that can be avoided in selecting sorts to plant where hardiness is a requisite. Summarizing the answers from New York and Michigan the following are the sorts most often named as having the softest and sappiest wood growth: Early Crawford and Late Crawford are named by practically all correspondents as being most succulent in growth, following which, named in order of degree of succulency come: Chair's Choice, St. John, Niagara and Surprise.

IV. ARE YOUNG OR OLD TREES HADIEST?

Beyond all question young trees suffer most in sever winter freezes. Practically all of my correspondents in both New York and Michigan agree to this and as a proof many of the Michigan growers give their experience in the several severe freezes that have occurred in that State during the past few years in which young trees universally suffered most. It is probable that young trees are injured most because they make a much greater and much ranker growth than the older ones and hence more sap remains in them during the winter. The formation of buds in the older trees is helpful, too, in maturing the wood. There are, however, many exceptions to the statement that young trees are less hardy to cold than old ones. Old trees can be forced to produce large quantities of new wood susceptible to winter-killing, while on the other hand the superabundant growth of young trees can be kept down by orchard treatment. It is fair to assume, too, that old trees possessing very low vitality are less hardy than vigorous young trees. Thus it was often noted that old trees which had suffered from the ravages of borers, or fungus parasites as curl-leaf or shot-hole fungus, were easily killed by cold.

While young trees are more susceptible to freezing than old ones yet they are much more likely to recover, if recovery is possible, and their return to the normal condition is more rapid. This is probably true because of the greater vigor of the younger plants and because of the possibility of an entirely new covering of bark for small trees often impossible with larger ones.

V. NAME THE FIVE VARIETIES OF PEACHES MOST HARDY IN WOOD.

There was as would be expected great difference of opinion as to the sorts most hardy. In New York the following five sorts, in order named, were considered most hardy: Crosby, Hill's Chili, Stevens Rareripe, Gold Drop and Elberta. In Michigan practically every grower considered Hill's Chili most hardy in wood followed closely by Crosby, then Gold Drop, Kalamazoo and Barnard. It was interesting to note that Elberta, Smock and Salway, considered fairly hardy in New York, are somewhat tender in Michigan. The three upon which growers agree in both states as begin hardiest are Hill's Chili, Crosby and Gold Drop. Wager, Jaques Rareripe, Carman, Belle of Georgia, Hale's Early, Champion and Greensboro, none of them in the lists of five hardiest, are harder than the average.

VI. NAME THE FIVE VARIETIES MOST TENDER IN WOOD.

Here, too, opinion differed but not so much as in naming the lists of hardy sorts. In New York the list runs: Early Crawford, Late Crawford, Chair's Choice, St. John, Niagara. In Michigan the first four are as in New York, Early and Late Crawford, Chair's Choice and St. John, followed by Smock which, strange to say, is considered a fairly hardy sort in New York. Michigan growers consider Salway tender in wood while in New York there was an even division as to whether it was hardy or tender. Elberta came within a vote of tying Smock for the list of tender varieties in Michigan.

VII. NAME THE FIVE VARIETIES OF PEACHES MOST HARDY IN BUD.

The New York growers named more than a score of varieties as being hardy in bud and were agreed only upon two sorts as being preeminently hardy, namely: Crosby and Hill's Chili, with Triumph, Gold Drop, Stevens' Rareripe and Kalamazoo having an equal number of votes for hardiness. The Michigan growers gave their opinion most decidedly for the five following sorts, scarcely any others being named: Hill's Chili, Gold Drop, Crosby, Kalamazoo, and Barnard with a few scattering votes for Triumph, Early Rivers, Wager and Salway.

VIII. NAME THE FIVE VARIETIES OF PEACHES MOST TENDER IN BUD.

Growers in the two regions agree as to the sorts most tender in bud. Not only are the same varieties given but in exactly the same order, namely: Early Crawford, Late Crawford, Chair's Choice, Reeve's Favorite and Elberta. Among other sorts named as being tender in bud in one or the other or both states are Old Mixon, St. John, Smock, Niagara, Surprise, Globe and Mountain Rose.

In summarizing the results of the investigations it appears that the peach is certainly influenced as to hardiness by the cultural treatment given. The presumption is, upon philosophical grounds, that the external influences of orchard management have a permanent effect upon hardiness of the peach and that the horticulturist is thus slowly but surely acclimatizing this species to greater degrees of cold than it could once stand. It appears, too, that there are favorable variations in the peach as to hardiness of wood and of bud from which the horticulturist can select and breed varieties capable of withstanding the vicissitudes of climates which in its wild state this plant could not have borne. We have, in cultural treatment and selection, means at the command of the horticulturist to acclimatize all plants and I have tried to set forth in their relative importance the chief factors as these means are now being used in the acclimatization of the peach.

DISCUSSION.

J. H. Hale: Mr. President, I should, in a general way, want to say amen to the reports as given by Prof. Hedrick. I am certainly convinced that he and his correspondents are right when they say that the most vigorous, well-fed, well nurtured, well balanced trees are more hardy than a half starved tree, more hardy in the fruit bud. I would want to emphasize that. I think he satisfies us it is correct, and my experience in growing peaches would warrant that. His other conclusions, in a broad general way, covered the situation as I have met it in New England and in the south.

The only addition, or subtraction, or whatever it may be, that I would add to his report is, when he speaks, or his correspondents speak of the hardiness of the fruit buds of certain varieties. I notice New York headed the list with Crosby and Hill's Chili, and Michigan with Hill's Chili, Gold Drop, Kalamazoo and Barnard. It struck me that your correspondents were just a little behind the light house; that is, that their reports were good six or eight years ago; and had they planted and tested thoroughly some of the more recently introduced varieties, their reports would have been different. Now I grow or have grown all these varieties referred to, and I have been up against the proposition of winter-killing of peach buds. That and the yellows are the only two things we have to fear. We do not worry about the San Jose scale or the other troubles, but the killing of the buds in winter has been the one serious proposition with me all through life; and so I have tested all these hardier varieties, and I have tested all the newer ones as they have come along in recent years, and I grow them very extensively both in Georgia and Connecticut, and today we find both the Waddell and the Carman hardier than either the Hill's Chili or the Crosby. And yet years ago those were our old hardy varieties. We find the Champion, under trying freeze conditions with us in New England, rather more reliable bearer than the Crosby and the Belle of Georgia, twin sisters of the Elberta; that is, the seed came from the same tree with the Elberta, or in the same year; a white flesh peach, full sister of the Elberta; it is one of our hardiest peaches in New England. We can put it under our most trying conditions, where we would not think of planting the Elberta, where we could not possibly grow a Mountain Rose or an Old Mixon or any of that standard type. We can plant the Belle of Georgia and get crops. We had in Connecticut three or four years ago—we do not brag about our climate as you do here in Michigan—we had fruit, following a fall in temperature to 34 degrees below zero in our peach orchards, on Belle of Georgia, on Champion, on Waddell, and Carman trees so that we had paying commercial crops. We had a drop in Georgia from 80 degrees above zero for two or three weeks, when the trees were in bloom, to 4 below zero, and it wiped out trees by the hundreds and thousands of acres; but a few Waddells bobbed up with peaches on the tree. And so I think if your correspondents had been testing all these peaches over any number of years, your report from Michigan and New York would have been different as to these varieties.

Prof. Hedrick: Let me say Champion, Belle of Georgia and Carman were all mentioned as hardier than the average, and had they been more generally grown I think they would have ranked toward the top. Waddell is not largely grown in this State nor in New York. I agree with you it ought to be grown more generally.

Mr. Hale: Some one asked the question about the time of ripening of Champion. It is about ten days ahead of the Elberta. The Waddell is ten days ahead of Mountain Rose, a white flesh peach with a red rose cheek, one of the most profitable early peaches I know of anywhere; in your professor's description of the growth of a low growing, spreading tree for hardiness, he might have been writing his report while looking at a Waddell peach tree.

Q. Mr. President, and Mr. Hale, is the Carman and Belle of Georgia hardier than Hill's Chili? I do not find it so.

Mr. Hale: I think so. I am sure the Carman is; possibly the Belle of Georgia is not quite so, but they are among the very hardy kind.

Prof. Hedrick: Of course Waddell is very hardy, but at the experiment station, while we had a great many of those varieties that were hardy, I

did not dare to recommend to the people, because in Michigan the white peach is not a valuable peach on the market.

Mr. Hale: Then you are supplying a low grade market. When you get to a high grade market you will grow white peaches always.

A Member: I am not saying anything about the quality of the peaches. The Waddell is very good, but, for all that, you cannot in Michigan sell fruit buyers a white peach; and all the growers along the lake shore will stand by me in that respect. The Champion is one of the white peaches that sell fairly good, but it has never proved as good a seller as one of the yellow varieties.

Q. How are these varieties for shipping? I find a white peach is a very poor shipper.

Mr. Hale: We grow them on a large scale and ship from Georgia all over the United States east of the Rocky Mountains, and they are good shippers. The Champion is the poorest of the lot; that is a very thin skinned peach and not a good shipper. The Waddell is preferable to Carman as a shipper; and the Belle of Georgia is fully as good a shipper as Elberta. If I were planting peaches in Michigan this coming spring, I assure you, whether your market wanted white peaches or not, I should plant white peaches more extensively than yellow ones.

Mr. Hutchins: With reference to soils; I think if there is a state in the Union, so far as my knowledge goes, that has diversities of soils, Michigan is one. In Allegan county, there was one field that was perhaps—oh, in a distance of thirty rods there was a gradation from a heavy clay to a fairly light loam; and a number of varieties of peaches running right across this field; the field was level and the treatment was entirely the same. A big feature of it was that on the one side the peaches set so full they required thinning; as we come to the loam soil the peaches fell off until that which was the most loam had no peaches at all. It seems to me there is a very suggestive point as to the character of soil as it affects hardiness.

DISCOURAGEMENTS AND SUCCESSES IN PEACH CULTURE IN THE MICHIGAN FRUIT BELT.

(F. M. BARDEN, SOUTH HAVEN.)

Peaches were first grown in Michigan at St. Joseph upon trees that were set about the beginning of the nineteenth century. The peach tree seems to have been necessary to the successful pioneer in this region, as nearly every settler possessed at least one. No attempt was made to grow more, as there was neither access to market, nor a knowledge of the commercial value of the fruit. However, when in 1840, Captain Curtis Boughton began to buy peaches and take them across to Chicago, where he sold many of them at \$45 per barrel, the whole country immediately caught the peach fever. Here was the first great success. A crop had been discovered that required simple culture and gave fabulous returns. An immediate effort was made to improve the quality, and the Crawford type soon superceded the seedlings. The result was an increase in the shipment of choice fruit, from a hundred baskets in 1840, to several thousand in 1855.

The accounts of the prices received at this early date read like a fairy tale; thus, it is easy for us to see why the people were so anxious to embark in their new industry. Those living north of St. Joseph along the lake were not slow in discovering the especial adaptability of that whole region for the culture of this fruit. The settlers in Van Buren county were soon in the wake of those in Berrien, planting orchards, from 1852, onward. The enterprise advanced up the lake shore during the succeeding years, until now the peach belt has reached a northern limit, such as the fathers' of the industry little dreamed of. Land at one time considered worthless, rapidly increased in value. The acreage increased, and although there was a corresponding decrease in the price, still there was a very wide margin between it and the cost of production. Those were boom days in Michigan peach culture.

THE YELLOWS.

As we glance back at this early time, we are struck by the simplicity of the task of peach growing in those days. The combination of virgin land, protecting influences, and comparative freedom from insects and diseases, produced excellent fruit with little effort, and the fruit sold for a higher price than is dreamed of now. Thus the peach existed in a natural state, with a balance of power between itself and the force surrounding it. But man in his anxiety for increased profit, cleared the way for those enemies which many growers today look upon as types of discouragements.

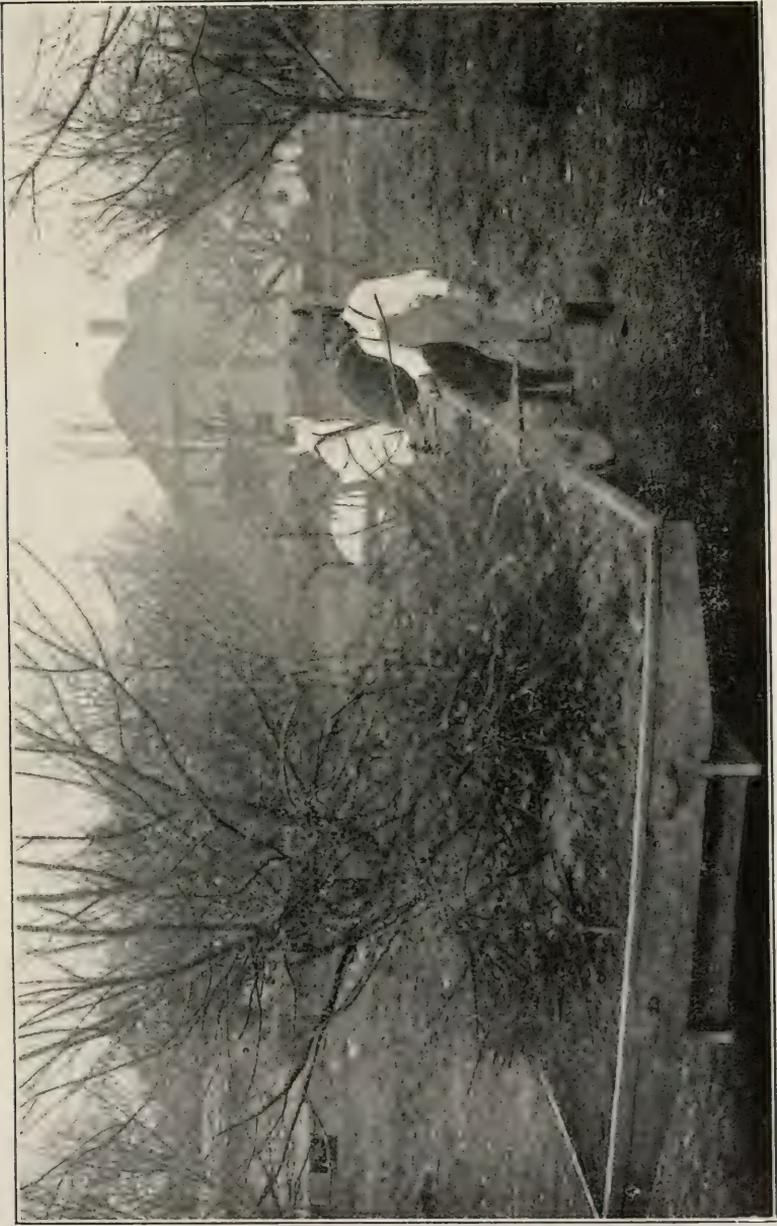
Of the discouragements, I shall mention four: The yellows, little peach, San Jose scale, and winter injury.

The year 1866 marks the date of the first notice of a disease in Michigan, that was destined to play a very important part in the future developments of peach interests. It first made its appearance upon the farm of D. M. Brown, just south of St. Joseph among the trees that had been obtained from a New Jersey nurseryman. Since it was known to have been brought westward from the seat of the disease in the east, it was quickly identified as the "yellows." In spite of the fact that the seriousness of its developments in the east was known, it attracted but little interest here and practically no attention was given to it. But it was not always to remain unnoticed. During the next five years, it laid a foundation that threatened the destruction of the peach industry of the State. In 1870, the residents of Berrien county suddenly became alarmed when they found that the disease had become widely disseminated throughout the region. But it was too late; the damage had been wrought. In 1874, Berrien county had 6,000 acres of peach orchards, the best in the world. In 1864, it possessed only 503 acres. From being the foremost peach county in the State with an acreage larger than that of all the others combined, it became ninth in order. This wholesale slaughter of trees was cause enough for discouragement, and affected to a greater or less extent, the judgment of the most conservative.

The disaster in the southern part of the fruit belt, was a warning to the growers in the north. By legislation and personal vigilance the dreaded disease was never allowed to gain the mastery in the vicinity of South Haven. Although this disease has appeared in every part of the fruit belt, and in many places has completely annihilated the industry, the growers have proved the fact that cooperation and vigilance are the only requirements necessary to hold it in check. The proof of this statement is being strengthened every year by the reports from those sections where the "yellows" suddenly obtained mastery; as a search into the causes, always reveals the fact that the growers have become negligent.

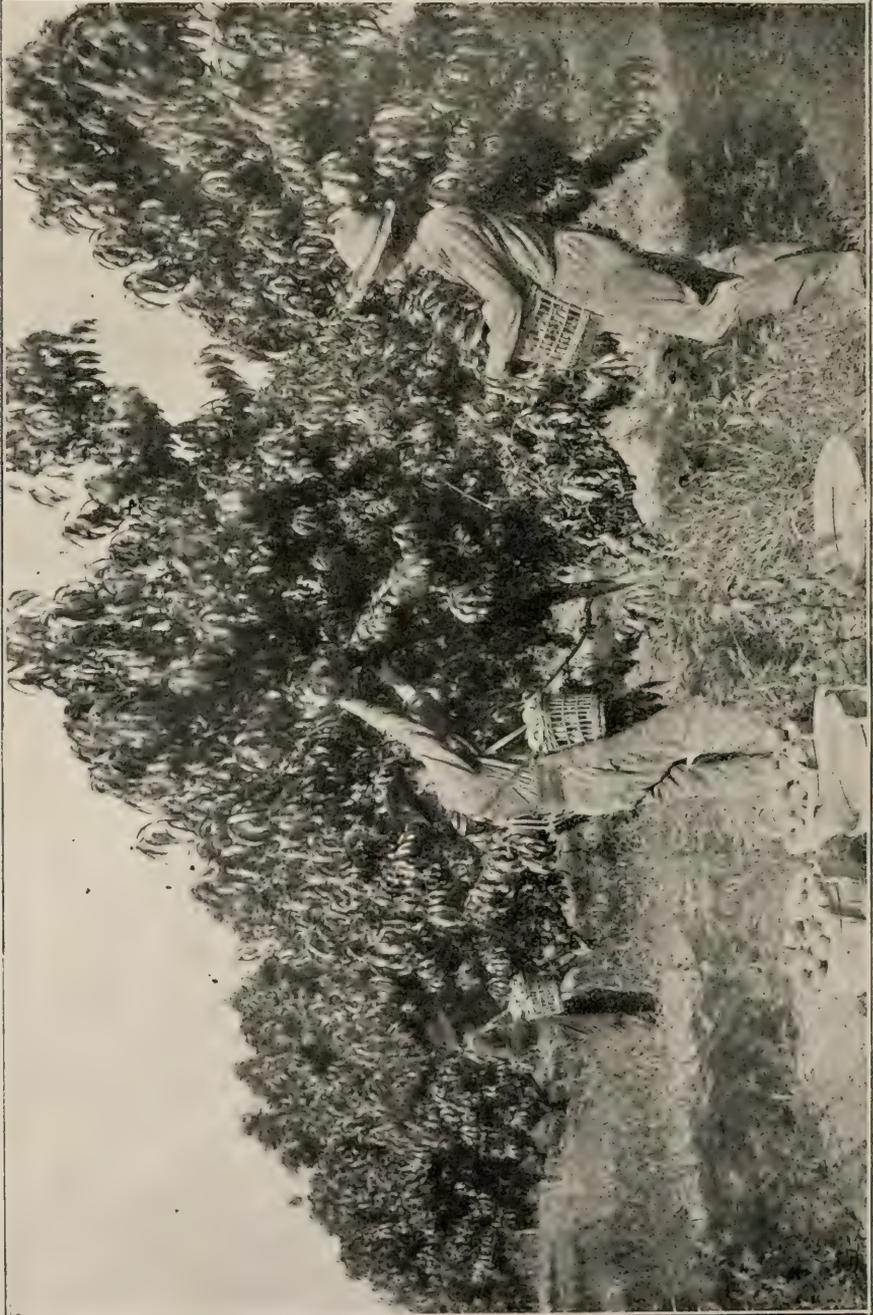


Peach Orchard of R. D. Graham, Grand Rapids



Movable Brush Burner in Orchard of C. B. Cook, Owosso.





Elberta Peach Orchard of Kingsley and Bassett, Fennville
Low headed trees from which nearly all the fruit can be picked without the use of any ladder



Packing House of Roland Morrill, Benton Harbor

However the question of interest after great depredations, is that of reconstruction. The growers of Berrien county, though vanquished for a time, soon regained their former standing. The history of their successes is one of actual results, that have been obtained in every district where reconstruction has been attempted.

LITTLE PEACH.

When the smoke of the battle with "yellows" was fairly well settled in those regions where the contest had been the fiercest, another disease of more than local importance, suddenly appeared in the southwestern part of Allegan county, upon the announcement by Prof. Taft that it was something new and unnamed. For the lack of a more appropriate term, it was designated as "little peach." This was the year 1895. The past twelve years has been sufficient time for it to become disseminated very thoroughly. Although in general it has not caused the damage that the "yellows" did, still most of those who have met it, would much prefer to fight the latter. Time does not allow of a full description of its record, but the fact should be emphasized that it can be controlled. The combined work of Professors Taft and Waite, and the experiences of hundreds of successful growers, established the truth beyond argument. It has simply been the old story of eradication and complete destruction of every diseased tree; being willing to sacrifice a little for the good of many. While the cause of the disease, is even now as much unknown as that of the "yellows," and it has produced discouragements to nearly the same extent; it has likewise contributed approximately as much to success in the culture of peaches through a stimulus to effort on the part of the growers.

SAN JOSE SCALE.

The discouragements that have been mentioned thus far, belong to the great class of natural enemies, known as disease; and we come to one which is classed among the insects, and bears the familiar name of San Jose scale. This is another contribution to our State from the nurseries of the east. While Michigan growers were reading of its destruction in the east and west, and rejoicing in the fact that it was so far removed, they suddenly received a chill of terror in the year 1897, on hearing that it had been discovered within our own borders. During the next four years, as it spread out over the southern portion of the fruit belt, the growers were in despair but at the critical time, the experiment stations and experienced growers of other states sent us the glad news that the scale could be controlled. This caused renewed activity in combating the pest, and consequently good results, although this was not accomplished until many orchards had been destroyed. Now the energetic grower has come to the conclusion that he need fear the scale no longer, and in fact, that it is an advantage to him by forcing out of business the shiftless grower who allows the scale to out-wit him.

THE FREEZE.

Of the agents of great destruction to peach interests, there remains one that is heaviest upon us now—the freeze. This includes not only the ravages of winter, but also those of October and May. Since the beginning of the peach business in Michigan, there has always been considerable anxiety concerning the safety of the buds. From early winter until the setting of

the fruit for next seasons' crop, the condition of the buds has been a constant cause for conjecture. Hardly a season has passed without one or more localities being robbed of its peach crop for the season, because of injury in this respect. However, there has never been a universal failure from this cause. Permit a personal reference at this point. Until the season just closed, our home orchard has had but one year within my memory in which it did not produce enough fruit to meet the expenses necessary to its maintenance, while nearly all of the remaining years have been those which the commercial man would class as highly prosperous.

However, the loss of the buds for a season does not tell the whole story of cold temperature in relation to the peach orchards of Michigan. There have been winters in which certain localities suffered the loss of the majority of their trees, while the remainder had their period of usefulness shortened by several years. Such, for example, were the years, 1873, 1885, and 1889. From those experiences, no region has been absolutely free, yet the remaining trees supported the locality until new orchards could be set. But the unexpected freeze of October 10th, 1906, left some impressions at nearly every point of the peach belt, while in the vicinity of South Haven, and for many miles south, it practically swept the board clean, doing everything but clearing the land. Localities which had been blessed with continual success, and in which the orchards were the pride of the people, have produced effects anything but pleasing during the past summer. This freeze was the greatest force yet exerted to bring discouragement to the Michigan peach grower.

The question of greatest importance since the eventful night has been "What of the future?" This is the question that follows every great devastation of property. Consider the events which have transpired in San Francisco during the last few months. Words can hardly picture the great and unavoidable destruction to that beautiful city by the forces of nature. But the inhabitants did not think of waiting a few years before rebuilding in order to ascertain whether there would be a recurrence of the catastrophe. The work of reconstruction began immediately. This spirit has been the moving force in the progress of the world; and it is the spirit that must regain for Michigan her rank in the production of peaches. The spirit of waiting for results, in a case like the present, has never accomplished anything, and never will.

Undoubtedly there are many localities that should never be reset, which is one of the successes resulting from the freeze. It is time that the half-way man either quits the business, or else comes up to the standard. Nature has settled the question. Henceforth, men who have belonged to this class, will either be found among the front ranks of fruit growers, or else they will have adopted another profession. In fact, this freeze was a great clearing house, ridding the country of hundreds of worthless orchards and raising the ideals of the growers.

We might enumerate many more occurrences that have tended to produce temporary discouragements in certain districts, such as; poor choice of varieties, failure of varieties to come true to name, and poor judgment in culture, but the time will not allow us to discuss them. Each one of them has contributed its share toward the development of men who are fully equipped to make peach culture a success. The recent destruction of Galveston by water brought discouragement to thousands of people, but it developed the ingenuity of man to such an extent, that the new Galveston, is now one of the most remarkable achievements of engineering skill. The

same is true of the backsets in the culture of peaches. The man who will be successful in growing fruit in the future will have to abandon the crude culture that was effective in the earlier years. He must be thoroughly acquainted with every aspect of the work before him, always searching for improved methods, having good judgment, and having a love for the work. To men of this stamp, the past fifty years of Michigan fruit culture, have been almost an unbroken record of successes, in which the four or five partial failures, due to the discouragements that I have mentioned, only make the successes stand out more prominently.

Since the evidence clearly shows that the successes in Michigan peach culture during the past fifty years have greatly outnumbered and outweighed the discouragements, I see no reason why we should not be very optimistic for the future, even in the face of such a crushing blow as that of last October. We have natural advantages of soil, climate, and nearness to market, such as no other great peach region possesses. I am convinced that these advantages will enable us not only to retrieve our fortunes in the peach industry, but also to advance it beyond the highest point that it has ever reached in the successes and discouragements of the past fifty years.

PLUMS FOR PROFIT.

(O. K. WHITE, HART.)

In growing plums for profit there are three principal lines of operation which the grower must follow: 1st. Selection of varieties; 2nd, culture and care; and 3rd, harvesting and marketing. Each must be carefully and thoroughly done if the grower is to attain any degree of success.

In discussing the first problem, the selection of varieties, I want to emphasize that it is a difficult one and an important one. I am almost tempted to say the most important one. Many things are to be considered. In the selection of varieties we must take in consideration market demands, shipping quality, vigor, productivity, resistance to rot and a succession of varieties.

In Oceana county, the principal outlets for our plum crop are the wholesale commission markets of Chicago and Milwaukee. These markets prefer a large blue plum, which is attractive and of good quality, a plum that can be left upon the tree until it has reached its fullsize and color, is fully ripe and still will reach the market in prime condition for dessert or canning purposes. The grower demands varieties that bear annually for his orchard must afford an annual income. In this respect plums are more constant than peaches or apples and hence a desirable fruit to grow. Most varieties of plums, when well cared for give yearly crops. The Washington, Satsuma, and Quackenboss are quite apt to be shy bearers every other year. The Lombard is a variety which goes to the other extreme and overbears very frequently.

The grower also demands plums which ship well. Most of the Japanese plums have thin, tender skins and are so juicy that they soon spoil after reaching the ripened stage. The Red June which ripens with the earliest plums is quite firm however, it bears well, sells well but is not a vigorous grower. The Hale and October Purple are excellent plums except for their

color. (The October seems to do best when top grafted on Abundance.) The Burbank is an abundant bearer, of good size, quite firm but is very susceptible to rot and cracking in wet weather.

Of the European sorts, the varieties which qualify best in the requirements of the market and grower are Bradshaw, Black Diamond, Hudson Egg, Arch Duke, Grand Duke, Copper, Monarch, French Damson and Fellenberg. All of these are valuable commercial varieties. Coes Golden and Bavay have the wrong color but are excellent in every other way. They are of high quality and the very best for dessert and canning purposes. The Geui and Field invariably fall prey to brown rot, sometimes as much as three-fourths of the crop being destroyed.

CULTURE AND CARE.

The second point in our discussion is culture and care. This is quite as important as the selection of varieties. Though a grower may have the choicest varieties if he doesn't practice high culture and take good care of his orchard, he cannot expect to get regular paying returns from it. In the culture and care of an orchard I include pruning and thinning, spraying and tillage. Each of these operations is absolutely essential. It cannot be omitted. Much damage is done in prejudicing consumers against the plum as a desirable fruit and a great loss to the grower is caused by the neglect to prune and to thin the fruit. Neglect in pruning allows the tops to become matted, irregular and to grow out of reach of the pickers. Neglect to thin permits over bearing which should, by all means, be avoided. It requires one or two years for the exhausted tree to regain its vigor. Now this is the result: Matted tree tops which are over loaded produce a crop which is very inferior in quality, in color, and in size. Besides such crops are usually picked too early and rushed into the market and cause a distaste for plums and hurt the market more than any one thing. There is no one variety which has caused more damage to the plum market or which has over borne so much as the Lombard.

Pruning should be done thoroughly every year at the spring time before the growth begins. Head the young trees low, cut them back severely until bearing, and thin every year, cut the current year's growth back one-half to two-thirds whenever the growth exceeds five or six inches.

Thinning out the top may be omitted every other year. In this cut out all the cross limbs and enough others to leave it open so that the sun can penetrate and color the fruit.

Thinning of the fruit must be done thoroughly for it serves two important purposes; first to relieve the tree of its excessive load and second, to reduce the chances of rot. In relieving the tree of its excessive load, we not only save it from exhausting itself but we secure a much larger size in the fruit that is left, if it is done in time. Thin the fruit so that the load is well distributed and no bunches are left for the rot to thrive in.

Of the insect enemies and fungous diseases which infect the plum orchards, the curculio, San Jose scale, Tussock moth, Shot Hole fungus and the Brown Rot are the only ones which so far as I know, do any serious harm in Michigan. All of these can be controlled if proper sprays are used and applied at the right time. A successful spray for curculio, shot hole fungus, and rot is Bordeaux mixture in the proportion of copper sulphate four pounds, slaked lime 5 pounds, water fifty gallons with one-third to one-half pound white arsenic added, this applied first just after the petals fall and again at intervals

of ten to fourteen days as the case demands. Two applications are usually quite satisfactory. I have never seen simple copper sulphate or ammoniacal copper carbonate used as a later spray for rot but I have heard them strongly recommended. The San Jose scale has not appeared in Oceana county yet in such numbers but that their destruction has been comparatively easy with lime-sulphur or the hatchet. The Tussock Moth is a new enemy to us this year and has appeared in serious numbers in some orchards. The eggs are so white and deposited in such large bunches they can be easily gathered in the fall or early in the spring and the insect held in check.

To keep the orchard in good condition of vigor and health a thorough and frequent cultivation is indispensable. Begin about the middle of May and continue until the first weeks of August and then put in the cover crop. During dry spells, we must be especially active in order to conserve the soil moisture. The cutaway harrow is a great labor and time saver and does excellent work. It is a superb weed killer. It can be substituted for the plow in many instances. This, with the spring tooth harrow and spike tooth, when used judiciously will keep an orchard clean and in good condition.

To keep up the fertility of the soil, use cover crops, barnyard manures, ashes and commercial fertilizers. Spring barley or oats do fairly well as cover crops for they provide considerable humus and also serve to prevent washing and deep freezing. But the ideal plants for this purpose are sand vetch and clover. They furnish an abundance of humus, besides they are legumes, and hence free nitrogen gathers. Some growers discard sand vetch because it so easily becomes a weed, but I believe it is one of the most valuable plants for the cover crop that I know.

Barnyard manure is invaluable as a fertilizer, especially in young orchards where it should be used liberally. A few fork fulls spread about each tree will give it a remarkable start and vigor which is very desirable.

Wood ashes are a good source for potash, but they are becoming so scarce that high grade commercial fertilizer must be used. Armour's bone meal and dried blood fertilizers contain about 20 per cent phosphoric acid and 12 per cent potash and are very good. Sow these at the same time you sow the clover crop. Remember it does not pay to buy cheap commercial fertilizers.

HARVESTING AND MARKETING.

The third part of our discussion is "harvesting and marketing." These two operations need the greatest care the orchardist can give them. Altogether too many people pick their plums too green, and rush them into the market. Such fruit will reach the market in sound condition, it is true, but it has not attained its full growth and color and is very inferior in quality and cannot be expected to bring fancy prices. It will not do it. The plums should be allowed to hang until a few of the most advanced are just beginning to soften. Then, if they are the varieties the market prefers, they are bound to bring the top prices. Usually two and sometimes three pickings are required to remove a crop in the best condition.

The question of marketing the fruit is the most troublesome part of this topic. A large majority of shippers do not know how to market their fruit to the best advantage. As I have said before, we in Oceana county, in most cases, are of necessity shipping to wholesale commission markets, and this puts upon us problems which other methods do not have. In the packing of our plums I have found that it pays, and pays well, to use two grades,

firsts and seconds, and occasionally a third grade of the extra fancy ones. Culls have no business on a market. They only make too large a supply and reduce the price of the better ones. Those three grades, firsts, seconds and extra fancy must be strictly adhered to throughout the season. The firsts and extra fancies should be marketed under a brand. Buyers who are willing to pay fancy prices for fruit, want an attractive, fancy article that they can depend upon. The best packages for firsts and seconds is the climax 1-6 basket, while for fancy fruit a smaller package, as those in the four basket carriers of the Miller type are excellent: During the canning season the round third bushel basket is proving very satisfactory. A larger package does not find favor in Chicago or Milwaukee.

There are some commission merchants who are unscrupulous in their dealings, and take advantage of the shipper, but there are honest ones who do all in their power to get the most possible out of the fruit consigned to them, deduct their 10 per cent and send the rest to the shipper. The shipper must find these men and then stick to one of them. It does not pay to consign fruit one day to one man, to another the next day, or to two or three houses on the same day. This method does not secure any reputation for a shipper's fruit, his brand is no good and besides it puts the shipper's fruit in competition with itself. Fruit consigned that way is picked up by a transient trade which is not willing to pay a fancy price for a fancy article, or a good price for a good article. Plums are a perishable article and cannot be held over from day to day until some generous buyer finds them. They must be put where the trade is, in a manner that they are known, and can be depended upon.

In concluding this article I wish to say that plums are a profitable fruit to raise. Extra care must be taken in the selection of varieties, in the care and culture of the orchards. Prune regularly and thoroughly. Harvest and market the crop in a business way and it will bring handsome rewards for the customer has received a good article, and is satisfied with it and wants more.

Benton Gebhart: Being somewhat familiar with the aims and practices of the plum growing as outlined in the paper, I can say that, highly endorsing those practices, I wish to mention one work of caution, and also to emphasize several points and facts which were not plainly given in the paper. One is, while a few fruit growers are making a success of growing plums, I would not advise every one or a large majority of growers who can grow plums to go into the plum business. For one reason, they are not in demand, as many goods are. They are called for to a certain extent, and if you have a fine quality of plums you can sell any amount. But outside of a certain season in the north fruit belt, they are not profitable. For instance, early in the season they are not profitable. It is hot, and people are not calling for plums, and where we sell one bushel or half a bushel of plums we sell ten bushels of peaches. Of course, if a higher quality of plums could be raised, such as Coe's, the Edward, and perhaps Monarch there would be a greater demand for plums for canning and consumption; and the canning factories in certain localities are offering a premium of 20 to 40 cents a bushel for those high quality plums in comparison with ordinary varieties. But if many carloads or bushels were grown, I care not if high quality plums or large size, it would naturally form a glut on the market, because they are more hardy and more productive than the peach, and can be grown, with proper care, over a larger extent of country than the peach, cherry, and other fruit. But there probably is no danger, and if a man wishes to engage in plum

culture, and chooses a proper variety, with the care and attention as outlined they are very profitable and successful. The point which I wish to emphasize is to choose late varieties. People are seeking and wanting plums late in the season; when they return home to the city, and the season comes to a close, and just as long as the fruit season extends, there is more or less call for the late fruit. For instance, this year, while local conditions might change the price and demand for fruit like the Japanese variety, I have shipped the past season fruit to Detroit and other places, and the very finest fruit we could grow sold at 30 cents a basket, while five weeks later fruit not as large sold for 50 cents. That showed the difference in the profit in choosing varieties and in the time.

Another point I wish to emphasize, is the severe pruning and heading in of the trees. If the trees are left alone, unpruned, to grow from two to three feet, they get very long bushy ends without fruit spurs; and by heading severely, or by trimming back the old wood, it forms an innumerable number of fruit spurs. For instance, Bradshaw and Field are very thrifty growers, and if pruned back sufficiently will form a sufficient number of fruit buds, if pruned annually; while if not pruned, they are not an annual bearer. So the pruning is one of the most important points to succeed in getting regular crops.

Geo. E. Rowe: I used the Niagara gas sprayer this last summer and I liked it very much. I have used several other sprayers. They are good, but I think this is better; at least, the others stood under the shed, and the gas sprayer was the only one I used last year. I had no trouble with it whatever, simply the getting of the machine back and forth from the orchard to the place where we filled it. I do not know how many are preparing the lime and sulphur mixture for their orchards; I have not seen but very few plants, but last spring I had so much spraying to do that I felt it was necessary to have something larger and so I put up a platform eight feet high, put six barrels on it, connected them with the steam pipe, borrowed an old thrashing machine engine from the neighbors that had not been used for several years, put it alongside of the platform, and cooked that lime and sulphur with steam, and we had all the material that we could use cooked up in that room. I think the most we ever used in any one day with the machine was about 900 gallons. I presume if we had put in the hours some people do spraying we could have used more than that, but 900 gallons was the most I could use in any one day with one machine.

Q. What was the expense of operating?

Mr. Rowe: Just about \$2.00 for every 800 gallons. I used a little more than that; I used a tank—\$2.00 worth of the gas power to about 600 gallons when I started out; but after I sprayed two or three days and learned how to use it, I did not use as much. I do not think at the last I used over one tank of gas, which cost \$2.00, to 1,000 gallons of liquid. That was the lime and sulphur.

Q. What was the average pressure?

Mr. Rowe: One hundred and forty to 150 pounds. We used pressure higher than that usually used; but I found it did not take as much gas by keeping up a high pressure as it did when I was running on a low pressure. When my tank was within a foot of being empty, then we run on a lower pressure, so that when the last of it was sprayed out we never had over 75 or 80 pounds. We would start out and keep up to 140 or 150 pounds until the very last, and then let it run down. I had a little trouble to start with in the spring. I ordered a 200-gallon tank, and they did not have them,

and so they sent me two 100-gallon tanks and had them coupled together, stating they would be just as good, and it would balance up the wagon better, be more convenient to use two tanks on the wagon than to use the one; but I had not used the two tanks on the wagon more than half an hour before I found they would not stay coupled together, and we had a little difficulty along that line. I telephoned Mr. Brown, the man who had guaranteed they would work, and he came up and tried it, and he said, "I guess they won't work on your place;" and so he took one tank and sent it back, and I kept the 100-gallon tank in place of the two on the one wagon.

C. E. Bassett: The Niagara gas sprayer is simply a heavy steel tank, galvanized with a lining of some kind, which is supposed to be impervious, so that the acid mixtures will not have an effect upon the iron. Attached to that is a gas tube which comes from the Liquid Carbonic Acid Gas Company, from Chicago. They furnished that formerly at six cents a pound, and later five cents, and now for four cents; so that one tank, which weighs 55 pounds, costs about \$2.20. You pay the freight one way, and they pay the freight on the empty tank going back. When this comes, you simply attach this steel tube, which contains the gas under immense pressure, to your tank which contains the mixture; simply turn the stop cock and allow the gas to go over into the tank; and as soon as you have the pressure you wish you stop the gas from passing over, and you start to spraying. It merely blows it out, presses it out, same as you blow soda water; it is the same thing exactly they use in forcing soda water. And I will also say I am informed it is the same thing they use in blowing beer. No one here of course would understand anything about that. A 55-pound tube of this carbonic acid gas costs, you see, \$2.20, plus the freight, which will make it say \$2.50 altogether. This 55-pound tube we found, in using warm lime and sulphur would spray in the neighborhood of 900 gallons—850 to 1,050 gallons. But when we came to use it on cold Bordeaux mixture we did not see as we got quite as much effect; and we figured that it was the expansive force of the heat—the heat of the liquid we were spraying, the lime and sulphur, that caused the gas to expand still more. They caution you about allowing this tank to get hot. If the sun comes out bright and hot and shines upon the tank, it will immediately raise your pressure.

It is more expensive; possibly, when you get right down to the point, it is the most expensive in the outlay of any spray machine on the market. But after all, results are what count; and I believe that when you come to buy anything, the best thing is the cheapest there is. Spraying is insurance, isn't it? It is a preventive, not a cure. And if you go to buy insurance on your buildings, or on your life, you want something you know your family can draw on, or you can, in the case of fire insurance; in case you have a loss, you want something you are sure is going to do the business. If it were true that spraying could be done like thrashing and go from one orchard to the other and spray any time you got ready, I do not see that this machine would cut much figure. But the importance of spraying is to spray on the moment, the exact time when it must be done; if you have got to do it on a day's or minute's notice, or a special day, it is absolutely necessary you should have a machine which can be depended on to do it at that time. Really, if you saw the number of gas engines that have been drawn into Fennville past my place from time to time, and see them shipping them back and getting them repaired, and all that, you would know that man, when he had to lay off and could not spray when he ought to, is possibly losing

the price of a spraying outfit right then and there. A few bushels more to a tree then will pay for the whole outfit in one year. We paid \$150.00 for this outfit, just simply the tank and the spraying rods and nozzles and hose attachments. There are other machines that are good. We like this one. I examined it in New York when I was there. We bought it and we have been well pleased with it this year. While I know some others have had trouble, and possibly we may have trouble in the future, we are well satisfied and feel it has done us good service.

Mr. Farnsworth: I would like to inquire if any members have had trouble in turning on the gas. Last spring I bought such an outfit as Mr. Rowe has. When they brought the 100-gallon size to us, it seemed too small, and we bought a couple and connected them together. But every time we tried them we would pull them back into the shed and take out the two old Wallace machines. They have been a dismal failure. I know many who have splendid success with them. It encourages me to try again, hearing your success. I notified the company and Mr. Brown agreed to come to my place and stay until the machine worked. We are not altogether greenhorns in the use of spraying machines, because I was perhaps about the first in Ohio to spray, and my foreman is an expert; my brother across the way has an outfit and is very handy with machinery; and none of us could succeed with it.

A Member: The gas would freeze up. In turning it on oftentimes the drums would be half full and sometimes empty entirely. I am not condemning the machine, but I must say we will not undertake to use it next year unless we can have a little more demonstration between now and then, because if we had depended on it this year we would have lost our entire crop.

Q. What was the expense per gallon?

A. We did not average 500 gallons from the 55 pounds of gas. We bought it later in the season. My brother took one of his singly and used it for spraying potatoes, and had no better success then. He didn't get out over 500 gallons with the drum.

Mr. Kingsley: Perhaps there is a difference between Cincinnati and Chicago gas. In regard to coupling together; that may have something to do with it. I say there would be a weak point there; I told my man in setting them up that would be the danger, and we fortified that. So we had no trouble with that; but I think that might have had something to do with the filling of them.

FOOD VALUE OF FRUITS.

(DR. J. H. KELLOGG, BATTLE CREEK SANITARIUM.)

I am very glad, my friends, to meet you here this afternoon, and for an opportunity to say a word in reference to the food value of fruit. Although I did not solicit the opportunity to speak here, it certainly is a pleasure.

I believe fruits were formerly much more appreciated as food than at the present time; but they are coming into appreciation more and more. I think it quite possible that the failure to make a proper use of fruit, or a sufficient use of it, is largely due to an erroneous belief concerning its digestibility. A large number of people think it is indigestible.

There is an old adage that fruit is golden for breakfast, silver for dinner, and lead for supper; but this is an error. Fruit is golden all the time; it is never lead; it is never anything else than one of the choicest of all the food products which the Creator has provided for our sustenance.

There are certain reasons, I think, why fruits have come to be considered rather indigestible. One is, perhaps, they are usually taken at the close of the meal, after a full meal has already been consumed; they are taken as a luxury rather than as a real food. Another is, fruits are often taken between meals; and perhaps, most of all, are not properly masticated in eating; they are swallowed without proper chewing. As a matter of fact, fruits are predigested foods. That is one of the values of fruits; they practically require no digestion at all.

The green fruit contains a large amount of starch. As you know, in the process of ripening this starch is converted, under the influence of sunlight, into sugar and dextrine, and agreeable flavors and acids.

In Mexico, you ask a fruit woman in the market for some fruit, and she will ask you, "Do you want them hard, or do you want them cooked in the sun?" And when we say we want the fruits cooked in the sun, she simply gives us some ripe fruits—not fruits that have been baked or cooked, but fruits "cooked in the sun," as the Mexicans say. This, really the true cooking. Cooking is a process of artificial digestion by which the insoluble starch is made soluble, hydrated and prepared for the action of the digestive juices. This work is done in the fruit by the actinic rays of the sun, which convert the starch into dextrine and prepare it for the action of the digestive fluids. The action of the sun goes further than the process of cooking can go: It converts the starch into sugar, which in the end result of the process of digestion. In fact it goes a little further than the saliva. The saliva converts the starch into malt sugar; but it is only after the saliva has converted the sugar or starch into maltose or malt sugar and it has reached the intestine, and is undergoing absorption in the intestines, that it is acted upon by another ferment and is converted into dextrose. The sunlight acting upon the starch in the fruit converts it not only into the soluble starch and dextrine, but carries it further into the actual completely digested product, dextrose and levulose substances ready to be immediately assimilated and utilized in the body.

Sugar, or products akin to sugar, are almost the sole substances found in the great majority of fruits. Fruit is a carbohydrate food. There are three different food elements; the proteids, which correspond to the white of egg

and the lean of meat; fat which we are all familiar with; and the carbohydrates, which appear in the form of sugar and starch and pectin, and other similar bodies. Fruit is almost a pure carbohydrate. Ordinary fruits contain only about half of one per cent of proteid, and so cannot be looked upon as a proteid food. Beefsteak is almost all proteid, proteid with some fat in it and no carbohydrate to speak of; while fruit is all carbohydrate. These three elements are all necessary—proteids, fats and carbohydrates. Animal food gives us only two of them, proteid and fat; while fruit gives us carbohydrates, so you see, if one is a meat-eater, fruit is a very necessary complement to his beefsteak; and those who are accustomed to use meat will find the large use of fruit in combination with meat a very wonderful advantage. The reason for that I will show you a little further on.

Fruit has other advantages as a food; not only that it is a predigested food and only requires chewing to render it ready for immediate assimilation into the blood—complete and thorough mastication is the only thing necessary for rendering the fruit ready for immediate assimilation, immediate absorption. If one eats a ripe apple—as Dr. Beaumont found in his experiments upon Alexis St. Martin nearly a hundred years ago; it is digested in an hour and a half; while beefsteak requires three hours and a half; roast goose five hours and a half; and pickles are never digested. So you see we have in fruit something that has taste, acid, has all the flavors that the pickle has, is something that is entirely wholesome, and digested in an hour and a half; ripe apples, that is. Sour apples requires a little more time. A green apple requires longer time of course, because it is not likely to be masticated so thoroughly. You have all experienced, probably, to your sorrow, when boys and girls, that the green apple is not digestible at all; but if it is cooked, it becomes digestible. A green apple when cooked is just as digestible as a ripe apple, because the process of cooking has done for the green apple what the action of the sunlight does for it outdoors in the ripening process.

The fruit must be properly chewed. If fruit is swallowed into the stomach in chunks, the stomach can do nothing with it, because the stomach cannot digest carbohydrates. The fruit requires no digestion; it requires nothing but crushing, that is all the ripe fruit requires; it does not require any digestion at all. There is nothing for the saliva to do upon it; practically nothing for the gastric juice to do upon it, because it is 70 to 90 per cent water, and there is only about one-half of one per cent proteid—such a small amount of proteid that there is practically nothing at all for the stomach to do. There is no fat in fruit, with the exception of a very few peculiar fruits like the olive—and the nuts which contain a large amount of fat. But the ordinary fruit, the acid fruits, the sweet, saccharine fruits, juicy fruits, contain no fat, no proteid; they are simply carbohydrate, and that carbohydrate is already digested ready for immediate assimilation. That is the reason fruits are so refreshing; the reason why the tired boy is so happy when he gets into the peach orchard or a cherry tree—which the little boy has a perfect right to do. Moses gave the children of Israel instruction in passing through a vineyard that they were at liberty to eat to the fill. And that is what the small boy does when he gets into the peach orchard, or cherry orchard or apple orchard—and according to the Mosaic law he has a perfect right to eat all he wants, not carry anything away, but to eat to his fill. That is what he does, and goes home and has a stomachache, if he has swallowed those cherries too fast without chewing them; his mother perhaps puts a strong hand on one side of him and a hot water bottle on the other, and he feels better. Next day he climbs another cherry tree and does the same

thing, and gets off without anything more serious than a spanking, a hot water bottle and a stomachache. Suppose that boy had swallowed an over dose of roast turkey: He would not get off so easy; he would have a bilious attack and vomiting spell, and next day a bilious attack, and would not want any more roasted turkey for a week. The fruit may produce a little gas in the stomach, a little inconvenience, a little colic; but it can not produce poisoning; cannot produce autointoxication; cannot make the boy so sick he will not have an appetite for some more next day, and it seems just as good. The natural love of children for fruit is an indication of the intrinsic value of this food substance; and the instinctive leading towards it—you never found a child that did not like fruit. The sweetness of the fruit is a recommendation to the sweet tooth which every normal human being has.

Cane sugar is quite another thing. It is a substance which is likely to produce more or less mischief when taken too freely. But the sugar found in fruits is absolutely harmless; can be taken in any quantity you can get it in, in the shape of fruits and juices. But cane sugar, in the form of candy, is another thing. It is a coarse sugar, is intended for cows, is good food for cows. The cow has a special stomach which enables it to digest sugar, especially cane sugar. The sugar of fruits requires no digestion, while cane sugar requires digestion in the intestines, and must be digested before it can be utilized. The sugar of fruit can be injected straight into the blood and assimilated without digestion at all; whereas cane sugar taken into the blood is cast out through the kidneys and cannot be utilized at all. That is the difference between these two sugars.

I assure you I am heartily with you in this business. I am helping to produce a market for fruit. If you will supply the market with good fruit, I am sure the market will grow. I believe it is so important to increase the use of fruit and persuade the people of the importance of using it, that I look upon every one of you fruit growers as a self-supporting missionary working for me. So we are very glad to have you here in this town, and to have the people waked up to the importance of this thing.

Now about the chewing of fruits. Fruits are more or less firm in their structures—most fruits—and if they are swallowed in chunks they cannot be utilized; but these chunks of fruit will pass right along through the alimentary canal like so much sawdust or other indigestible material, because of the woody framework which gives to the fruit its form; it is saturated with the juices like a sponge, and when it is taken into the stomach and alimentary canal, unless that woody framework is crushed and broken down, the woody part of the fruit cannot be utilized, and mischief is likely to be done, and for two reasons: Not only because it acts like a foreign body irritating the intestines and alimentary canal, but because the sugar of the fruit, not undergoing prompt absorption, undergoes fermentation instead, and this fermentation produces acids, and the acids are irritating, and the intestines may be distended with gas, and much mischief may result from it.

Improper chewing of fruit has led to the supposition that it is hard to digest; that the people with weak stomachs must beware of it; that it must especially be kept away from children; and this great error has led to very great mischief.

I had a good illustration of it some years ago during the Spanish-American war. Just at the close of the war a great number of soldiers were being brought back, who were suffering, not from the wounds of their enemies, but from the wounds they had received in germs from unsanitary conditions

in camp—neglect to take care of water, improper feeding, embalmed beef (the very antipodes of fruit), and from improper care. Thirteen soldiers died from camp disease in that war, where one died from wounds from the enemy's bullets. Think of it! Thirteen soldiers from bad feeding and bad sanitary conditions were killed by want and neglect—criminal neglect with reference to their care—thirteen soldiers were killed by their own officers, where one was killed by the enemy! That is a shame to us. In the recent Japanese war, the war between Russia and Japan, among the Japanese there were two soldiers killed by bullets where there was one killed by camp disease. Just see the difference. The Japanese are twenty-six times ahead of us in the sanitary care of their soldiers.

Well, now, these soldiers down in Cuba, where they were surrounded with the most splendid fruits—oranges and bananas and pine apples, and magnificent fruits of every sort—these soldiers were absolutely prohibited from the use of fruit, commanded that they must not touch it. Why, if a man ate any fruit he was hurried off to a guard house. It was a crime to eat an orange, to eat fruit down there in that country. Why? Because the officers in charge of them were laboring under this delusion, that fruit is such a dangerous and poisonous thing. If those soldiers had been allowed to eat fruit instead of embalmed beef, a lot of them would have been saved alive. I had a good chance to prove it.

I went to headquarters in New York. We had a little summer sanitarium at Staten Island; we had just closed it up; we were experimenting a little there in the east before we began more extended work; and I went to the army headquarters in New York and said, "I want to take care of some of your sick soldiers." The hospitals in New York were all full, and they were farming them out in various places. They said, "All right." I went to the wharf and picked out the worst people I could find; I would not take anybody that could walk; anybody that was able to walk, and walk off, I did not want. I took the people that had to be carried on litters and were so bad they didn't know whether they were going to live or not. We got about forty of them and carried them back to Staten Island; we took them up to the sanitarium. When dinner time came, I had them waiting in the adjacent room, occupying the sofas and things; a few of them were too feeble even to sit up, and were in their beds; but most of them were in the parlor adjacent to the dining room. I said "What would you like for your dinner?" (I didn't propose to give them any beefsteak, nor any beef tea, nor any of that sort of rubbish, because there is no good in it, and there is nothing wholesome in it; but I thought I would try them. I was afraid they might be disappointed, some of them that had been fed on army beef so generously; I didn't know but they would have an artificial appetite). There wasn't a word from anybody.

"How would you like some roast beef?" You ought to have seen the look of disgust that came upon the faces of those men. They looked down to the floor. Those men were fine fellows, by the way. I was glad to have a chance to feed them, because they were the men who charged up the hill that was almost lost; they were really the men that saved the day for Roosevelt's cowboys. That is the fact of the matter, for the cowboys didn't get there until after the battle was won. I learned that from those boys, and they were only boys, too, some of them. I got the whole story right from their own mouths. They saved the day. There is no question about it—Brave fellows.

"How would you like some mutton chops?" Not a word. They all looked at the floor.

"How would some fried pork do?" Every man looked at the floor. The look of disgust that came over their faces was quite interesting to me.

"How would you like to have some pears?" "Pears?" "Pears?" They began to look at one another.

"How would you like to have some grapes?" "Grapes! Grapes!"

"How would you like to have some watermelon?" Watermelon! Watermelon! You ought to have seen those boys. I said, "All right. Come on." I took them into the dining room. The table was completely covered with great pile of pears, peaches, grapes, and everything I could get, watermelons with the rest. It was in the fall, and frost just beginning to come. And those men just fell to eating; they just laid hold of that fruit and they ate to their fill—as Moses said they might—and not one of them suffered the slightest inconvenience. There was not a man there that did not have looseness of the bowels; there was not a man there that did not have diarrhoea or dysentery; they were just getting over typhoid fever; they had just barely survived terrible attacks of dysentery and diarrhoea, every one of them. They just ate all the fruit they wanted, and they got well from that minute right straight on, although some of them were considered most desperate cases whom it was hardly possible to save. There was only one out of the whole number that died, and he was so nearly dead when he got there that he could hardly raise his head. He died a day or two afterwards, and the rest of them recovered, and not the slightest ill effects from those fruits.

I mention this to you as an illustration of the terrible damage that comes from the reckless and absurd notion that this food which is one of Heaven's greatest blessings to man, one of the very choicest and most delicate things God has given to us, that this food is dangerous, poisonous. It is simply one of the devil's tricks to keep us away from the good things that belong to us. I hope this error may disappear. One thing that is going to help about it very much, is a splendid publication recently issued by the United States Government, entitled "Farmers' Bulletin No. 293, U. S. Department of Agriculture," and the subject is the same as mine, "Use of Fruit as Food," by C. F. Langworthy. I wonder how many people here have it? Every one of you is entitled to it. All you have got to do is to send down there and get it, or have your congressman send it to you. It is quite a large pamphlet, as you will see, and it is just brim full of the most splendid things; tells you all about fruit; tells you just what I am telling you, that fruit is good to eat; and it prepares a table giving the caloric value of the food value of fruits.

If you are going to buy fuel, you know basswood is not worth so much as oak, and oak not as much as hickory; hard hickory has more fuel value, more heat in it, than pine, a whole lot. When you come to investigate these things, you will find some kinds of fruits are much more valuable than others.

I was at a banquet last night. The first thing on the bill of fare was oysters. I did not want any. Why? In the first place, the oyster is a scavenger; his business is to lick off the slime at the bottom of the sea; you catch the oyster down there; he has got his broad lips open and licking off the slime; he likes that slime because it is full of germs. A drop of oyster juice is like a silver mine in Colorado: "It has millions in it." I am not mentioning this to discount the banquet last night, for it was a splendid banquet—for those that like that kind of banquet. It was very fine of its kind. But

I noticed that alongside those oysters on the plate that was passed to me there was a piece of a lemon. What do you suppose that lemon was for? It was to disinfect the oysters. (Laughter). And that is exactly what it will do. Lemon juice will kill not only oyster germs, but typhoid fever germs. Oyster germs are typhoid fever germs. That is why people get typhoid fever sometimes by eating raw oysters. If you are fond of typhoid fever germs, oysters on the half shell will be a good way to get them. The oyster lives largely on typhoid fever germs. He likes them. You can almost always find typhoid fever germs in oyster stomachs.

Secretary C. E. Bassett: Two died in Allegan county last week from eating oysters, and they had all the symptoms of typhoid fever; and when I left home there were four more not out of danger; these had every symptom of typhoid fever from the report given to me. From eating oysters at a Masonic banquet held at Dorr.

Dr. Kellogg continued: One of the most eminent surgeons of Chicago a few years ago died from eating oysters. He ate some oysters, and the germs that were in the oysters set up such a frightful inflammation in his bowels that they had to operate upon him a couple of days later, and he died; the operation could not save his life.

A few years ago a man came into the sanitarium about 3 o'clock in the morning, a workman in the city here, and he was suffering frightfully. He was vomiting and purging, and was in terrible distress, pale as death, and he thought he was going to die. He was all tied up in knots, and he was in a frightful state. What had he been doing? "I was down to the restaurant last night. I don't know anything unless it was that; and I called for oysters, and they were so good, and I had two plates of them, and I don't know, but I guess it must have been that." He suspected the oysters only because he had heard oysters sometimes made that sort of mischief. I said to him, after he recovered, a couple of days later, "Go back to that restaurant and tell them those oysters were so good you want some more just like them." I knew if he told them they made him sick he could not get them. He did so, and brought them to me. I took a little of the juice of the oyster and injected it into a cat with a hypodermic syringe, and that cat was dead in a very short time; died with the same symptoms he had. I took just a little of that juice and put in a two quart can of milk and put it away, and three months afterwards I took some milk out of that can, some of the serum, the whey, and injected it into a cat, and the cat died promptly. The very same thing. This was tyrotoxicon. This oyster juice contained the poison, which is the same as the tyrotoxicon of poison cheese. You can produce it any time by putting some oysters such as you frequently get, into milk and putting it away for a few months; you will get the same thing. The oyster always has this dangerous germ about it.

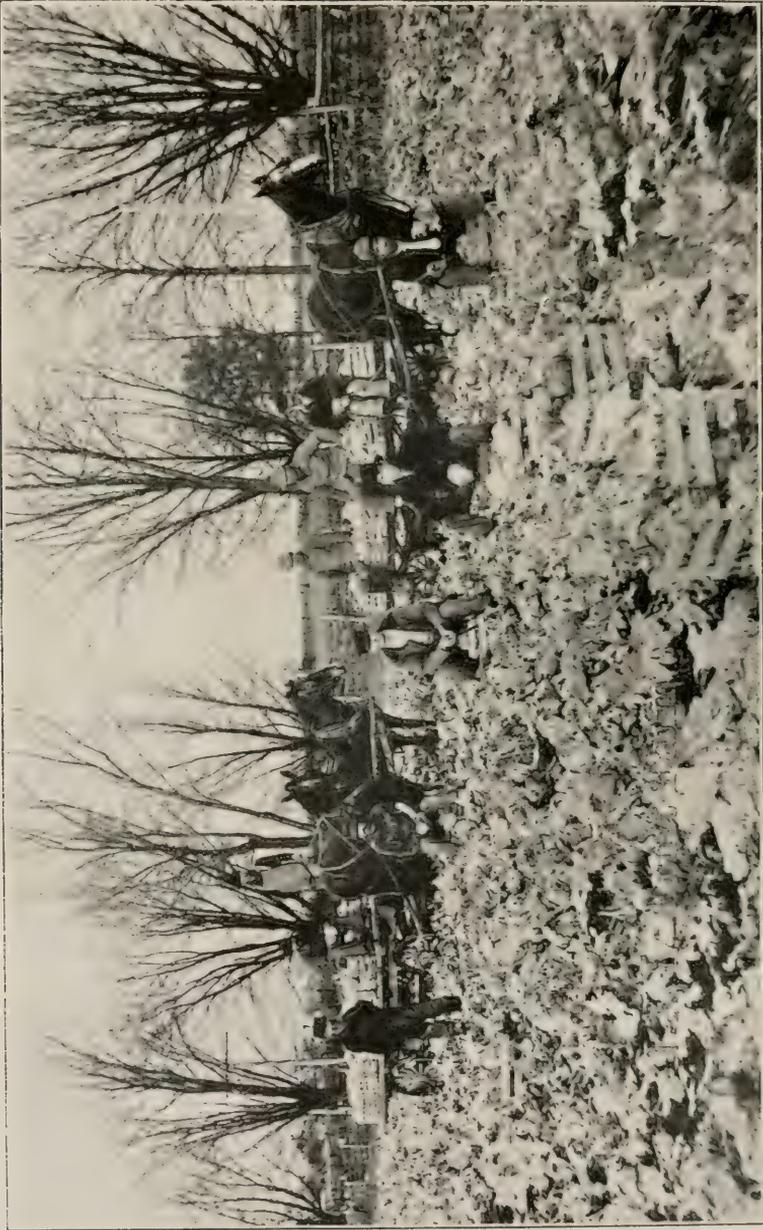
I call your attention to the fact that lemon juice is always served with raw oysters. The lemon juice is to disinfect the oysters. Two drops of lemon juice will disinfect two dozen oysters. There is a disinfecting power in lemon juice, and also in apple juice and grape juice; fruit acids of all sorts are antiseptics. That is one great value of fruits; they are a natural antiseptic. Fever germs cannot live in lemon juice; cholera germs cannot live in it; no sort of germs can live in lemon juice; and the juice of the sour apple will kill any sort of germs. So it is a valuable thing to know that the juices of fruits are a means of disinfecting, and a perfectly harmless means, while corrosive sublimate and formaldehyde are poisons. Fruit juices are poison to germs, and at the same time are actual food to us.

Another thing to be said about fruit is, that fruit not only contains—acid fruits—these antiseptics which are of value because they disinfect the alimentary canal; but the fruits themselves encourage the development in the intestines of germicidal substances, substances which are capable of killing germs.

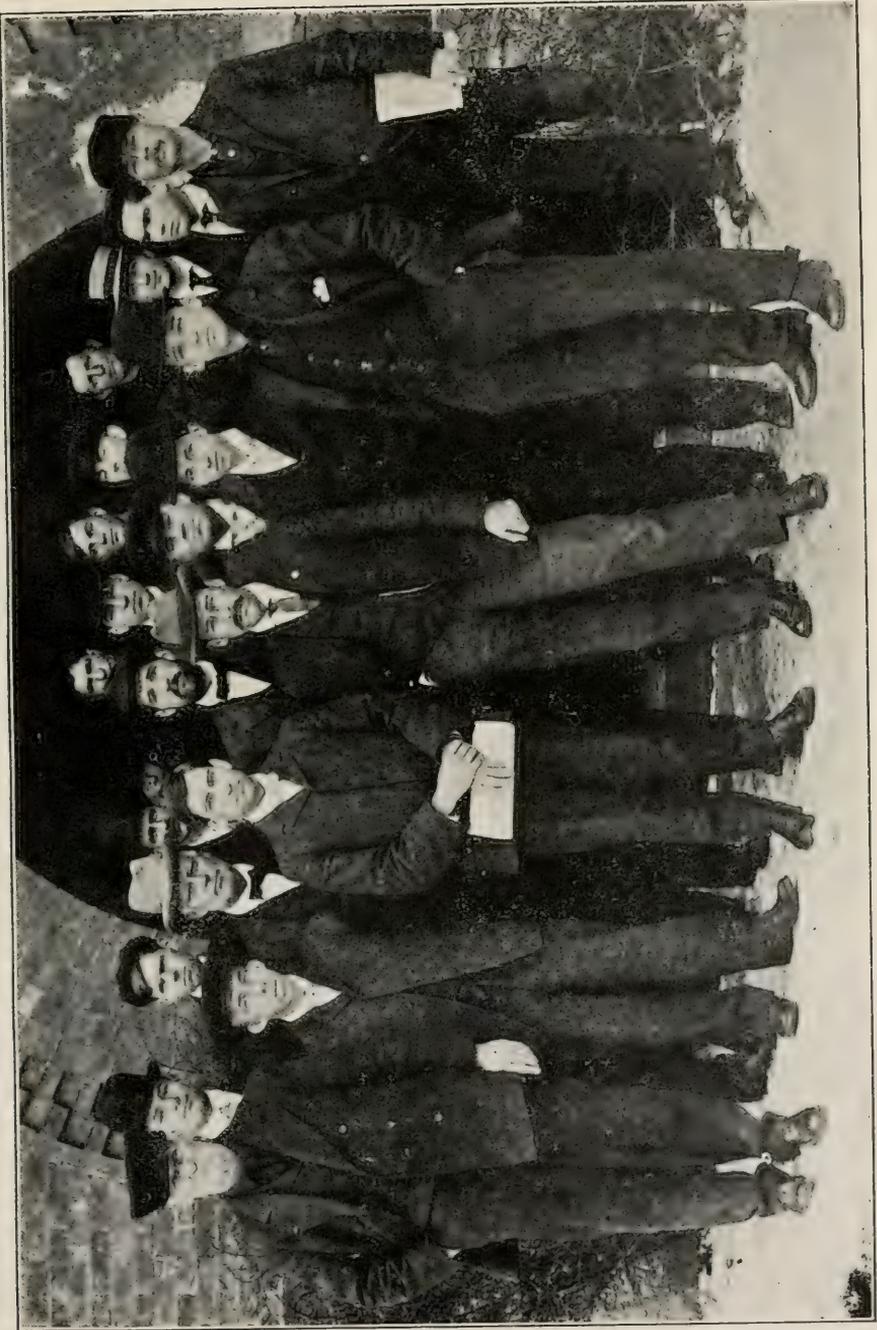
I made some experiments some ten years ago which illustrate this very forcibly. When we examine people at the sanitarium we sometimes find the stomach fluid swarming with bacteria, sometimes as many as a million germs in one drop of fluid from the stomach. Think of what it would be in three pints of stomach contents! Well, now, I have taken stomach juice and put it into different media; put some in beef tea, and the next day we found it had so much poison in it when it was injected into a guinea pig the guinea pig was dead in half an hour, because poison was generated in the presence of beef tea. Some of the same stomach juice was put into apple juice, tomato juice, carrot juice, orange juice, lemon juice; it cannot be made to grow in any kind of fruit juice. I tried it many, many times; and these germs that grow in the stomach that produce such awful diseases as cholera morbus, typhoid fever, and diarrhoea, none of these germs can grow at all in fruit juices, but are actually killed. Don't you see the same thing would happen if you take these fruit juices into the intestine, into the stomach; they disinfect the stomach.

But, as I said a moment ago, fruit does something more than that. The sugars of the fruits encourage the growth in the intestine of friendly germs. Did you ever hear of friendly germs? There are friendly germs. Some time ago the rats got to making so much trouble in Italy that Pasteur was appealed to to help them. He sent a man down to Italy, who found a rat and infected that rat with a certain disease and turned him loose; and he also infected other rats, and the thing spread until all the rats in the region died, and so they were free from rats.

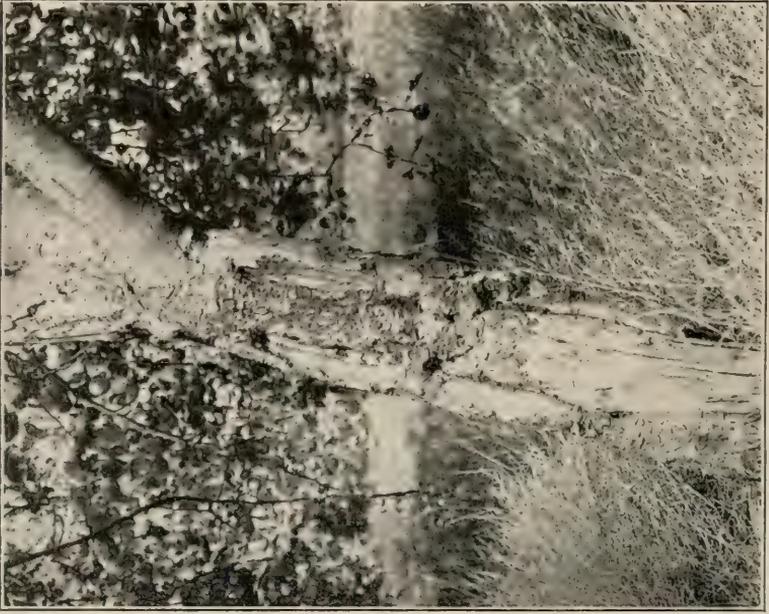
So there are friendly germs. There are bugs that are friendly. There are bugs that kill other bugs. There are also friendly germs. Two classes of germs in the body; the friendly and the unfriendly. Germs that make poisons are the unfriendly germs, germs that do not belong to us at all. And then there are the friendly germs, that make acids similar to the acids of fruits. When a baby is born into the world he has no germs about him; but in ten or twelve hours after he is born his alimentary canal is swarming with germs, friendly germs. I went to Paris last year to find what it meant. I found a baby, his intestines just swarming with germs; a teaspoonful of the discharge of that baby contained eight billion—too many to conceive of, found in one dram of the dried fecal discharges. I went clear to Paris to find out what that meant. It scared me. I said, "What in the world is the matter with these babies?" The babies seemed to be all right, but I was entirely at sea when I found a baby a week old, and perfectly healthy, with all those germs. I found the thing had been studied over there in the Pasteur Institute, and they found out the germs were friendly germs, had been put there for the protection of the baby, like the clover in the field, to keep the weeds from growing. You sow clover in your field; it keeps the weeds out. That is exactly what nature does for the baby—sows flowers in its flower garden. Mr. Dooley you know said he went to a doctor, and the doctor thumped his chest and hit his stomach, and told him the weeds were getting into his posy garden. And nature plants flowers in the baby's alimentary canal, and these are germs which produce acids similar to the acids of fruits. That is another hint you see in favor of fruits. By and by



Cabbage Harvest at "J. X. L. Fruit Farm" of O. S. Bristol, Almont, Lapeer County



Students in Fruit Growing (Two Weeks Course) at Michigan Agricultural College, Jan. 3-17, 1908.



A 19 Year Old Ben Davis Tree Practically Killed by Borers



In the Formation of a Head, Such Crotches Should be Carefully Avoided



Cultivating a Double Hedge Row of Sugar Beets on Farm of C. B. Cook, Owosso

the baby does not get its natural food; they begin to feed it on baby foods, on cow's milk that has not been properly cleaned, selected under clean conditions, and has fragments of fertilizer in it, gleanings from the barnyard; in other words, it has manure germs growing in it, and his alimentary canal gets filled up with those wild manure germs. The cow has been grazing all about, and the farmer has thrown out filth on his land; the cow eats the grass down close to the earth and gets her alimentary canal filled up with wild germs of all sorts; and there is the manure that gets into the milk; it carries to the child all these wild germs in great variety. Prof. Roger, of Paris, has found 161 different kinds of germs, and half of them poisoning germs that will kill cats, mice and rats, guinea pigs, rabbits and dogs, and kill babies as well. There is no doubt that half the babies who die are killed by wrong feeding, are poisoned by their food; and that is the great reason for the shortening of life through the dying off of half the human family. In civilized lands half the people die before seven years of age, and it is almost entirely because of this wrong feeding. Down in Mexico it is a great deal worse, for they are so awfully ignorant down there the average length of life is only seventeen years in that great country, ten or twelve million people; and in this country it is only forty years. It ought to be 140. There is no reason in the world why it should not be; 125 or 130 ought to be the ordinary length of life; nobody ought to think of dying at less than a hundred years, unless by accident; and very few people do die a natural death. An eminent French physiologist says: "Man does not die; he kills himself." That is true in the great majority of cases. Most of the babies are killed by wrong feeding.

Well, now, as I said before, here are these two kinds of germs, the friendly and unfriendly. The friendly germs live on sugar. That is why sugar is put in the milk for the infant; that is what milk sugar is for, one thing, is to feed those friendly germs and keep them growing. Acids are formed from the sugar.

The unfriendly germs do not live on sugar at all; they do not want any sugar. But they live on such substances as the lean substance of meat, lean meat, the white of eggs, and even undigested curds of milk will feed these germs. These are the germs that cause decay. You know the difference between the apple that is rotten, and a dead rat, for instance, or a dead pig, or a dead cat. You know how it smells; what a loathsome condition it is in. Here is a rotten apple; it is not pleasant, but still it is not so horribly offensive as a dead rat; it is a very, very different thing. The rotten apple has the friendly germs growing in it; it is sour, etc. But the dead rat has these unfriendly germs I am telling about. These unfriendly germs are always found in meat. If you take a piece of meat and put it away, it undergoes decomposition. Here is a piece of meat and a pan of milk; put them away side by side in a warm place; after a few days the meat will be very sour, and you can hardly describe what it will be; it is certainly very loathsome and unpleasant, horribly so. If you put that beefsteak in a pan of milk, the beefsteak will not decay, it will not become putrescent. I have up at the sanitarium some beefsteak that has been in a pan of milk three months, and it is perfectly sweet yet. The milk is sour; the acid that has formed in the milk is a preservative; it is a germicide, it is a disinfectant, an antiseptic. The same is true of fruit juices; they undergo fermentation and produce these acids, which are protective.

So if a man is going to eat beefsteak, it is important he should eat plenty of fruit to disinfect his beefsteak.

When you kill an animal, you do not have to go and smear that animal over with something filthy in order to cause it to decay, in order to cause that meat to become putrescent. All you have to do is to let it alone, because the germs are in it already. If the animal is wild game and is hung up in the market without being drawn—which is a crime and ought to be prohibited by law—it very soon decays, becomes permeated with these putrefactive germs.

Buttermilk is another good thing, and that is why buttermilk and kumyss are so very valuable.

Another word about the food value of fruit. People have no idea, the average man, how much value there is in fruit. For instance, the oyster I was speaking about that we had at the banquet last night. I say that I excused myself. The oyster has eleven calories or food units to the ounce. You know what a calorie is. It is just 4 times as big as the heat unit; 4 times as great as the British unit; the British unit is the amount of heat required to raise 2 quarts of water one degree in temperature; to raise 4 pounds of water one degree in temperature, or one pound of water to 4 degrees in temperature. Every stick of wood has a certain number of heat units in it. Food is fuel for the body just exactly as coal is fuel for the locomotive; it is necessary to keep the body warm, that is what we eat for. Four-fifths of all we eat goes to keep us warm; only about ten per cent of the food stuffs we eat actually are utilized in work. If you had such a poor locomotive, if you had such a poor engine as that, you would change for another one, because the best boilers are able to utilize a great deal more of the energy than that.

In food we have two kinds of fuel, just as in a locomotive. When the locomotive comes down the tracks it stops and some coal is put in; it stops at Marshall and at Albion, and by and by, when it gets to Jackson they take the locomotive off and run it into the repair shop; it goes in there for another kind of fuel; it takes on coal at all the little way stations, and when it gets to the repair shop it goes into the round house and has to have another kind of fuel supplied to it; and the fuel is metal fuel put on there in the round house: A bolt has dropped out, a nut has fallen off, a bearing is worn out. Some metal repairs must be applied to the locomotive. That is the kind of food in our bodies; the metal repairs and the fuel or coal are all done up in the same little package together. So when we eat a piece of bread we get everything we need. We get the coal and the brass and the copper and iron—it all goes in together. The proteid is the metal of the food; the lean meat, the white of an egg is metal that goes to repair the machine itself; while the starch and fat and sugar are substances which are simply burned in the body, matter simply to keep up the energy, and for no other purpose; that is what they are for. Fruit gives us fuel for heat, while lean meat gives us metal. If people would substitute fruit for a large part of this lean meat, it would be vastly to the advantage of the human race.

Prof. Chittenden, acting with the United States Government, has been making some experiments recently, especially in the last three years, and has found out, what the Minnesota farmers found out more than ten years ago, that we do not need so much metal food; that we do not need so much proteid; that we do not need so much of the proteid element. Most of you farmers are better posted on that subject than city people are.

The Minnesota farmer found out pigs grew faster, fattened better, were stronger, healthier pigs, if they did not have so much proteid in their food. Now Prof. Chittenden has found out the same thing. Prof. Chittenden,

in his experiments with fifteen soldiers, four professors and six athletes, during nine months, gradually reduced the amount of proteid until he got it down so small he could not eat any meat at all; the last piece of meat he was eating was about as big as your thumb nail—a little piece of bacon. I met Prof. Chittenden recently, and he told me he was satisfied the body could be healthily and perfectly maintained with non-flesh dietary; that vegetables provide for the body all the sustenance it needs. The fact is, when you avoid eating an excess of proteid, you cannot eat meat. Even potatoes contain all the proteid, everything you want; the same is true of corn bread; rye, wheat, barley, etc., have an excess of proteid. Then there is milk and eggs if you want; they are not the very best foods for adults, but come in far ahead of flesh foods at any rate.

Just a word about the medical uses of fruits. After what I said about the free use of fruits, I should say further: Fruit should enter largely into the bill of fare, should be part of every single meal. One of the great advantages of fruit is that it is raw food. Fruit is of all substances the one natural food for man.

I got a monkey some years ago, and tried to see what different things we could get him to eat. I found he did not like anything so well as fruit. Monkeys are so nearly like men, you know; they look like them, and act like them to a remarkable extent. They are so nearly like human beings that I thought it would be safer to follow the monkey than to follow some people I knew. And so I studied the monkey. I watched him to see what he ate; and I said, first of all, he did not chew; but I found I was in error about that. I gave him some cherries, and he seized those as fast as he could get them, kept putting them in his mouth so fast I thought certainly he would choke to death. I said certainly this monkey does not chew. A little while after I was noticing the monkey again. I saw he had large bunches on his cheeks. I said, "Dear me! this monkey is getting tuberculosis." I watched him very sharp; pretty soon I saw him put his paw up and hit one of those bunches and it disappeared. In his great cheek pouches here he had stored up those cherries, and now he was taking them in between his teeth and chewing them up thoroughly.

There isn't anything that pays so well as chewing. You farmers sometimes put some gravel in the feed box of the horse so he has to pick the oats out. You adopt other means of keeping the horse from bolting his dinner, and then you go straight in the house and bolt the dinner yourself. (Laughter) It will help you to put some gravel in the manger just as much as it will the horse. You must chew thoroughly. Gladstone was a great chewer. And Prof. Fletcher has recently been calling our attention to chewing. Fletcher has come out as the apostle of chewing. He has rediscovered chewing. When I was down east a few days ago I found Mr. Fletcher had been down at Yale and had all the professors out, and all the students out, and he showed them how to chew. And he came down to New York and he had a great meeting in the Academy of Medicine and got all the great doctors of New York—I understood the academy was filled and they had to open the back doors and filled up the hall with the doctors that came there to watch Mr. Fletcher chew, to find out how to chew. It is really a sort of lost art with us; but if we are going to eat fruit we must chew. Fruit is something that is worth chewing. Chew the fruit until you get all the flavor out of it.

Pawlow made a wonderful discovery, that our food must be palatable. If we chew the food in the mouth, the stomach produces a juice just the

right kind and quantity to digest the food. Every food if put into the mouth and chewed long enough will produce in the stomach just the right gastric juice to digest it. So the beautiful flavors, delicious flavors of fruit are something more than pleasure and delight; they are one of the most marvelous arrangements whereby the proper digestive process is set in operation to care for the whole meal.

Now another thing about fruit is, it is the natural diet of man. It is better adapted to him than any other substance he can possibly eat; and it can be eaten raw; and it cannot be improved by any process of manipulation by the cook; and it is necessary for us to eat a certain amount of raw food, and fruit is a thing which we can eat with pleasure and delight.

I haven't any sympathy at all with the people who tell us we must eat raw potatoes, raw oats, and come down to the horse diet, become herbivorous or granivorous. It is simply ignorance that leads people to that conclusion, because raw wheat and flour and oats taken into the stomach are passed right through the alimentary canal without any digestion at all. Even raw starch that has been completely broken up and ground fine, three-fourths of it will pass right through the alimentary canal. When a man eats two ounces of raw starch, fully half passes through the alimentary canal undigested. But fruit is a thing that is completely digested; that is the one raw food that is adapted to us.

Sailors go off on a long expedition with a lot of cooked food on board, and they come back by and by with scurvy. Their gums are lacerated, their teeth falling out, their faces swollen, and limbs swollen and blue. The poor fellows are almost dead with scurvy; and some may have died on the way. You bring in a few oranges, lemons, nice ripe apples, some fresh fruits of any sort, and supply them with them, and the change is marvelous. In a few days those ugly wounds are healed up, the discoloration and abscesses disappear, and it is a veritable miracle wrought by simply a little raw fruit. We ought to have learned the value of that lesson long ago, and made a practical application of it, but we have not done it.

In Germany, and since that time in England and this country, they have recently made the discovery that if a baby is fed on some infant food, some patent baby food, that costs three cents a pound and you have to pay 75 cents for it—you can make it just as good at home by toasting bread and grinding it up in a coffee mill, just as good, and better than most of the foods you buy. Anything in the shape of patent foods is not better for a baby than flour ball, and every housewife knows how to make that; but it is better to toast it a little. If you feed a baby on this kind of food continuously it gets scurvy by and by—the best kind of cooked food in the world. Boiled milk, sterilized milk, gives the baby the scurvy after a while; and it is found out that fruit juices will prevent it. The only thing necessary is to give that baby the juice of an orange every day, or the juice of a couple of apples; a little juice of that sort of raw fruit; if you cannot get any fruit, it probably would be advisable to get a little juice from sweet corn, or the juice of some vegetables like the beet perhaps, or some other vegetables, or tomato juice, or anything of that sort; any kind of raw juice will save that baby from the scurvy and cure it. It has been of immense value to us since we learned that. We find at the sanitarium a great many people come there really suffering from a kind of scurvy from living entirely upon cooked foods for a long time, bread and meat and potatoes. A great many people eat no fruit at all, nothing but cooked fruit. You know what happens to your pigs fed on cooked food alone and nothing else; in six weeks that pig will

be sick. And something will happen to your horse, or cow, or any other of the animals. Every animal that lives must have raw food, food in just the condition that the Creator made it for him. All our cooked foods are artificial, artificially prepared. God made man to live in the forest like the monkey and ape and gorilla and orangoutang; these still stick to the Edenic bill of fare; but man has wandered away and sought out all kinds of things.

You must feed your pig or horse the right thing if you want to get the right kind of work out of him. How do you feed yourselves? This is certainly cognate to this subject. If the average farmer fed himself as he feeds his horse, and his horse as he feeds himself, in the same reckless sort of way, his horse would become a dyspeptic in a very short time. It is only because man is tougher than a horse that he can stand such a bill of fare as he has—because he has a better constitution than a horse. We have got inoculated with bad habits so we are able to endure them.

I sat down to a hotel table a while ago, and there was the bill of fare. What was there there? In the first place, there were fish of various kinds. Do you know how many stomachs it takes to digest fish? The whale is a fish eater, and the whale has seven stomachs, and some whales have as high as eleven stomachs; so it takes seven whale's stomachs to digest this fish. And so I put it down. There were half a dozen kinds of fish; there were several kinds of vegetables there; there was grass of various sorts. Now how many stomachs has a cow got? Four. It takes four stomachs to digest lettuce and spinach—grass of all sorts. Seven and four are eleven. There were various kinds of nuts and fruits there; that is what a monkey eats; a monkey has one stomach, and that made twelve. There was meat, all sorts of meats, red meats of various sorts; and it takes a dog's stomach to digest meat. A dog has a stomach intended for meat. So there were thirteen stomachs required to digest that bill of fare, and that man right opposite me sat down there with one puny little stomach and expected to be able to digest the bill of fare of all creation. There is only one animal that can do it with impunity, and that is the Michigan woodchuck. The Michigan woodchuck has got fourteen stomachs. (Laughter) There is a chance for him. But when a man undertakes to swallow a woodchuck's diet he gets the worst of it.

So I recommend that you substitute in a very large degree the delicious fruits, these wholesome fruits that God has given us, and which we find are so wonderfully helpful in the cure of disease.

Away back two thousand years ago, Pliny, the Roman historian that saw the eruption of Vesuvius that devastated Pompeii and Herculaneum, and who lost his life in that terrible eruption, was smothered by the ashes as he was trying to escape—this wonderful old historian, the author of "Pliny's Natural History," recommended fruits, and said they were accustomed to use them with great success in the treatment of diarrhoea, rheumatism, and acute dysentery.

Van Swieten two hundred years ago recommended fruit in great abundance; he recommended strawberries; he recommended some patients to eat twenty pounds of strawberries a day, and especially for consumption,

Linnaeus, the man who made botany—and you know how dependent you farmers are on the observations of Linnaeus, the great Swedish botanist, had the gout and cured it by eating cherries. Van Swieten tells of the wonderful things that have come from a fruit diet for consumption.

I have visited Germany many times, where I saw the signs up, "Grape

Cure." "Grape Cure." "Grape Cure." Now we have a cherry cure, peach cure, plum cure, apricot cure, as well as a grape cure. It is simply the fruit juice, the raw juice of the fruit; the natural food substance which is exactly suited to us just as God made it for us.

We find at the sanitarium a very great use for fruit in various ways; we find it wonderfully helpful, especially in antagonizing this chronic auto-intoxication which almost everybody is suffering from. You have headaches every once in a while, feel dull and stupid—Auto-intoxication. If you will stop eating the greasy dishes for a day or two, or three days, and eat nothing but fruit, you can save a doctor's bill and a whole lot of sickness and wretchedness. Get in the habit of eating plenty of fruit every day. You will be surprised to see how it will antagonize this bilious tendency. Biliousness is nothing in the world but auto-intoxication.

Do not imagine I am charging you who have suffered from biliousness with being intemperate. I said to a lady the other day, who had tawny skin, a tongue that looked as though the city scavenger ought to be after it, a tainted breath, a terrible stench arising from the body, and perspiration had an odor to it, I said "Madam, I think you are suffering from auto-intoxication." "You are entirely mistaken, sir, I have not taken a drink of whiskey since day before yesterday."

Auto-intoxication is the condition in which a man has got the distillery within himself, the whole thing, the brewery and all.

It is these unfriendly germs I am telling about that are feeding upon the meat you eat, the fragments of undigested meat of various kinds that have found their way into the colon, where there are fragments of undigested food stuffs sometimes actually for weeks. What happens to a dead rat, cow or sheep, that lies off in the corner in a warm place somewhere? The same thing happens to that dead sheep or cow that happens to you: Putrefaction takes place inside as well as outside. If it remains in the intestine, it will rot.

Some of you have tried a beefsteak poultice over your stomach or over a carbuncle or boil—beefsteak poultice. You know what the condition of the beefsteak is. You want it changed in a few hours. Suppose that beefsteak is inside instead of outside. The very same thing happens to it; it has not been digested; it is bound to happen to it, because of the germs that are in it. The codfish and mackerel and salt fish and herring, and various things you buy in the market are simply swarming with germs. The same is true of cheese. Cheese has a great many germs in it; but fortunately the germs in cheese are of a friendly kind almost entirely. I am sure you will thank me for saying that. That is why people can eat such quantities of cheese apparently without doing them any harm. But that depends. There are certain kinds of cheese this is not quite true of. Certain kinds of cheese have the unfriendly germs growing in them; and sometimes, especially Germans carry a tin box around in their pockets. A story is told of a German in one of the West India Islands who sat opposite a Spaniard at dinner; and he took out a little tin box and passed it to the Spaniard and asked him if he would have a little. The Spaniard said, "No, thank you," and turned his face to the wall. "Do you think it unhealthy to eat Limburger?"

"No," said the Spaniard, "I think it an unnatural crime." So it is. Substances of that sort are simply in a state of advanced decay, and they are not fit to go into the body.

Fruit is one of the most important means of killing the germs off, and disinfecting the germicidal acids in the intestines, which make it impossible

for them to act. When a person has a tawny skin, a stinking breath, an offensive perspiration, and fecal discharges which are like those of the cat or a dog, or any other carnivorous animal, the person in that condition is in a chronic state of auto-intoxication; and Bright's disease comes on after a while, and liver disease, and other troubles that grow out of the poisoning that is going on.

We may do more to increase the longevity of the American race, to increase vigor and endurance, by increasing the use of fruits, than in any other way.

USE OF COMMERCIAL FERTILIZERS.

(J. H. HALE, SOUTH GLASTONBURY, CONN.)

Mr. President, and Fellow Fruit Growers: After such an enjoyable time last night, I feel as though I would like to unbutton a little at this time, and might have done so earlier.

I thought of one thing last night while enjoying that delightful banquet, of some of our negroes down south that might interest you, in a way. The darkies are always gambling in petty ways. They had worn out about every gambling game down there some years ago, and finally one of them said one day during the noon hour, "Let's each put a nickel in the pot, and name what good eating is; and then we'll ask the boss to say who has laid out the best program, and the fellow that has gets the money." So 75 or 100 of them put in a nickel apiece, and asked the boss in to decide what was a good square meal, what was the best bill of fare laid out. One named various dishes, and another another, until it got to about the fifth or sixth fellow, and he said, "Well, dah's 'possum, an' dah's sweet taters, an' dah's water-melon—" About that time the other negroes, some of them, began to slide up toward the pile and reach their hands out. "Hold on, niggah, what yo' doing taking the money out?" "O sho', but dat niggah has done named all dah is."

So I felt almost last night as though "dat niggah" Kellogg up there had done named all there was. It was good eating, "shoo nuff, honey."

But now to this question of commercial fertilizer. I know little or nothing about it scientifically. I am not a chemist, and I ought not perhaps to try to tell you anything about commercial fertilizer. All the knowledge I have is that of a practical fruit grower.

It happened to be my privilege in my early boyhood days to be at the first public meeting of American farmers where the discussion relative to chemical fertilizers and of agricultural experiment stations took place. I was a boy at the time. Old Prof. Stockridge—perhaps none of you here know anything about the Stockridge plan of plant feeding; but Dr. Stockridge and a number of others were talking and I as a boy got enthused with those ideas. Some of them were founded on fact, and some were not. But it led me to believe, in my earliest days, that plants were real animals to be fed with the foods that would stimulate them to their most perfect bodily development and most perfect fruitage.

In Connecticut we had the first agricultural experiment station that was started in the United States; and the first work of that department was

the work of the study of the then very inferior commercial fertilizers upon the market, with Prof. Johnson of Yale—many of you have read “Johnson’s Agricultural Chemistry”—and with Dr. Jenkins, his predecessor at the head of the Connecticut station, I have been in close touch in a general way with the very early use of commercial fertilizers and as studied on a large scale by them. Also one of my near neighbors, a thoughtful farmer, reading years ago of some French experiments with various chemicals agriculturally, I had the opportunity when a very small boy of knowing of his going to the nearby drugstore and buying the chemicals, such as you would find at a drugstore—potash, phosphoric acid—and experimenting with those on his land for growing crops. I can assure you it was not a profitable industry so far as those chemicals were concerned, paid for at drug store prices, and as far as the crops were concerned, but it was profitable as to his development as an agriculturist, and to my early schooling in the use of agricultural chemicals.

My farm at home was not naturally grass land, and if it had been I guess we were too poor in the early days to have many cattle to feed thereon; we never had cattle to any extent in the early time; and as we increased our plantings it became necessary of course to feed them. You hear about the so-called wornout soils of New England, but they are not as much worn out as the men are worn out trying to handle them. But we never had the amount of stable manure necessary for the proper plant food of the acreage we had to till; so that my earliest peach planting, and those ever since, for the last forty years, have depended upon the commercial fertilizers that were offered at the time.

I do not say I am the first, but I know I am one of the first farmers in America to buy nitrate of soda. I bought nitrate of soda, Brother Collingwood, when it was \$70 a ton; I bought nitrate of potash at \$100 a ton, experimented with it and got profitable results; and I have bought in large quantities at \$70 a ton and found it profitable. There isn’t any question, brother fruit growers, but what you can grow all the trees you want, both vigorous trees and the fruitful ones, entirely on commercial fertilizers. Prof. Hedrick told you yesterday about the hardiness of the peach depending somewhat upon the solidity of the wood and the hardiness not only of the tree but of the bud; and it is unquestionably true that you may grow a tender fruit like the peach in a more trying situation, a more trying climate, if you will build up the tree with the commercial fertilizers that are best suited to grow a stocky, hardy, tough wooded tree. I am in the Connecticut valley, where tobacco is grown more largely than any other crop, and they have for years grown nothing but crops of tobacco on the same fields and where they have depended on fertilizers alone and failed to plough in any green crops there is unquestionably deterioration in soil; but where they have added humus to the soil regularly year after year, there is a steady improvement of the soil. We read once in a while of the continual wearing out of the Connecticut soil by the growth of tobacco. It is not true, except in the sense of where they have used commercial fertilizers alone; but wherever any green crops have been planted and ploughed under, and the commercial fertilizers used, the lands are steadily increasing in productiveness.

I have several hundred acres of land in Connecticut at the present time, taken forty years ago as poor semi-abandoned, worn out Connecticut land, and it is steadily increasing in its productiveness. We have many acres of land in the east that produce from 100 to 120 bushels of shelled corn per acre, that have been built up on commercial fertilizers and green crops and

proper tillage of the soil. You can't just put fertilizer into the soil and get direct results out of it. Tillage is a large factor in the handling of any soil.

I like the commercial fertilizers best because they are the easiest to handle in the first place. With us they are the most economical. The cost of stable manure would almost prohibit handling it on many acres of land. The land that I cultivate lies back on the hills, where the cost of cartage alone would be almost as much as that of the purchase of commercial fertilizers and their application.

I like the commercial fertilizers because I can apply them in a way that the trees need. Here is a great broad field like this room here, of perhaps thirty or forty acres, and it has the different characteristics of the soil. If we spread on stable manure, we put on the same kind of plant food all over. If we use commercial fertilizers we can see from experience, if we keep our eyes open, that a certain section of land responds more readily to potash than another; this section perhaps does not need the potash; so we only put it there where it is most needed. Another section of trees needs increase in foliage and we supply more nitrogen. As we need, so we put the fertilizer. We apply just the raw materials that the tree and the plant tell us they need; and they tell that very readily. An observer who keeps in touch with his trees and plants will soon find out what they want. Trees are a good deal like children and chickens and pigs, when you listen to them, that is all. There are different ways of listening. You have to listen mostly with your eyes; sometimes it pays to listen with the returns that come back from market; those touch your pocket book and you feel those pretty thoroughly.

I made some notes here, and I don't know whether any of them are good or not. Notes don't go nowadays; they rather have the cash. (Laughter.) Or at least they seem to.

In my early days, when I was interested perhaps more in experimenting than I am now—and speaking of early days and experimenting reminds me: Some little time ago I was taking dinner with dear old Edward Everett Hale, just a family party there, and he was telling us something of his early life, and telling a little story of marrying a couple one day, and of what he said to them, which made us all laugh; and then he went away in a reminiscent mood, and he said, "Yes, but that was years ago, when I was giving more advice than I do now." It showed he had grown, showed the dear old fellow had grown.

Some one has said, "It is more blessed to give than to receive," that applies only to kicks, medicine and advice. There is some truth in that unquestionably. But I made some tests of commercial fertilizers with potash alone on small fruit, and I was astonished at the increased color that was added to the lighter types of strawberries by heavy feeds of potash. I was astonished at the increased sugar that we got into the strawberries by heavy applications of potash, both from the wood ashes and from the German potash salts. I have made applications in the same way to our peach orchards extensively; I have been almost prodigal in the use of potash at times in some of my sand land peach orchards, but it has been astonishing how we have painted those peaches with a wonderful blush that made them so attractive in the market, and enabled us to get the money back to pay for the potash, and something extra for the bank account.

From my experience on sandy land, on the light soil such as you have in many sections in Michigan, where you are growing peaches: on similar types of land in the east and south we have added wonderfully to the color of our

peaches and to their sugar that they contain, by very liberal application of potash. If you are not using potash very freely and are not satisfied with the color on your peaches, I would advise you to depend partially upon potash and partially on pruning shears, and light open-headed trees and sunlight, because all those things work together for perfectly developed fruit, and no one thing alone will bring it about.

I am growing at the present time I hardly know how many acres, but nearly three thousand acres of peaches north and south, and that thing would be impossible were it not for commercial fertilizers; simply could not be in the game at all were it not for commercial fertilizers; or, if I was in the game, I would be down in the bottom somewhere where there would be no fun in playing it, and perhaps little or no profit. I depend almost entirely however, upon two elements—potash and phosphoric acid; because in getting the humus I need to plough into my soil I also get all the nitrogen I want, by growing cow peas, vetches and clover; I assure you we buy but very little nitrogen; and yet we always keep some “up our sleeve,” or at least under the shed. But potash and phosphoric acid are our main dependence. If I could get all the wood ashes I want, at a price I thought they were worth, I don't know that I would buy any other form of potash; but that is difficult. We therefore depend quite largely upon the German potash salts, and muriate of potash is the form in which I usually buy it. In the south we depend entirely upon the acid phosphate for the phosphoric acid. In the north we have always depended upon the fine ground raw bone; it is not so available as some other form, but the trees will take it out in time and I think it best and cheapest in the long run. I always like to have a little money in the bank, a little surplus food in the soil. While I depend almost entirely upon the cover crops to get my nitrogen from the air, yet we always keep some nitrate of soda, that is the most quickly available form of nitrogen; just as soon as it is dissolved and in the soil the plants go to taking it up in 24 hours. Sixty pounds to the acre will make a whole field turn green 24 hours after a rain. It will stimulate the corn crop, or a little sickly peach tree. Just a little scattering broadcast of nitrate of soda will set that tree into a green, vigorous growth; and you can't get perfect fruit without vigorous growth. Of course, a sickly tree will give you high colored peaches, and they will be a little earlier and ship a little further; but perfectly developed peaches never come off anything but a healthy developed tree. So a little nitrate of soda sometimes will help the tree quickly to come into that vigor that is needed. I use any and every available form of the plant food that we can buy in its highest and purest state at lowest price per unit of value. It is the one thing to be considered in the use of commercial fertilizers.

This putting fertilizers close to the plant, and putting fertilizers close to the tree, is a large waste. I should not think of standing in a plate of soup to absorb soup for my dinner really; and I don't want a tree to have the fertilizer close around it; after the first year, if you spread your fertilizer broadcast all over the field, the roots will get it just as chickens will get after it. No question about that. You need not worry lest you might lose some of your fertilizer if it is not put close about the tree. The further you scatter it, the further your tree will chase its roots after it and become a vigorous and healthy tree, for in its roots hunting after that scattered fertilizer it will find a lot of other things suitable to its uses.

The fertilizer dealers are shrewd business men, and they have made thousands and millions out of the business, much of it legitimate and some not; but they make one regular rule: They take ten dollars worth each

of phosphoric acid, nitrogen and potash, and put them together, and three times 10 is 40 or 50 every time. Now I don't like that arithmetic. It hurts my pocket-book; and so I don't figure that way. I buy my chemicals separate. I buy what potash I want, as potash; and what phosphoric I want, in that way; and my nitrogen, if I buy it at all, in another way. There is a good deal of talk about home mixing of fertilizers. There isn't anything in that. If you take it on to the barn floor and turn it over and mix it over, and you add nothing to its value, you are going to scatter it all over the field in the end anyway, it is a good deal better to spread each one separately on the field, because each portion of the field requires a different portion.

So I would say, buy your chemicals separate, so far as you can. Then here comes the next business proposition. A small farmer who only wants a few hundred or thousand pounds will find it more difficult than will a large farmer; and here comes the need of a society like this, or your local societies, or your Grangers. You have some Grangers in Michigan; you ought to have more, a good Grange in every agricultural town in this State, where the farmers are thinking and working together for the general cause of agriculture. With such an organization you could buy together. Farmers are the hardest people in the world to pull together. Farming is such a blessed good business that you can live in spite of the other fellow some way. But here is a chance in this particular line to cooperate in your buying, and run into your towns five, six, ten, twenty carloads of chemicals, and divide it up among yourselves, and get the full benefit of the lowest market rate. You will find dealers ready to meet you more than half way, because it is one solid business proposition; it is a sure cash deal. If you go into this cooperative business, every fellow puts up his money Johnny on the spot. Don't wait to see whether the crops grow or not; but go into it as a business proposition and pay as you go sure.

That, Mr. President, in a general way, is practically all I have to say on this subject.

I would like to say just a word about spraying discussed here by Prof. Fletcher day before yesterday. It is one of the important things in our orchard management, is the spraying. I have had a good deal of experience in fighting this blessed little friend of ours, the San Jose scale. While I have been a strong and ardent believer in the use of lime and sulphur on account of its stimulating effects upon the tree itself, I have been experimenting with oil for three or four years, and I have from away back; tested all the soluble oils, so-called, I have been experimenting with, and I was glad to hear Prof. Fletcher say what he did, and that, while perhaps the time had not come when we were going to abandon lime and sulphur, he did believe the oils were pretty nearly here. After an experience of a number of years, I am perfectly well satisfied that, while lime and sulphur has the most stimulating effect on our trees of anything we use, there isn't any danger in the modern oils; I don't think there is any danger whatever in them. They are making them now with some fungicide in them which makes them actually helpful to the tree. I am thoroughly satisfied that the oil sprays are coming, and are going to be so much easier to apply, and if they reduce the cost somewhat so they don't cost any more than lime and sulphur, I believe we shall use them in all our sprays in the future for the destruction of scale insects.

DISCUSSION.

Q. I was interested in that point brought out about wood ashes. I have been following Mr. Hale's advice and using a good deal of wood ashes on strawberries, as we have them very handy and can get them by the ton by hauling a quarter of a mile and paying a small price, and I want to know where to put them. But Mr. Collingwood here advises us not to use very much wood ashes on strawberries because strawberries do not like the acid soil. I am kind of between two fires and don't know just which to do.

Mr. Hale: Strawberries do not like acid soil; that is all right. The potash and lime in the potash helps sweeten your soil.

Same Member: I beg pardon. I misspoke. They like acid soil, but not an alkali soil.

Q. Mr. President, if questions are in order: Mr. Hale speaks emphatically in regard to the advantage of the use of cover crops for the production of humus. I would like to understand whether it is his idea to plough under these cover crops while they are green and full of sap, or whether they should be allowed to reach a certain stage of development where they will not be very sappy, before they are turned under?

Mr. Hale: I never like to turn them under in sappy condition. For instance, my cow peas, which are a semi-tropical crop, I want them to grow and be killed down by the frost. The dry part is all I want; the water in a sap plant is no particular advantage, while turning in some of those green crops tends to souring the soil. Same with clover. I do not like to wait in the spring until they have grown six inches or a foot or more. The value of a cover crop to me is through the summer and fall; just as early in the spring as I can I turn them under. No, I don't want to turn them under in a green state.

Q. I would like to have Mr. Hale's opinion about the aphid. That is the worst we have to contend with in our locality in the growing of peaches, besides winter killing.

Mr. Hale: They trouble you the first year's planting; not after the trees get under way?

Q. No, the trouble is getting the trees under way, in planting near an old orchard, where there has been trees planted in it before.

Mr. Hale: By the liberal use of nitrate of soda around a young tree the first season, we get it going, and its roots run away from the aphid.

Q. What stage of the growth of the rye do you plough it under? You can't wait until it is frost killed.

Mr. Hale: In the first place, I would not grow it at all except to keep the land from blowing away. I would plough it under early in the spring if I was foolish enough to have sown it in the fall where I ought to have had clover or vetch.

Q. In your experience, Mr. Hale, what is the best method of distributing the nitrate of soda in nursery rows? For instance, you speak of 200 or 400 pounds to the acre.

Mr. Hale: No, I did not say as much as that at one time. But that is too much to put on almost any crop. Fifty to one hundred pounds at a time is better. If I were going to try 400 pounds to an acre of nursery, I would put it on four different times, and probably hand sowing would be the most economical way to apply it.

Q. It would be a difficult matter to spread it thin enough.

Mr. Hale: No, no, no.

Q. It is awfully heavy you know, like salt.

Mr. Hale: I know, but you can do it; you can do anything in this world that *you have* to, brother.

Q. How cheaply would you have to buy barnyard manure to make it a profitable fertilizer?

Mr. Hale: That is a local question. How far would you have to haul it, what you have to pay for it, pay for labor, and for teams, etc.

Q. Get a large load on the ground for \$1.25, on the field.

Mr. Hale: I would keep them coming.

Q. Do you use soda in preference to potash on light sandy soil?

Mr. Hale: They are two different things for entirely different purposes.

Q. Is there much potash in nitrate of soda?

Mr. Hale: Not a bit. Nothing, but nitrogen. If you buy nitrate of potash, you can get the two together. But it is up to \$90 a ton, and therefore nitrate of soda is a little cheaper to buy, and buy potash separately.

Q. Potash is about \$50 isn't it?

Mr. Hale: No. I bought a hundred tons of muriate of potash a few days ago, delivered in Georgia on my farm, for \$37.75 a ton. Muriate of potash is \$40 or \$42 a ton at present time.

Q. How much of this nitrate of soda do you use to young trees? A handful or two?

Mr. Hale: A good liberal half-handful to a young tree. And another one a month later. It is rich and powerful and will reward you if you give it a chance.

Mr. Hutchins: There is a good deal to this cover crop question, a person is liable to find out if he studies it a little. There are several different kinds of conditions; and the conditions, it seems to me, that Mr. Hale has, of sandy ground, is different from what a good many of us have on our clay soils. I want to find something that will make some material, that is, something that is practical. We put in a cover crop of oats, which is one of the best I can find. We can't put it in very well before the first of August; it will make quite a little growth before the winter comes on, and it will catch the foliage; but as far as the humus you get out of it is concerned, it does not offer very much material, and you could gather up a whole lot of it in a tablespoonful. Now I think perhaps if we could make this vetch grow on these heavy soils, it would be all right, but we can't do it, not to amount to anything. At least I have not been able to.

Mr. Hale: Can't you make clover and turnips get to going?

Mr. Hutchins: Yes, we can make turnips grow. You can't make clover do very much; once in a great while you can, but you can't bank on it. And we can't leave it long enough in the spring to amount to much. That clay soil does have the faculty of evaporating the moisture. And with us we have to get at it early in the season. Some fellows have an idea you must leave the cultivation until the blossoms are fallen. Well, if you have made a study of it, you would be surprised to find how much water has left you during that time, and our only way is to get at it earlier in the season before the blossom; and you have got to have a cover crop that is out of the way by that time in order to cultivate. I want to get at something we can use and produce humus in appreciable quantities, and at the same time that will allow us to cultivate as early as that. Maybe I have been very obtuse and have not been able to search around as much as ordinary fellows; but I have looked a little for it, and I have not been able to find it. We can grow turnips. I have grown them some, and you would know, along in the spring, they

were growing there if you passed along the road; that is, know they had been growing. But they are like the oats; by the time you get them down there isn't a great deal of material to them. If we could find something that could just maintain the humus, it will help me out some.

Mr. Crane: I would like to ask Mr. Hale if he uses anything that he really gets any humus out of, down in Georgia or up in Connecticut? Same as Mr. Hutchins has mentioned here? He gets so little humus from anything he can put in a pear, apple, or peach orchard. When I was on Mr. Hale's farm, I could not see any humus in the ground, same as on my own. In a cultivated orchard in the summer perhaps might have been a little clover there, or something, and if he cultivates it very early in the spring, as he does, where does he get his humus? The only thing I have ever got any humus out of, that I thought was genuine humus, is when I sow my crimson clover and let it get out of bloom and turn it under; then I had a woody stock and something that did rot and make humus; when I ploughed it early and turned it under, I didn't get much humus, only a little from the root.

Mr. Hale: Things are seldom exactly what they seem. I am sure if Mr. Crane would grow good vigorous crops of clover through August and September, October and November, and into December, as they often grow in this latitude, that no matter what you saw there, when you turned it under in the spring, the roots of that clover plant would continually add humus to the soil. Take our soil in Georgia, where we grow cow peas every summer and let them die down in the fall killed by the frost, and they are broken up by the harrow in the winter, when we turn them under in the winter there is very little apparent matter to turn under. But if Brother Crane had seen the change in the condition of that soil, as I have, in the last fifteen years, he would know there was something being done by those green crops. When I first went there, if we didn't get to ploughing in the spring in February right after the rains, the soil would get so hard sometimes in April that we couldn't plough it till we had more rains. There are hundreds of acres in the lands of the south that are never ploughed each spring, because they get so hard they cannot plough them. But as we have been growing cow peas on that land, it is loose and friable; we can break up that soil whether it rains or not; it is in a loose and pliable condition, from the ploughing under of apparent nothingness of cow peas.

I agree with the brother, you have got to plough early in the spring for the best results in an orchard. Don't wait for cover crops to grow in the spring. I would go right ahead whether the thing shows or not—and I sometimes feel just as you do; but when I see the trees growing, see the way the land holds moisture during a dry time, I know the Lord has been doing something when I have been sleeping.

Mr. Crane: I thought it was your heavy pruning. They will grow better if you head them in. By severe heading I always got a big growth of tree; and you have always followed that up, and so your trees will grow in spite of anything when they are severely headed in every year. I noticed something kind of dead there; I guess it was cow peas down on the ground, and you hadn't begun ploughing yet; but it was about like our oats.

Mr. Hale: You try oats and cow peas side by side, and in a year or two the trees will tell you it has furnished something to your land.

Mr. Crane: I never could get cow peas to grow. They would kill out in August and would not grow.

Mr. Hale: That statement about not getting cow peas to grow is butting

in. Has no place here at a meeting of this kind, especially in a town where "there is a reason."

Down south the darkies are very religious, and they all have their churches. One good old negro woman finally came north, and for the first time entered a beautiful modern church. The usher showed her to a seat and she looked around. "Glory to God! Glory to God! I'se glad this house is de Lawd's."

The usher came up and tapped her on the shoulder and said, "Madam, you will have to be quiet. Please don't make any commotion."

"All right, I will be quiet. I will."

Then the organ burst out, and she jumped up again. "Glory to God."

The usher again tapped her on the shoulder and said, "You must not make such a noise. You must be quiet."

"All right. I will be quiet."

In a minute the choir burst out in song. She could not stand it. "Glory to God! Glory to God! I'se glad I'se here. I'se glad I'se got religion!"

He came up and said, "Madam, you will have to get right out of here. This church is no place to get religion." (Laughter.)

This is a scientific charge that is made by the fellows that know more than I do about that particular thing. I know land where clover does not grow very well the first year. If we stimulate it the first year with a little nitrogen, the clover growth is better next year. But cow peas will in my experience grow on any and all kinds of soil, during the corn growing season only, as they are a little more tender of cold than Indian corn.

CONTROLLING THE SAN JOSE SCALE.

W. W. FARNSWORTH, WATERVILLE, OHIO.

I think it was Solomon, that man of large wisdom and many sorrows, who once said there was nothing new under the sun. I have sometimes thought he had the San Jose scale problem in mind when he uttered that truth; for it would seem, with all the attention we have given this for the last ten years; all the discussing (and sometimes the cussing) we have given it, that we would have it worn pretty nearly threadbare. But we find there are a great many perhaps who do not thoroughly understand it yet; and sometimes an interchange of views and experiences may help those of us who have been in the harness for a long time.

It is unnecessary to go into a history of it. Perhaps the best I can do in this brief talk this morning will be to give you a general idea of how we have been handling it ourselves and keeping it under control.

Of course you all know one of the first remedies that was suggested for the control of it, was the whale oil soap, which we found effective, but very expensive and very difficult to apply. My first experience with it was on a little plum tree; I had planted 1,000 plum trees, and the following spring in going over the orchard and pruning them I found one tree badly infested. I pulled up the tree immediately, and tied a handkerchief on the adjoining tree so I could readily find the exact spot where the tree had been pulled out; took the tree up to the packing house in the center of the orchard, where the men were just gathering in with their tools, showed the tree to all

of them so they might become acquainted with the insect, and told them if they found any indications of it at any time to mark the spot and report to me at once. The tree was burned, and within forty-eight hours I had two men going over that orchard with whale oil soapsuds and washing the trees. We succeeded, by these vigorous measures, in stamping out that outbreak of the San Jose scale at once. But a few years later it manifested itself in our locality and we had to go to spraying.

The next was crude oil, and that proved a disastrous experience for many growers in Ohio. Thousands of trees were killed by the use of crude oil. It did kill the scale, and in a great many cases the trees were not injured; but a great many peach trees especially were ruined by it.

And then you know we were told that in California and in Oregon and on the Pacific Coast the growers there were using the lime-sulphur and salt solution. It was tried in the east, but for some reason or other the first tests with it in the east were not satisfactory; and at once the common people, and I guess the scientists too, jumped at the conclusion that the difference was in our climate. We are too apt to take things for granted in this world. We think a thing is so because some one has told us so; or perhaps our fathers or grandfathers have been following a certain way, and we take it for granted that is the correct thing. We do not do enough investigating for ourselves.

So we ran along for several years ignoring the sulphur and lime preparation, when we might have been getting good service from it; but finally investigation showed the lime, sulphur and salt was really being effective; and a little later we found out the salt was unnecessary. The reason salt was first used: This preparation was originally a sheep and cattle dip, used for dipping the sheep to destroy the scab, perhaps 25 years ago, I remember, before we heard of the scale, we had used it on father's farm in dipping a flock of sheep affected with the scab.

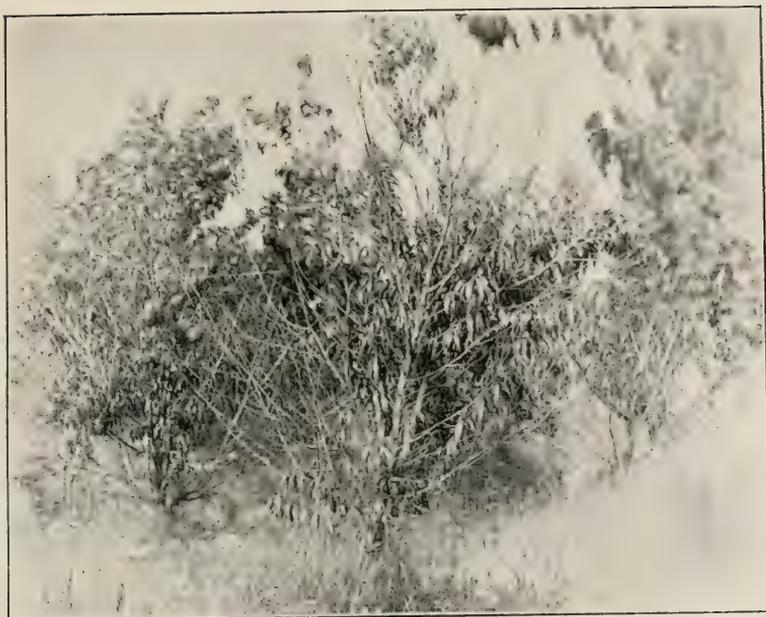
There have been different washes used, and different methods of applying, and different formulæ. We have had the selfboiled washes, and many other preparations; but I believe 90 or perhaps 99 per cent of all commercial orchardists today have settled down upon the use of lime and sulphur. And I want to endorse emphatically what Prof. Fletcher said, and what Mr. Hale has reiterated, that at the present time the lime and sulphur is absolutely safe. While it has its disadvantages, those of us who have our capital tied up in our orchards, those of us who are depending upon the outcome of our orchards for paying off the mortgage perhaps, and making the means of supplying our families with the daily needs, cannot afford to run off after false gods very much. It is all right to experiment in a limited way; but for me, I shall continue the use of the lime and sulphur at least another year, because I know it will give me satisfactory results; I know I can control the San Jose scale with it, and it is not injurious to my trees; I know it is beneficial and is not injurious. It has fungicidal properties and it will prevent the leaf curl on the peach, and will prevent apple scab.

As to our methods of applying: The great drawback to the use of lime and sulphur has been the fact it was a little difficult to apply on a small scale. A great many growers, who have perhaps applied it in a small way with a hand pump, became so thoroughly disgusted with the use of it, that they almost concluded to let the scale have the tree; thought the lime and sulphur was worse than the scale.

This problem has been solved in a great many horticultural sections by the growers building their own plants; or, where there was a community of horticulturists, by having, in a sense, cooperative plants. In our own



Cooking Plant and Power (Steam Engine) Spraying Outfit of Edward Hutchins, Fenncville



San Jose Scale Makes Short Work of a Peach Tree



Why Not Thin Our Apples, as Well as We do Peaches?

case, we have built a house, put in an eight horse power boiler with a steam pump, pumping a supply of water from a nearby pond, and put in two or three galvanized iron tanks holding about ten or fifteen barrels each to store water; and we don't need a very great storage capacity when we have the engine and plenty of water to pump from. If we were not fortunate enough to have this pond, we would have to construct an artificial pond, unless we had a well with considerable capacity. We have for mixing our lime and sulphur three wooden tanks; they were tanks we formerly used for spraying, and such as we now use also, half-round wooden tanks about eight or nine feet long, holding 250 gallons each. In the bottom of those tanks we run a long pipe with perforations, holes, along the pipe; this is in the bottom of the tank. The steam issuing from that keeps the lime and sulphur stirred up from the bottom. These are all elevated of course. We have our material there; the lime and sulphur is mixed, and the stop cock is turned and water runs in for lime and sulphur, which is mixed together, and then the steam turned on, and issuing from these pipes on the bottom of the tank, cooks it thoroughly with very little attention.

We have been using the usual formula, 15 pounds of sulphur and about the same of lime, but we use rather more of the lime. We have been using hydrated lime. We are only ten miles from lime kilns and can get the lump lime, and consider it a little better in some respects; but we find the other is so much better to start, and in making the Bordeaux dissolves more easily and quickly, that we prefer to use that and put in a little more; so we use 15 pounds of sulphur and 20 pounds of the lime, and mix it thoroughly, mixing up the lime into a paste form and stirring up with the pasty mixture lime until it is thoroughly mixed, adding just a little water by and by; and after it is thoroughly mixed in the form of paste or dough, we turn on the water and steam.

We used the salt one or two years, but for several years past we have not used it.

The length of time of boiling will depend a little on how rapidly you boil it. We are governed some by the appearance of the mixture; but as a general rule I might say that usually we boil it about an hour, although less will usually do; but to be on the safe side, we usually boil it an hour, or judge from the appearance of the material.

We have been using the flowers of sulphur. You know there are two grades, the flowers and the flour. I am not sure that there is much difference as we have been led to suspect; but we think usually that the flowers combine a little more readily with the lime, and with little less waste than in the other form.

There is a great deal of complaint as to its being unpleasant and disagreeable to apply; and this is true to a certain extent. It has something of a caustic effect. We usually use goggles and the men sometimes use rubber gloves, although they don't seem to care very much for them; they say they make their hands sweat. We have found, however, by beginning reasonably early so we can choose our time, and spraying with the wind—for instance, if we have a west wind, spraying just the west side of the trees; and then taking advantage of an east wind; if you have wind from two directions, it would be more pleasant, than to wait until a little too late and then be obliged to work in all kinds of weather. When you try spraying the lime and sulphur against the wind, be it ever so slight, you are up against a hard proposition. If you can manage to get the wind from both directions, you will find it much easier and pleasanter. I know some have

claimed that it injured their horses' harnesses, and everything else. We never have had any such results, and have applied a good deal of it for several years. It may have, possibly, something of a caustic effect on harnesses. Early in the season when it is cool, we usually have a burlap cover over our harnesses when we are using the lime and sulphur. Later, when using the Bordeaux, we think it is too heating for the horses, and we don't even use that, and we have not found any very serious damage to our harness. Men sometimes say it irritates their faces somewhat, but we have not had any trouble.

We shall be very glad indeed if the oil mixtures prove satisfactory, because we realize that when you apply the lime and sulphur you are obliged to strike every particle of tree; the lime and sulphur will kill every scale it touches, and no more; whereas the oil, if you don't hit every spot, has a tendency to spread, and a little less careful application will secure the best results.

We haven't any hopes of exterminating the scale. We only hope to keep it in check, even with the oil; but we may perhaps get a little nearer to it with the oil than sulphur.

I think the San Jose scale today is a greater menace to the small grower and the farmer in the farm orchard, or the villager or cottager, than to the commercial grower. Brother Hale calls it "that blessed little San Jose scale," and I believe it is putting hundreds of dollars in the pocket of every commercial grower in the United States, because it is putting the market in the hands of specialists. But the great damage that the San Jose scale has done, is doing, and threatens to do, is in the cities and villages. We cannot afford to have horticulture and horticultural products driven out of the homes of the cottagers and the farmers. We know that horticulture and horticultural products add immensely to the productiveness, wholesomeness and value of every farm home, of every village home in Michigan, Ohio, and all over our land, and it is there that the scale is going to do the greatest damage. It does not damage the commercial grower. As a matter of dollars and cents, dollars and cents—simply selfish interest, I would not today, were it in my power, ask that the San Jose scale be swept from existence. I believe that my business is more profitable, and will continue to be more profitable with the scale than without it. But out of sympathy for other smaller growers I would be only too glad to have it extinct; but that perhaps will never occur. Some of us possibly are building up false hopes this season; we think that the scale is not so active, not so pernicious, and some hope it will gradually disappear. I hope so, but I haven't the least belief that it will. I think it is simply a question of climatic conditions; and I think another season, the weather being different, will find the scale just as active as ever. We don't want to be misled by any false hopes.

There is one preparation of the lime and sulphur that has been put upon the market considerably, and I had hopes it would be satisfactory. We find some objections to it of course. I refer to the Rex lime and sulphur solution, which is simply lime and sulphur manufactured in a large way. They make claims for it, and as far as our experience has gone, it has proved satisfactory. A great deal of it was used in northern Ohio in some sections last spring. That brings up one objection that we hope the makers of the oil preparation will overcome; I hope they will be able to combine fungicidal properties with their oil.

Now if we spray with the lime and sulphur, and especially late in the season, my aim has been on the apple and the pear to spray just as late in the season as I could safely, and get it done before the blossom opened;

and I have found we can spray safely even after the buds have swelled considerably; and by that later spraying I find we have obviated the necessity of spraying with the Bordeaux before the blossoming. This will not be safe in all cases, but where the orchards have been as well cared for as mine, I find by spraying with lime and sulphur just before the opening of the blossoms I can safely dispense with the early spraying with the Bordeaux mixture, following that one spraying as soon as the blossoms have most of them fallen, and spraying once more in July and August. I fear some do not emphasize this latter spraying as much as they should. It is an important spraying. I would not by any means omit this August or last of July spraying.

DISCUSSION.

Mr. Crane: You don't mean to inform us it is possible to spray the apple or any other fruit just before they are blooming, with lime and sulphur, after the leaves start and up to the time the pink begins to show, and they are about ready to blossom?

Mr. Farnsworth: No. Just as the leaves are well started. But you can spray after the buds have started much more than the former idea was. We were told years ago, as soon as the buds commenced to swell we must stop spraying. But you can spray much later than that, and the later spraying has much better effect on the scale. But don't make the mistake of waiting too long and then being delayed by bad weather and not getting it done.

Mr. Crane: In making the preparation, what do you find the best way to mix it and boil it?

A. We usually slack the lime; but if hydrated lime, make it into a paste, and supply the dry sulphur and stir it up into a thick paste or dough; add the water; and the steam pipe runs in from the bottom keeping it well stirred.

Mr. Crane: We have all discarded that. That was recommended by an experimental station, and one of the professors came in there and gave them an object lesson. We abandoned that; it was too bothersome. It had been demonstrated two years before that it was not necessary, and he simply filled the tank half full of water, a 200-gallon tank, and brings it about to the boiling point, and dumps his lime right in when it is at the boiling point; and as the lime begins to slack rapidly, he has the sulphur and dumps that in on top without stopping, and shuts the cover down and lets it boil for half an hour; opens up the tank; there will be large lumps floating; he takes his hoe and knocks them to pieces; in an hour they are all boiled right into the lime and sulphur and it is a perfect union.

Mr. Farnsworth: Where you get your material all ready it is a very easy matter to turn in the water, where you have the building with the materials all ready. We prepare three or four thousand gallons a day. One man runs the engine, does all the pumping and mixing, and does not have to work more than half the time. It is very easy where you have all the material handy. We use the hydrated lime.

Mr. Crane: We used it one year, and every one of us abandoned it; it would not stick half as long on the tree in rainy weather. Our trees in a few days showed half of it was gone off, the excess of lime anyway; so we abandoned that.

Mr. Farnsworth: I think it is perhaps necessary in using the hydrate to be sure and have a fresh article. Our trees are still coated with the material we put on last spring. We have no complaint about it not sticking.

Q. I understood you to say you usually boil it about an hour, and tell by the looks of it. Describe how it should look.

Mr. Farnsworth: I could tell you better with a sample. It is a dark yellowish color. It is one of those things it is pretty hard to describe in words unless you are a better word painter than I am.

Q. To what consistency or thickness do you boil it, and how much do you dilute it? Do you boil it rather thick?

Mr. Farnsworth: We usually put in about half; that is, if we are preparing enough to fill 250 gallons, we usually fill the tank about half full and then add cold water before applying. We don't like to use it boiling in our hose. We usually boil about 100 to 125 gallons of mixture, and then before we turn it into our spraying outfit we turn in enough cold water to dilute it about half. It sprays better if it is warm; but we don't want it boiling hot; it is too hard on the hose and unpleasant for the men that handle the mixture.

Q. If you are spraying and there comes up a rain, or you have some left over at night, what do you do?

Mr. Farnsworth: We warm it up a little. We found that all that was necessary. If it does not crystalize—and it won't usually to any extent—you can easily use it by warming it a little.

Q. With the apple, what insecticide do you use along with the fungicide? And what proportion?

Mr. Farnsworth: For several years, arsenate of lead; but the objection is, it is a little expensive. We overcome that in one way by buying our supplies at wholesale. Last year we bought several thousand dollars worth from the shipper directly, at cost, at 9 cents a pound wholesale, a first class article. We economize a little in that by using half the usual formula. The usual formula is 3 pounds to 50 gallons. We use 3 pounds to 100 gallons, and then use full strength arsenite of soda. Arsenite of soda is a quickly acting poison, but does not remain on the trees long; while the arsenate of lead is said to be a little more slow, but sticks and stays right by. It is well worth the extra cost; but we economize considerable by using only half of it, and we get lasting effects; and with the arsenite of soda we cheapen it very much and get immediate effects.

Q. Do you use arsenite of soda with the arsenate of lead?

Mr. Farnsworth: Yes. We use both. We use the full formula that is usually advised, a pint of mixture to 50 gallons, and add to that the arsenate of lead. We have been decreasing the copper sulphate and increasing the amount of insecticide poison.

Q. Have you been able to overcome the russetting of apples by the use of it?

Mr. Farnsworth: Not entirely. That is one of the troubles looming up before us more this year than ever. We think we can overcome that partly at least by a little weaker solution of copper sulphate. I believe it is the copper sulphate that does the mischief; and spraying in showery, wet weather will make it much worse. Our practice is now to use not to exceed three pounds of copper sulphate, and some only use two and one-half for the first spraying; and the last of July or August spraying we use little or not any.

Mr. Hutchins: What about the comparative value of arsenate of lime and arsenite of soda?

Mr. Farnsworth: I never have used the arsenate of lime. I have used the arsenite of soda; I don't know that there is any difference; don't know anything about the arsenate of lime.

Q. How much lime do you use?

Mr. Farnsworth: We put in about four pounds. If lump lime, then three pounds would be enough. With the hydrate of lime a little more is required; it is a little more expensive than the fresh lump lime, but a little more convenient.

With regard to the spraying of the lime and sulphur upon trees up to the blooming time: it is perfectly safe to spray with lime and sulphur on the peach up to the time the blossoms open. I have tried it year after year. It may burn the apple foliage slightly, because the leaves on the apple get much farther advanced at the time of blossom than on the peach. This question comes up. We find people that just find out the scale is in their orchard possibly late in the season, and they say, "I am afraid I will kill my buds, or burn the foliage, and this will hurt my blossoms and possibly the tree, and I don't want to spray." By all means spray for the San Jose scale, even if the leaves are out up to blossoming time, on any kind of fruit, rather than let it go over for the season. Better do it a little earlier; but do it anyway.

Q. If you had an orchard and only once in a while a tree that had a scale on, would you spray the whole orchard, or wait a year or two?

Mr. Farnsworth: I would spray the whole thing right away, because if you find it pretty generally on one or two trees, the probabilities are it is scattered here and there all over the trees. Mr. William Miller said he would spray all his trees with the lime and sulphur if he did not have a scale on the place, it seemed to have such an invigorating effect, as well as fungicidal effect. I only have a few scales here and there over the orchard, and I spray every fruit tree except the sour cherries, because if I find here and there one, there are many scattered over the orchard. As a matter of benefit to the entire orchard, I spray them all. There might be exceptions to that. If I had good reason to think in a large orchard there were only a few trees, it might be better to spray that tree and a few surrounding trees. I rather tell what I do than to give general advice. I simply say in my case I do spray them all.

Q. Ever see any scale on grape vines?

Mr. Farnsworth: No, I never have.

A Member: I advise a little caution in using lime and sulphur during the growing period of the trees, especially in the spring when the trees are very sappy and the young foliage is coming out. I know from experience it injures foliage; the leaves being the lungs of the tree, it would retard the growth and have a tendency to check their growth; and I have been very cautious in that respect.

Mr. Farnsworth: Better to get it done before the foliage appears if possible.

Same Member: The insoluble oil will be more to be recommended during that time of year, and in fact during the entire growing season. I don't think the wrong impression ought to be brought out here with reference to the sulphur and lime solution being used during the time when trees are growing, because it is injurious to the foliage.

Mr. Farnsworth: We never have used it after foliage is formed and would consider it dangerous.

Mr. Crane: That was my experience last year. Brother Taft was in my orchard when I was spraying for the scale in the spring, and I put the question to him how long I could spray, and he thought it would be safe up to the time they bloomed. I wanted to know whether I could use that spraying instead of the first spraying of the Bordeaux, and so I left a little

bunch of apple trees, and also a little bunch of Kieffer pears. It killed the bloom in every bunch of blossoms on the apples, but that didn't seriously affect my crop, but it did curl the first leaves up, and they were curled all summer long. On the Kieffer pear it made every bloom drop. I lost all the Kieffer pear blooms entirely. To show that difference, though, a neighbor of mine sprayed the same day on apple trees that I did, and his lime and sulphur was not properly boiled; it was just white, looked white on the trees, and it never hurt the foliage a particle. That shows it didn't have the caustic property, hadn't boiled enough to get the chemical change. But mine did kill the scale and leaves.

Q. No. 1: Is it advisable to set commercial Northern Spy orchards in southern Michigan? Could the trees be brought into bearing sooner and be as hardy, prolific and long lived if grafted upon other stocks, and what stocks are best?

Mr. Crane: In my orchard I did not have any Spies about fifteen years ago, and I wanted some, and I had some Baldwins, my orchard was nearly all Baldwins; and so I grafted in some Spies on an old orchard; but those Spies did not come to bearing for about fifteen years after I grafted them; never could get any commercial crop really; now and then a few apples, but it was very slow in starting to bearing. That is the only stock I have ever worked the Spy upon.

Mr. Gebhart: I have had some experience in grafting the Northern Spy, but they were on older trees, seedling trees, or any description of trees. The tree was 12 or 14 or 15 years old, and in six years they bore a full crop; I think they began to bear at four years, Northern Spies. It hastens the bearing on the Northern Spy very much if you have any old trees; but if you have young trees and graft, I don't know whether it would or not. I have not had the experience. I should use Red Astrachan or some strong grower for grafting the Spy; but on old trees—on any kind of tree—it brings the Spy into bearing very soon; it bears very fine fruit.

Mr. Farrand: I would like to raise Northern Spies, but don't want to wait so long for it. I am planting Northern Spy and using them as a stock to start all my orchard. I plant Northern Spy and top work them the same year, or in some cases perhaps a year later, although usually the same year, with the Baldwin, Grimes, Greenings, Jonathan, or any variety I want; and I am not sure it would not pay to plant Spy and in three or four years top work them. The Spy is an ideal root stock, good healthy trunk, and we know it is comparatively free from insects.

Mr. Greening: In my opinion, it matters not what variety you use for the stock. I would not advise a slow growing variety; but we are now speaking as to bringing the Spy into bearing earlier, and what method should be employed. I say that you can top work on any variety; the fast growing variety would be the most advisable to graft the Spy on to, and the trees will come into bearing after two or three years after top working on old trees.

A Member: I had a little experience in working Spies. I had a number of Red Astrachan trees and other varieties in summer fruit I wished to top work about ten years ago; so I employed a man to graft those into Spies in my own orchard; it has been ten years and I have never had a crop of Spies, never yet. Thrifty tops, but never a crop of Spies.

Mr. Hutchins: How old trees when grafted?

A. Trees 15 or 18 years old when grafted.

A Member: I would suggest to the gentleman that he top graft again. I have been told by an old apple grower in New York State that the greatest

trouble with people today is we don't top graft enough. Top graft the Spy, and in five years top graft again, and you increase the quantity.

Mr. Crane: There may be some special strain of the Spy tree, and it might be well to work that on to other stock; we may catch something from that; we may possibly get into a stock that would be an early bearing Spy, but that has not been so in my case.

Mr. Hutchins: I don't propose to do any free advertising for any man, but I have understood that is the case, and I understood Mr. Gebhart did have some Spies that either by the process of selection or something of the kind, got to bearing earlier, and I sent there a couple of years ago and got some Spies and grafted them; and there may be something in that.

A Member: I don't know as the Spy is so much different from any other apple in that respect. What I mean, as a rule, if I put a graft into an old tree 12 or 15 years old, they come into bearing more or less in three to five years. I know a case where the trees were grafted with Spies and in three years he had a good crop, and bearing ever since. I had one tree of Spies which the hired man ran through with a plough some years ago, and it had a bushel or so. If the Spies are checked in any way with top graft, or any other way—and I believe as a rule, if you top graft old trees you will get in two or three years more or less apples. All the trouble I have seen is they make rather of a high tree; they are upright growing, and you are liable to get a two-story tree on old trees; but there is no question that they get into bearing in a short time, if the tree you put them on is all right; but some soils they don't seem to do well on.

Question No. 18: What per cent of young peach trees, five or six years old, are destroyed by either the yellows or little peach, when planted in the same places immediately after the old trees have been destroyed by these diseases?

Mr. Hutchins: Mr. President, in my own experience, not one. We took out quite a good many trees a few years ago, and very largely the vacancies have been filled in, fertilized as we could, and filled in, and in five years I don't remember of seeing but one or two cases of yellows. More recently the little peach has been making ravages—not so much with us as with some others, because we have been after them pretty lively when we found them; but we at once fill in again, and I have not known of an instance of the disease developing. Now I want to speak guardedly here. My ground is heavy loam and clay; and still on lighter soils, lighter loams, I have seen some things that would make me hesitate a little before setting trees on that kind of ground. I don't want to make any sweeping assertion.

Mr. Tucker: I have had a little experience on a loam soil in taking old orchards out and setting young trees in. It is my experience it cannot be done successfully, and we have tried it and I have lost the whole business.

Mr. Hutchins: Mr. Tucker's orchard is quite a little lighter; and where the old trees are taken out on that land they are very liable, I guess pretty sure, to be affected with the black aphid, and I know people do have difficulty with the black aphid in setting on that kind of ground, and still I don't think it is the yellows or little peaches.

Question No. 7: Shall we burn over strawberry beds in renewing or clean out without burning?

C. D. Rhodes: My idea in burning over strawberry beds is simply this: That I would invariably do that, provided it could be done at the right time and in the right way. By the right time, I would say that the strawberry beds should be burned over just as quick as the crop is harvested. The

strawberry plant is, you might say, semi-dormant when the crop is off for a short time, and burning at that time would not be good for the plants. I have seen some of my neighbors burn strawberry beds and do considerable damage. In fact, this past season I have noticed one bed where they have burned it and destroyed nearly all their plants. There have been several instances around me. So I think it should be done the right way and at the right time. In burning it over, there should be very little fire, and it should be done when the wind is very brisk so to just barely singe everything as it passes over. I usually go on my land with a hay rake to clean up a good share of the muss and take it off from the land. Then I mow the strawberries down, and as soon as it is as dry as it can be, watch my opportunity and run it over with fire. If I cannot do this immediately, I usually clean off my beds by mowing it down and going in with the cultivator, getting ready to mulch, and cleaning it up that way. I find I will really come out better than I will to attempt to burn it later.

A Member: I had quite an experience in burning strawberries. But I met an experience this last season I never had met with before. Through the pruning season we had exceedingly dry weather. Some varieties, especially the Warfield, were affected by this dry weather more than some of the others; and after the crop was matured and taken off, vines were mowed down and part of the mulch was taken off, and the rest burned; and after the time came for them to show signs of growth, I noticed the kinds that suffered most from the drought, suffered most from the burning; the kinds that survived the drought, showed little, if any, effects from the burning. So I concluded after this, in case of a severe drought, without we had rain before the time came to burn, I should not burn them. I may say, however, with regard to taking off the mulch, I have burned berries in all kinds of ways conceivable, have stirred up the mulch and laid it on the rows in case there was not sufficient vines to make enough to burn over the rows, and had good results, although I would not recommend the idea of covering the row with straw to burn; but where your vines are vigorous and healthy, and there is a sufficient amount of moisture in the soil, it is not necessary to take off the straw with the idea of saving the plants; if you burn soon enough and not wait until the second growth of trees you can burn safely by leaving the mulch on. Some varieties are more susceptible to injury by fire than others. Any variety of berries that are hardy and of good growth, and can get moisture, will survive the burning if it is not too much. But where one mistake is made in burning a strawberry patch is in failing to loosen up and liven up your mulch so it burns quickly. If it has been loosened or your ground is moist, the under side of your mulch bed is damp, and if the mulch is close to your berries when the fire comes it gets in there and the fire and heat makes a sort of steam and will generate a heat in there that will very often injure your plant; while if that same mulch had been loosened up and livened up and thoroughly dried, it would have burned very quickly; therefore the plants would survive. So it is advisable in all cases to loosen and liven your straw before you burn.

Question No. 4: Is it a paying practice to mulch young peach trees over winter?

Mr. Farrand: Possibly it would be all right if you keep the mulch away from the trees; but otherwise put a protector around it. You must either have one or the other, or the mice are going to do a great deal of damage. Any sort of mulch makes a place for mice to harbor, and they will live upon

the bark of the tree. I have seen whole orchards practically ruined by the mice girdling the trees.

A Member: The way we protect ourselves from danger of mice is to run a bit of veneer about fifteen inches square, and wrap those around and make a mulch around the tree; or, if it has been left over from the previous year, before applying this veneer we go around and examine, put this veneer on, and then put on the mulch; and we have never had a tree girdled with mice yet. It costs very little and is quickly done.

A Member: A novel way is to wrap the tree with tar paper.

A Member: I will say we have tried this mulch for the last four years; all our trees up to four years old are mulched with straw or marsh hay. I do know that last winter we did not lose more than three or four peach trees out of 500. That is here in this county. We did not have as bad a cold spell in October as they had farther west, but I believe it helped them quite a good deal. Of course we used protectors.

ANYTHING NEW IN SPRAYING?

(BY T. A. FARRAND, EATON RAPIDS.)

I wish I might come before you this afternoon with something that would stir you up, something so radically new. Like everything else, we are always looking for something new in the spraying line. It is an interesting topic. It has got to such a state of affairs that spraying is one of the chief things in the up-to-date culture methods with fruit. But I simply want to stand again and advocate some of the principles of spraying that we ought to know. There are a whole lot of new things; we could talk all day of new things here; but the people that ought to hear them are not here. You that are here are looking up all these things; so it is hard to give something new. But these same spraying problems are new to thousands of people in the State of Michigan. The only way we can reach the masses is through the individuals; and as individuals when you leave this hall you ought to carry this spraying knowledge we have been hearing, to your neighborhood and your locality, and spread the good news in that way.

As you know, I want to still stand, in spraying for the San Jose scale, for the old and reliable lime and sulphur. Up to date, we have nothing better. There may be something in process of experimentation by our station that is new; but we have nothing today that is as efficient and cheap as lime and sulphur. It is all right to experiment a little, but all these soluble oil sprays have been tried and found wanting up to date. At the experiment station, while I was in charge, I tried a great many of them, and always found them wanting, and we had to fall back on to the lime and sulphur. It is a disagreeable spray, and we all certainly hope there will something sometime come that will be easier to prepare.

So far as the codling moth is concerned, it is not altogether new to us here. I think we must come to the use of arsenate of lead. While I have not used it myself, I have talked with a great many who have. I am going to use it for the codling moth, in with the Bordeaux mixture. The only change which I would make in our regular Bordeaux mixture would be, I believe in cutting

down the quantity of copper sulphate. I believe we can use it three pounds of copper sulphate instead of four, with perfect safety.

While Prof. Hedrick said there was not anything in the excess of lime, some way or other I like to use an excess of lime. There may not be any use in it. I have not tried it experimentally; but you can see where you have been if you use an excess of lime; it shows up good; it seems to give a fellow a little more satisfaction. And then you are sure, with an excess of lime, of not burning your foliage or causing any trouble.

There is one thing about spraying that I want to bring out here, and that is on nursery stock. We advocated the method of dipping nursery stock before you plant it. It don't make any difference where it may come from, we know the lime and sulphur is very helpful for the foliage of trees. The papers came out a while ago—I think it was "The Farm Journal," and other papers—with the theory that it injured the trees; people had injured a large per cent of their young stock by dipping the trees. The only way I could account for it was, they didn't let the mixture cool sufficiently before dipping the trees. I shall never set a tree without treating it with the lime and sulphur wash before it is put out.

Last spring I did not dip the trees; they were standing in a bunch where I had hauled them in preparing to set them up. I thought I would spray those trees; so I cut the bands on them and spread them out and sprayed them with lime and sulphur; the buds were just starting nicely. Well, it gave them a set back. I know why. I did not think anything about it at the time. We have always said even if a mixture was hot in spraying an ordinary tree by the time the atmosphere struck it, it cooled instantly. I was right on to those trees. It burned them. I didn't take into consideration I was spraying so close to those trees; that the spray mixture was too hot. It was not the mixture that hurt the young trees; it was because the mixture was so hot; and in trying to do a thorough job I had not let it cool sufficiently, and I turned it right into the tree, and I hurt the peach trees.

I don't believe I would set a tree in Michigan without treating it with a mixture of lime and sulphur before planting. It may come from the nursery free from scale, and all that; but I would not risk it. I have found none in my orchard at Eaton Rapids; I have been looking ever since I have been there—two years. The only way I can account for it is, it is not a section where they have been planting fruit trees. I can only account for it in that way, for there is no San Jose scale through that section.

Q. Would you dip the roots too?

Mr. Farrand: No, sir, I would not dip the roots. That mixture is pretty strong, and I would not risk it, knowing what I know about the mixture.

We must stand by the old formulæ. I don't advocate to a great extent trying those new remedies. Let our experiment stations first try them for us. The Benton Harbor people are here. There was a new spray came up, and I sent down and told them to be careful. It is so disagreeable, this lime and sulphur mixture, they couldn't stand it any longer; they must try the new mixture. There were whole orchards killed from the use of that mixture they used. It killed the trees because it was ineffectual and did no good—right at Benton Harbor. So I say stand by these old formulæ until you know definitely the new mixtures that are all the time coming up will prove efficient.

DISCUSSION.

Q. What would you use for a strainer? It will destroy copper.

Mr. Farrand: I use a brass strainer; or I have used galvanized iron. They last one season and they are cheap. But it will eat copper very quickly. Brass of a very fine mesh I use. There is no trouble in straining this mixture. I find when it is hot it will run right through just as nice. I have proved it in a hundred places in Michigan where I have held demonstrative meetings, where they thought it was going to be so hard to use. The success of it has always been a surprise to them—a very fine brass mesh strainer.

Mr. R. A. Smythe: We have been spraying five years with the sulphur and lime. Of course the first year we had all sorts of things eaten up with it. This last year we had a very large funnel made with a three-inch hole; and a funnel made of galvanized screening and soldered right on a steel ring; the angle of the screen is in the same angle of the funnel, so it gets a large surface; having this steel ring on it, you can take it out and knock it on the wheel of your wagon and it is clean in an instant; and it is the most satisfactory thing I have found yet; we can run the liquid through almost as fast as it comes out through the two and one-half inch pipe.

Mr. Farrand: I have a little note here I would like to read from Prof. Taft. He is not here. I wrote him regarding the spraying experiments and tried to find out what there was new at the experiment station. He says: "I really don't know of anything new, I would call new, that is really worth while to take up. We have continued testing the various prepared remedies for the San Jose scale, and have found none of the old kinds nor any new kinds worth considering." That is what Prof. Taft says after a year or two working at the experiment station. "The results were not different from those obtained by you, or what we have reported since that time, for the summer brood of San Jose scale nor other enemies." Now that is my point. I have been asked that question many times about fighting the summer brood of San Jose scale, and I have never been able to get a mixture strong enough to kill it without killing the foliage. "I would use the self-cooked sulphur lime mixture, using the 20 pounds lime and 10 pounds of sulphur for 50 gallons; but in order to dissolve as much sulphur as possible I would prepare it in a barrel, using at least 40 pounds of stone lime and 20 pounds of sulphur, starting the slacking with hot water and diluting to 100 gallons. This would not injure the foliage even of the peach, and is also one of the best remedies for scab and rot of peaches and plums. It should be applied at intervals of ten days, beginning when the fruit is about half grown, or earlier if the rot appears. When it is used in addition to one spraying of Bordeaux mixture and arsenite, after the fruit has set upon peaches, and two applications upon plums, it will, if applied thoroughly, practically prevent the rot and scab.

Mr. Hutchins: Have you ever had any experience in spraying the peaches for the brown smutty spots on them?

Mr. Farrand: Yes sir, I have. We sprayed at the experiment station all the years I was there. All I know is this; that in the four years I was at the experiment station we used always every year one spraying of weak Bordeaux mixture, two pounds of the vitriol and three pounds of lime, to 50 gallons of water on the peach. We did sometimes get a little burning of the peach, but I never saw the black spot upon any variety while there.

Mr. Hutchins: What time did you put it on?

Mr. Farrand: Usually when the peaches were well set, the latter part of

June, when the peaches were about the size of your thumb. Never saw any black spots while I was there. Other people had it all over the country in their orchards, and different varieties would get blotched by it where they didn't spray. I can only lay it to the spraying of the Bordeaux mixture.

Q. Did some of the leaves drop?

Mr. Farrand: Occasionally. It would depend somewhat on the weather conditions. It is like the Bordeaux injury; if it was dry and warm, not much rain, you would get no bad effects on the foliage; but sometimes, if it would rain right away, and we had just the right kind of moisture conditions, we seemed to get a burning of the foliage a little; sometimes it would burn holes right in the foliage. But we never got an injury sufficient, in my estimation, but what the other counteracted it and was better. If self cooked lime and sulphur will do the business, he says it won't hurt the foliage; and if it will do the business, that is the thing to use.

Q. I would like to know what is the cause of the bitter rot on the Baldwin apple?

Mr. Farrand: It is not the regular bitter rot that we hear and read of in the southwestern states. It is a black leathery brown spot under the skin. I have written to the Department of Agriculture and to every other conceivable source of information I can get, and they don't know any more about it than I do what is the cause, nor how to prevent it. I notice this, when a Baldwin apple tree has a partial crop, and the fruit is inclined to run very large, you will get that brown spot; where with a full crop, on the same tree, and the fruit just medium size, the apple seems to be firmer, coarse in texture, and don't get that brown leathery spot on the skin. I don't know any remedy for it.

THE HORTICULTURIST'S EDUCATION.

(BURT WERMUTH, DETROIT.)

I believe it is Russel Conwell who tells the story of a young man down in one of the New England states who had given his time, while attending one of the eastern universities, to the study of mining engineering. He was a most thorough student and his scholarly ability, together with a gift of common sense, had won from his masters the prophecy that some day he would become one of the leading men along the lines of study he had pursued. In his search for knowledge he had made the acquaintance of several men who had spent considerable time in practical mining surveying and engineering. Some of these men became friendly with the young man and often called at his home. These acquaintances soon nurtured a desire in the heart of our young friend to go into some of the great mining districts, where he might put into practice the knowledge he had already obtained. One day, while seated on a stone fence in front of his home conversing with a friend, he expressed this longing. The friend was sympathizing when, upon glancing at the stone upon which the young man was seated he observed what he thought to be valuable ore. It afterwards proved true and the discovery led to the finding of a rich vein in that very neighborhood.

We all know the career of Frederick Douglass who started in life not even owning his own body, for he was a slave, and by dint of determination he

forced himself to the front where he won the esteem and favor of a great nation because of his scholarly attainments, splendid judgment and unquestioned integrity.

Within each of us is a vital secret and that secret is that our own duties, and the situations which call those duties forth, are of more importance than are the duties and the situations that surround our neighbor; hence we are prone to say that if we were in this man's place or that man's we would not lack for many of the things that we are now deprived of. But it is more than likely that if we were in his place we would be as he is, since within his own breast he has a real vital feeling of the importance of his duties and he looks upon us as we do upon him—with envy for the opportunities that we have. The young mining student went on and finally became what his masters in school predicted he would be; but he did not achieve his reputation in some foreign mining district, for there was a great opportunity that had never been taken advantage of in his own state and, after his friend had opened his eyes, he laid hold with an ambition that could not help but succeed. If we say we have no opportunity for the preparation of ourselves for horticultural work we should but think of the obstacles overcome by Mr. Douglass. But a thought should make a free man blush that he had made such a remark.

What is wanted is not an opportunity for acquiring knowledge about our work but a desire; for if we have the latter the other will present itself. If there is a hungering and a thirsting for information about soils, and trees, and fruits, and marketing, and about life itself, nothing is so strong or so large as to prevent the gaining of that information. But we wisely and legitimately ask, how might such a desire be developed within a person who finds no love in study and can see nothing about him that raises a question in his mind. The following suggestion is offered:

For the first lesson let the prospective student take a tape line, go into the orchard and measure the height of the heads of the apple or peach trees above the ground, average up the resultant figures so that he can tell the neighbor at the grocery store, the next time he is there, whether the heads of the trees are eighteen inches above the ground or seven feet. For the second lesson he will endeavor to discover if there is any difference in the shape of the buds of the different varieties of fruit. Some will be found to vary in shape from others, while in many varieties no difference can be distinguished. However, what is found will make a good subject for the audience at the corner store. The third week the average size of the trunks of the trees in the orchard is determined and, again, a careful study of the branching of the plants is made. By this time the student will have observed some things that had not been noted before, and, observing them, he will have awakened a desire to learn of these discoveries. He is less frequently found on the cracker barrel than when complaining that he had no opportunity for study and is often seen at home in quest of solutions for problems his opened eyes have discovered. In some mysterious way the finding of a few little facts with our own eyes and hands leavens our whole being and, if not interrupted by some unusual obstacle, is sure to lead us on till we are filled with information regarding the subject. You may have to drive yourself for a few times, but soon you will be led by a yearning that will not want for zeal, or ambition, or strength to attain the goal.

Now such a beginning, if allowed to run its course, will result in the attaining of two things—a general and a special education along the line of horticulture. Let us consider these together for a moment.

It is said that a man, graduated from our best engineering schools, is actually a hindrance to the work in a draughting room for the first few months he is there. The doctor who has just taken his degree from a medical college is not given the responsible cases that are tendered the one who, besides his preliminary training, has seen years of careful practice. When we were studying arithmetic in the grammar grades we found many problems that gave us trouble but which were greatly cleared up when we began dealing with numbers in an abstract manner as was practiced in algebra. Now the draughtsman's experience in the shop does not argue that his schooling was a failure, nor the doctor's inability to secure the confidence of the community at once does not prove that the college he attended was teaching its students false doctrine as regards the practice of medicine; but both simply show that besides the general education that has been acquired a specific or practical education or training is demanded. And, on the other hand, the specific problems of arithmetic are greatly simplified by the general terms of algebra, representing the help given by a general preparation in the solution of specific work. A fruit man may grow good fruit and know simply his own orchard, but the chances are that he can grow superior fruit if besides understanding his own trees he has an appreciation of the principles of fruit growing. Then again, a person who has learned the principles of fruit growing is not insured success until he may have acquired practical knowledge.

Next, we ask for the sources of our general horticultural education. These need but be suggested—the vast amount of knowledge gathered by our experiment stations, by such conventions as we are now holding, by our agricultural colleges, by the press, publishers and men in attendance at public gatherings. By putting together the knowledge gathered through these different avenues some of our broadminded horticulturalists have deducted general laws which serve as a general guide for all horticulturists and which we are accustomed to call the principles of fruit growing. We can learn these principles in different ways—from journals, bulletins or books in college or by travelling about to observe trees growing under widely different conditions. The latter method is more expensive than the most of us can bear, but it is very desirable so far as possible to carry out; the former methods are good and should be carried on in connection with both of the others; but a course in school is preferable, since besides the information secured there is the added inspiration from the personality of the teacher that is sure to ever after move the recipient to a sterner battle for success. If any here are considering the fruit growing business, either as a main occupation or simply as a side issue to some other calling, they should not hesitate to secure from our own agricultural college a description of the courses offered. If time does not permit the taking of a regular course of four years, read with hopeful mind the splendid provision that has been made in the short course of two weeks this winter. Then do not forget the experiment station bulletins. Too many of us are too sparing in reading these publications; and there are men who avoid reading them. There is a man living in Michigan, who, because he understood that our station once sent out advice that afterwards did not prove good, rejects all the information the station publishes. He was not ready to admit that he would quit walking if he slipped down on an icy walk, but agreed that the logic was quite similar. But to refuse the knowledge contained in the bulletins sent out by the different stations, especially those where conditions are like unto those in Michigan, and by the United States department of agriculture, is to refuse one of the best

and most reliable sources of up to date matter. Finally, the press should have a place with the man who desires to learn what is going on in the horticultural world; for, since it is necessary for the columns of our journals to contain much that is elementary because such a large portion of the readers are yet in the primary grade of horticultural study, yet the very position occupied by these journals in our society makes it possible to collect much that is valuable even to the most advanced fruit men.

If it has been your opportunity to correspond with other growers about your fruit you will have recognized the conditional clauses used when advice is given. The writer has looked through different volumes and many journals in quest of the conditions that are attached to the information given, and it is surprising how frequently they do occur. Be it remembered that the use of these clauses is no discredit to the discussions, for they betray a carefulness and broadness of consideration that should bait confidence; but they indicate that the party receiving this advice must have some practical knowledge. For example, if he is told that he should not feed his peach trees too much nitrogen, he must decide whether his trees have too much, not enough, or just the proper amount. Should he be told again that the color of the foliage will indicate the amount of nitrogen that has been available to the tree, then it is for him to again decide if the color of his leaves is a dark green, a light or a medium. Generally when advice is sent it is supposed to go to men—to thinking men who have judgment. If they are not thinking men and do not have a reliable judgment, advice to them would not only be of no value but would be an absolute danger. What intelligent fruit grower would send a half-witted man into his plantation to spray his trees? Not one; he would fear the results of the spray more than the depredations of the insects or fungous diseases. So fruit men need, beside an academic knowledge, a specific knowledge of their own trees, and soil, and market. Let me give examples:

A few years ago our president told us that he went to the plants themselves to learn what they wanted in the way of fertilizers. Mr. Hutchins, of Fennville, rather contrary to the printed page, has found that in his conditions a rotation of clover and corn is keeping up the fertility of his pear orchards in excellent shape. Mr. Hartman states that tests on his own grounds have proved to his satisfaction that he is a loser by practicing burning over his strawberry patches after harvest, which is advised by so many. By trial, Mr. Perry has satisfied himself that he can grow superior apples on his farm in Oakland county by following the sod mulch method rather than by clean cultivation. We need go no further. These illustrate what we might term a specific or practical knowledge of the trees or plants that they are working with. Know your own orchard. Know each individual tree if you can—know what it needs and what it can do for you. In other words have a *home experiment station*. Instead of getting a little experience each season, get much by having many things before you all the time for study and comparison. Let every task be an opportunity for learning a little more. Get the habit of observing, of thinking things through, of seeing how others look at the problems that have occurred to you and how they reason them out. Equip yourself, not only with a hand lens, but with a microscope that will magnify many times. Break the dark glass and look at things "face to face."

Finally, remember that ignorance is bliss, but only to the lazy. To the up to date horticulturist it is a sin, as it is in the social world, and nature will ever exact a most trying punishment, with increasing severity as the

years go by, from the men who attempt to produce fruit by it. Therefore, turn the searchlight of knowledge on the dark places wherever and by whatever means possible, making our work not a coercing of our baser nature to the accomplishment of a hopeless task, but making a hopeful and cheerful exercise of our highest faculties.

WHERE NATURE'S HAND FALLS SOFTEST.

[Annual poem, read before Michigan State Horticultural Society at Battle Creek, Dec. 3, 1907.]

E. L. KEASEY, SOUTH HAVEN, MICH.

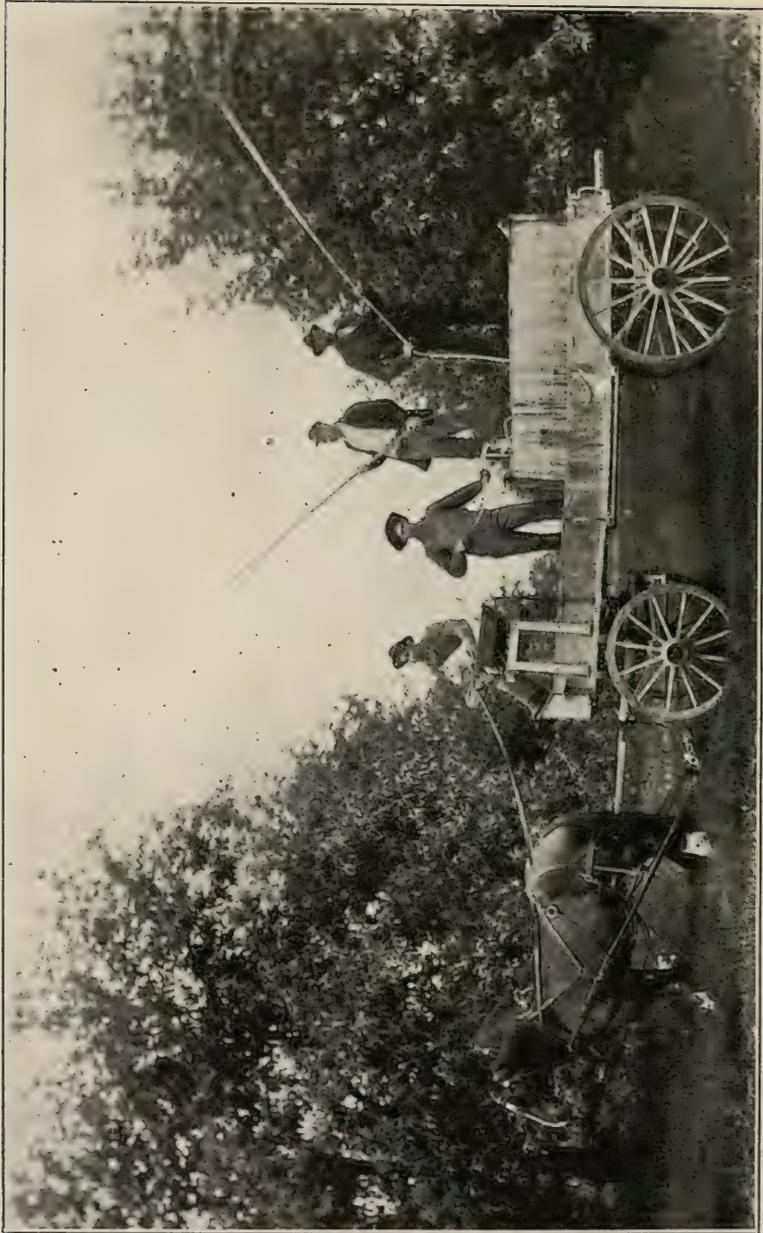
Could this weak pen of mine be given the power
To trace in words the beauties of this earth—
I first would choose some tree or fragrant flower
And base my story on their wondrous birth.
I'd picture out a landscape broad and fair,
And on each bending hill I'd plant a tree;
And then, I'd build a cottage here and there,
And place their windows so that all might see.

I'd place a lawn before each cottage door,
And on these plots I'd plant my favored flowers,
And when, at eve, the day's rough duties o'er,
I'd have my people rest within these bowers.
And then to make fond memories closer cling—
To bind the childhood heart to denser charm,
I'd place on some out-stretching bough a swing,
Lest we forget the joys down on the farm:

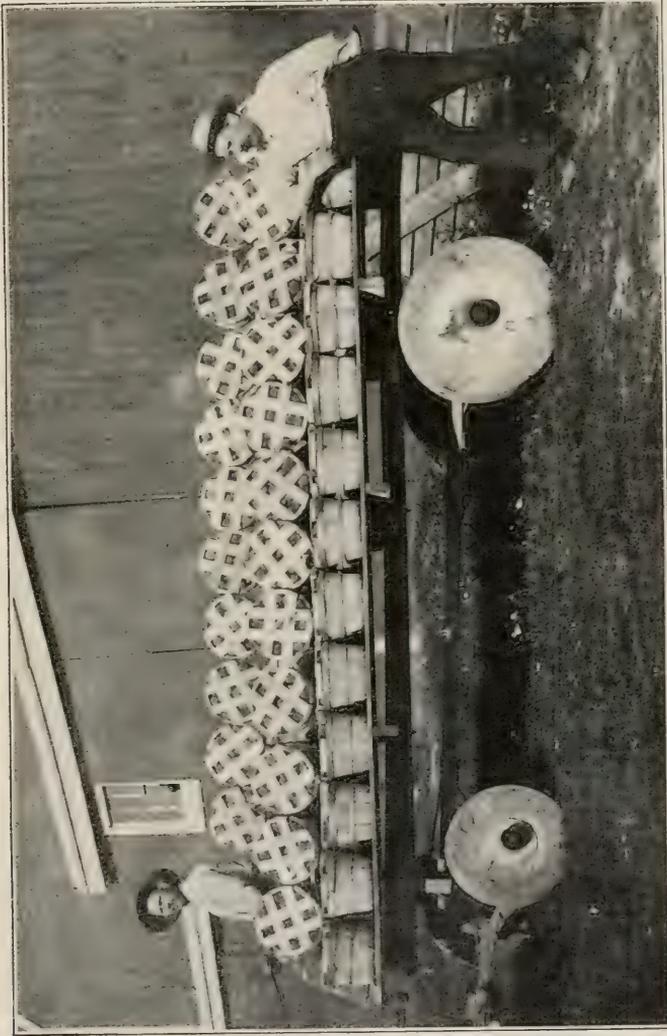
I'd also plan my fields in such a way
That passers-by would pause to view the scene;
I'd have my rows and fences add display
To fields of waving grain and meadows green.
And, in this wondrous story I would tell,
I'd not forget the dear old orchard land,
For out of this comes that we all love well—
These ruddy fruits, fresh from Dame Nature's hand.

And then, to round my story out complete,—
To lend this pictured landscape life and light,
I'd want to hear the tread of busy feet,
And see some sunny faces warm and bright.
My pastures I would dot with feeding kine,
And out within the wood-lot I would keep
A drove of well-bred money making swine,
As well as flocks of high-grade favored sheep.

And all among the trees I'd have my birds,
They'd serve as leaven to each saddened heart;
And, though we fail to understand their words,
Yet, through each gladsome note they'd joy impart.
Then in the midst of all this pictured scene
I'd place that sacred precinct known as home.
Then all around this group of views serene
I'd bend a frame, made up of God's blue dome.



Spraying Outfit of O. S. Bristol, Almont



A Fancy Load of Peaches, Which Secretary Bassett Found Both Pleasure and Profit in Marketing

Oh, where's the heart that fails to feel the touch
 Of Nature's kindly hand upon this earth?
 And who could hold within his selfish clutch
 The means to mar life's beauties and their worth?
 Yet, there are those who fail to realize
 That pleasant, happy homes come not by chance
 And these same souls lay claim to share earth's prize,
 Yet block the forward march in earth's advance.

I want to see the farm and city homes
 Of this industrial pulsing state of ours
 Draped out in all the pleasing changing chromes
 That Nature spreads in tinting fields and flowers.
 Aye, wherever childhood voices float the air—
 These future hopes that grow to earth's recruits,
 I want each one a happy home to share,
 Enshrined midst love, and flowers and luscious fruits.

Our homes may not be perfects of our dreams,
 Our lives may fail to match our high ideals;
 Yet, if we strive to do our best, it seems
 That we get closer to high heaven's appeals.
 It takes but little time to plant a rose,
 Yet what a wondrous revenue it yields.
 It's beauties please the eye, it's fragrance flows
 Beyond our border lines to other fields.

I have no word of praise for those who shirk
 These small redeeming duties round the home;
 We're given brains and muscles for the work,
 While heaven supplies the sunshine, rain and loam.
 So, if I fail, I've no one else to blame;
 My home stands out an index of my deeds.
 So, rather than to fail in life's great game,
 I'm going to raise the rose instead of weeds!

'Tis true, that winter's rigor now holds sway,
 That summer lies asleep neath earth's chill crust,
 Yet evolution soon will bring the day
 That gives us back our summer, held in trust.
 'Tis true that neath earth's heaven spun robe of white,
 Are hidden all our faulty homes and farms.
 So let us plan, while summer spends her night,
 To lend our aid when she returns her charms.

This Horticultural Society
 Has plans that reach beyond man's selfish greed.
 It gives to rich and poor an earnest plea
 To plant about our homes redeeming seed.
 It aims to drape the hills with clustering vines,
 To bring to every home some fruiting tree.
 It strives to teach each heart to so incline
 Towards crowding earth the nearer heaven's decree.

We've come to Battle Creek to join with you
 In weeding out the tares among the sheaves;
 To sweep away the trash where thistles grew
 And place instead a wreath of shimmering leaves.
 We're here to kindle hopes in broken hearts,
 To scatter sunshine down the paths of gloom
 To lift the lids of eyes where tear drops start—
 To roll away the stones from living tombs.

Life means a little more than just to live,
 That heart that beats for self beats on in vain;
 But he who plants the earth hath joys to give
 Because he adds to life and stills earth's pain.
 So let us join our hearts and mental powers
 To make the fireside pure as ocean's foam.
 Let's drape the cottage door with fruits and flowers,
 Let Nature's hand fall softest on the home.

CIVIC IMPROVEMENT IN CITY, TOWN AND VILLAGE.

(S. W. FLETCHER, MICHIGAN AGRICULTURAL COLLEGE.)

The past ten years have witnessed a remarkable awakening of civic pride in all parts of our country. There are now thousands of local organizations bearing such names as "City Improvement Society," "Municipal Art League," "Clean City Club," "Nature League," "Out-Door Art Club," "Civic Club," "Village Improvement Society," "Shade Tree Association," "Rural Art Club." Most of these organizations devote their efforts to only one or two of the many problems of civic betterment, as the abatement of the bill-board and smoke nuisances; the adornment of private yards; the planting and care of shade trees; school gardens; but all have a common aim, which is to foster the desire for private and municipal cleanliness and to stimulate the appreciation of the beautiful, both in art and in nature. So widespread is the movement for civic improvement, and so marked are the results already accomplished, that I am justified in saying that a city, town or village which is not making some definite organized effort to improve its appearance, is most decidedly behind the times, and lacking in public spirit. And all of these thousands of local efforts for civic betterment all over the country are gathered up into one great national organization, "The American Civic Association." The work of those local organizations touches everything that has to do with the making of a healthier, cleaner and more beautiful community, from city dumps and other eye sores, to the architecture of public buildings and the location of boulevards, and play-grounds, but I shall speak briefly only of a few points that are of common interest to all communities.

STREET TREES.

Trees are easily the most important part of a beautiful city or town. They soften and partially screen the harsh architecture of buildings, shade walks and windows from the glare of the sun, and give a bewitching play of light and shade on the pavement and lawn. Moreover, trees have a sanitary as well as an aesthetic value; their cooling shade prevents the diseases incident to heat, and the leaves absorb noxious gases. A committee of physicians in the city of New York passed a resolution urging the wider planting of street trees on the grounds of public hygiene alone.

The chief difficulty in the management of city or town street trees is the conflicting authority over them. In most cities the street trees are not controlled by the municipality but by the individual land owners in front of whose property they are planted. The planting and care of the trees are left to the individual. This arrangement is never satisfactory. One man will prefer and will plant one kind of tree, and a neighbor will prefer and will

plant another kind. The result is a hodge-podge. However much more desirable mixed and natural planting may be on the private lawn, the street planting should be formal and uniform. Every street that is noted for the beauty of its shade trees has only one species of tree planted on it. When the planting and care of street trees is left to individuals, kinds are often selected that do not thrive, or some trees may be neglected, leaving gaps here and there, which spoil the avenue effect.

There are several ways of overcoming this difficulty. Some cities and towns prefer to let the individuals retain authority over the shade trees, but seek to guide them in the selection of kinds and in their care. A few cities furnish trees free, with advice about planting and caring for them. There are a number of tree-planting associations, also, in large cities, which provide trees, send out circulars, etc., without cost to the tree planters, and do much good in this way. But in most cases it has seemed best for the city itself to assume the management of its street trees, in the interest of uniformity.

The duty is sometimes delegated by the city to the park commission. Such, for example, is the policy in the city of Lowell, Mass., by special act of the Massachusetts legislature. The Lowell Park Board enforces rules to the effect that no street tree shall be cut, broken, or otherwise disturbed, nor shall any guy rope, cross bar, placard, or other contrivance be fastened to it, nor shall a tree be used to fasten horses or other animals, without permission of the board. Requests for the removal or trimming of trees are made by the property owners to the board. The 80,000 trees of the city of Washington are under the care of a special commission, which also maintains nurseries. In 1893 New Jersey provided for the appointment of commissions in each municipality to take charge of the planting and care of shade trees.

In the commission method of caring for street trees, the individual property owners really have jurisdiction over the trees, but they are guided and advised by the commission. It is but a step from this policy to the appointment of a tree warden or tree forester, who shall have complete and sole charge of all street trees. This is the prevailing policy in many of the eastern states. The legislature of Massachusetts has provided for the appointment of tree wardens in every town, large or small. He has care of all trees in the town, except those under the care of the park commission. He may prescribe regulations for their care, enforced by suitable fines. Anyone who desires to remove or prune a tree makes application to the tree warden, who then announces a public hearing on the proposition.

Thus it is seen that the trend is toward municipal ownership of street trees. Most of the trees in a city are in a narrow strip of land between the lots and the curb. There has been a dual sovereignty over this strip of land, which has not been conducive to the best care of the trees upon it. The idea that the street tree should be communal, not private property, is gaining ground; inasmuch as the tree is a highly useful article of street furnishing, like a piece of fine statuary. In any case, it is preposterous to leave the matter entirely with the individual. No uniformity can result in that way. There should at least be an ordinance providing that a hearing be given before street trees are cut down. Ultimately, every city, town and village will have its tree warden. Let us hope that politics will never enter the office of the tree warden, as it sometimes has the office of park commissioner, to the confusion of park development.

KINDS OF STREET TREES.

Societies or individuals interested in civic improvement should see what can be done to secure greater variety in the kinds used, not on the same street, but on different streets of the city. The maple and elm are beautiful street trees, but that is no reason why others should be excluded, as is often the case. There are not many trees that are adapted for street planting. A street tree should possess the following qualities: It should not be easily injured by gas, smoke, dust and pavement; it should be at least moderately quick growing, not offensive in odor when in blossom (like the pistillate *Ailanthus*); of a size suitable to the width of the street when fully grown, and adapted to the local conditions of soil and climate. The City Forester of Lowell, Mass., makes the following excellent selection:

For Wide Streets.

American or White Elm.
 Hard or Sugar Maple.
 American Basswood (Linden).
 Horse Chestnut.
 Sweet Gum
 Sycamore.
 White Oak.
 Scarlet Oak.
 Red Oak.
 Honey Locust.
 American Chestnut.

For Narrow Streets.

Norway Maple.
 White or Silver Maple.
 Red Maple.
 Ailanthus.
 Cucumber tree.
 Ginkgo.
 Bay Willow.
 Pin Oak.
 Red Flowering Horse Chestnut.
 Black or Yellow Locust.
 Hardy Catalpa.

Far too many of the several varieties of cheap and rapid growing poplars are planted on our streets. These may often be planted to advantage, however, between the slower-growing kinds, to be removed when the latter need more space. Over crowding—the prevailing sin of street planting—should be guarded against. Some cities have an ordinance that no street tree shall be planted less than 35 to 40 feet apart. The average distance in many cities is 10 or 12 feet. Much of the beauty of a well grown tree is in its symmetry, which is never realized under crowded planting.

Aside from these larger considerations in street planting, there are details in the care of municipal trees that tree lovers should look after. Guard the trees from the gnawing of horses, which quickly ruins them. The trunk of every street tree, whether small or large, should be enclosed in inexpensive wire netting, or some other metal guard. Watch for trees that are being killed by gas escaping from a leaking pipe, and compel the gas company to repair the pipe. Insist that limbs that have to be removed are sawn off close, and the wound painted, not hacked off, a foot or more from the trunk, thus inviting rot. Provide for fighting the insect enemies of shade trees, especially the tussock moth on elm, horse chestnut, white maple and the lindens; the elm leaf scale, the cottony maple scale, and, most omnivorous and dangerous of all, the San Jose scale. If there are some particularly excellent specimens of trees in the neighborhood, have them marked and saved. Use your influence to save the fast disappearing groves. You are also interested in the country roads leading into your town. Protest against the common path-master method of slashing down all the beautiful native trees, shrubs and vines along the roadside, and substituting therefor a bare cut over right of way, with a stiff row of maples along each side. Don't

confine Arbor Day to the last Friday in April. Quote the Scotch laird's advice to his son: "Be aye sticking in a bit tree. They'll be growin' when ye are sleepin'."

THE ADVERTISING NUISANCE.

Next to the shade tree problem, this is usually the most profitable object of civic improvement effort. No one will deny that this method of advertising has become a hideous nuisance. Vacant lots, which might be made attractive breathing spots, are walled around with glaring posters. Old buildings and gable ends extol the merits of so and so's whiskies, corsets, or patent medicines. Trees are not only temporarily defaced, but permanently maimed by having posters nailed to them. The country roadside fence proclaims the virtue of Hood's Sarsaparilla, and the end of a country barn screams, in letters three feet high, for Paine's Celery Compound. All along the roadside and railroad track great sign boards obstruct the view and disgust nature loving passersby. Even the beauty spots, the falls, gorges, cliffs and the like, are besmirched by the advertising devil. Often the posters are grossly indecent. This is the Great American Nuisance. It is our prevailing sin of commercialism running riot over our sense of decency, appropriateness and appreciation of the beautiful.

Largely as the result of aggressive campaigns by city and village improvement societies and kindred organizations, much has been done in some places to check the advertising nuisance. The time has not yet come, apparently, when it may be altogether abolished; but it has been regulated quite successfully in some places. This regulation is usually in the direction of reducing the size of boards. The New York supreme court has decided that the city of Buffalo has the right to regulate bill boards as it sees fit. The city has passed an ordinance restricting the height of all bill boards to seven feet. Kansas City has an ordinance requiring that all bill-boards shall be at least 12 feet away from the side walk, and that no board shall be over ten feet high, and that no board shall be nearer than 100 feet to a park or boulevard. These are distinct advances, and do away with the great boards 20 to 30 feet high. Chicago goes a step further by passing an ordinance requiring that no bill-board shall be erected on a residence street or drive without the consent of three-fourths of the frontage of the block. A number of cities have legislated especially against the hideous sky signs, with monstrous lettering; and against all kinds of advertisements on bridges, which are simply aerial and very conspicuous streets, and so should be especially well guarded against defamation. In these ways many of the most objectionable signs are eliminated altogether and the remainder made less conspicuous.

The advertising nuisance is being attacked in another way. If it is impracticable to abolish it utterly, for commercial reasons, at least the character of the posters may be improved. In the Dutch city of Leiden, the municipality itself manages the public advertising. It erects small bill-boards of attractive design in locations where the bills will not jar harshly with the surroundings, as is often the case with us. A Belgian society offers prizes for the most artistic posters, and there are exhibitions of "artistic signs" in New York City. Advertisers must realize that careful design, grace of line and care in color are worth while, even in a poster; people will stop to look at them because they are artistic, not, as now, because they are glaring. It is very appropriately suggested that all posters be edited or censored as

to their artistic fitness, or at least as to their decency, before being put upon the boards.

One proposition is to secure a state law taxing bill-boards as income producing property. This would certainly restrict the nuisance very materially. But in most places the remedy is in the hands of the people already without new laws. In many cities and towns three-fourths of the bill-boards are now erected in violation of existing laws. No bill-board can be erected on private property without the consent of the owner. If the farmer who sells the side of his barn for an advertisement, or the merchant who sells space in his vacant lot for bill-boards, could be made to see this subject in the right light, there would be fewer eyesores. Building ordinances are sufficient to prevent the erection of any bill-boards near sidewalks, or which endanger public safety in any way. Indecent posters can be abolished without new legislation. An aroused public sentiment will very quickly abate the advertising nuisance, both by restricting the number and the size of the boards, and by censoring the character of the advertisements. There is no work that a civic improvement society can take up more profitably than this.

OVERHEAD WIRES.

Here is another fruitful field for the civic improvement worker. Overhead wires are very unsightly in themselves, but their worst feature is the towering rows of ugly poles that carry them. Who has not seen a beautiful city street or country road most grievously marred by these signs of modern progress. In the country it is usually impracticable to put wires below ground; but that it is not only practicable, but also very profitable in the city has been demonstrated in many places. The time was when a maze of wires in a city street was taken as a sign of progress, of much business; now the city that has the fewest wires above ground is the most progressive. Overhead wires are not only ugly, they are also dangerous. They fall during storms, especially ice storms, hinder firemen, and damage shade trees. But it may not be practicable to lay wires underground when there are only a few going a long distance, as in some residence sections. In the busiest sections of the city, however, especially if the streets are narrow, it is entirely practicable and profitable.

Several cities have adopted municipal ownership of the conduits, which are made of glazed tile embedded in cement. All wires are ordered into the conduits, and the companies are charged rental. But usually each company builds its own ducts, under municipal supervision. The proposition to bury wires usually meets intense opposition from the electric light, telephone, telegraph and trolley companies, but it should be fought to a finish whenever the occasion justifies. Especially should the underground trolley, which has proved entirely practicable, be insisted upon, for residence streets in particular.

In this connection the injury to shade trees by linesmen should not be forgotten. The employees of these public service corporations have a habit of doing as they please when it comes to cutting down trees or lopping off limbs to make room for poles or wires. Thousands of street trees are needlessly ruined by linesmen every year, which is an unanswerable argument for municipal supervision of street trees. The linemen act as though they have full right of eminent domain over these trees. As a matter of fact, no telegraph or telephone company has the right to erect poles or string wires in front of your property or to trim or mutilate your shade trees without

your consent. This has been thrashed out in the courts many times and is beyond dispute. More than once the companies have been compelled to pay several hundred dollars for mutilating a single valuable tree.

OTHER IMPORTANT WORK.

I have spoken in some detail concerning shade trees, bill-boards and overhead wires, because these are of paramount importance in so many cases. Each community has its own problems, different perhaps from those of any other place; it will be enough to merely mention some of the other lines of work that civic improvement society workers are carrying on everywhere. School grounds are being improved. The time will come when no school in city or country will be considered well equipped unless it has plenty of room for ornamental planting in front, with a playground on each side and ample room for school gardens in the rear. The school of the future will occupy an acre, two acres, or more, instead of the few square feet that we begrudge it now, for the children will be taught out of doors, as well as out of book. Thousands of packets of flower seeds are distributed to school children in many cities, either free or at a penny or two apiece; flower shows are held. Prizes are offered for the best kept back yards, the most artistic lawn planting, the most beautiful effect with vines, the best bed of annual flowers, etc. Campaigns are made against public dumps, and against the degradation of vacant city lots. These are being utilized for children's gardens. In 1906 Washington had 80 vacant lot gardens, averaging one-eighth of an acre. They cost the association an average of \$6.16 each, and were the pride of the neighborhoods, especially of the children who worked in them. In some places war has been declared against the smoke nuisance which disfigures the exterior of buildings, injures household furnishings and vegetation, casts a gloomy pall over the vicinity and is a menace to health. A committee reports that smoke is causing St. Louis to lose 4.05 per cent of her trees every year. A practical remedy in many cases is the installation of smokeless gas producers, and internal combustion engines.

Cleanliness, both of city streets and private grounds, is the focus of much effort on the part of many civic improvement societies. A city is known by the cleanliness of its streets as a man is known by the condition of his linen. Rubbish cans are furnished, ordinances are secured prohibiting the scattering of refuse, paper, and the distribution of flyers at doors. Uniformed street cleaners are secured. A municipal "cleaning day," one in the fall, and one in the spring, is incorporated in the city law and emphasized by the mayor's proclamation. Norfolk, Va., sets aside April 1 for this purpose. In Lincoln, Neb., the schools are dismissed on city cleaning day so the children can help. The board of health furnished free wagons for rubbish and garbage. Back yards, alleys and vacant lots are cleaned. As a result the health officers report a great improvement in the sanitary condition of the city, as well as in its appearance. A Seattle daily paper has published daily photographs of eyesores, with incisive editorials; these made the people mad, but sooner or later they cleaned up the objectionable places. Attention has been directed to factory grounds, which are almost universally hideous to behold. The cemetery, often the most desolate of places, has not been forgotten. A Michigan state law requires the governor to appoint a Memory Day, when the cemetery will be cleaned and adorned, so that it may be beautiful to the living, as well as restful to the dead. Prizes are offered

for the most artistic lamp posts, benches, shelters, and other necessary street utilities.

In these and in many other ways, the thousands of workers for civic betterment all over our land are making concrete their desire for retaining the beautiful without sacrificing the useful. The national government has adopted a policy for conserving our great national beauty spots, as Niagara, the Yellowstone Park, and similar reservations. Every community, large or small, has its own natural assets; it is trustee for a certain amount of beauty in landscape, trees or water. What is it doing to make the place more beautiful for the next generation? Adopt the motto of the Municipal Art League of New York—"To make us love our city we must make our city lovely"—and get behind every movement to preserve and enhance the attractiveness of your community. You owe this much to the generations that follow.

STATISTICS ON THE COST OF PRODUCTION IN FRUIT GROWING.

(S. W. FLETCHER, AGRICULTURAL COLLEGE.)

The rapid development of commercial fruit growing within fifty years is one of the most notable features of American Agriculture. The twelfth census reports that on 1.4 %, or 86,094 of the 6,149,584 farms in the United States, fruit growing is the leading industry. These farms included 6,064,877 acres of fruit plants which produced, in 1899, 12,366,646 bushels of fruit, worth \$83,751,840. In value of the product, fruit growing the eighth, the crop of corn being \$828,000,000; hay and forage, \$484,000,000; wheat, \$369,000,000; cotton, \$323,000,000; oats, \$217,000,000; vegetables, \$113,000,000; forest products, \$109,000,000; potatoes, \$98,000,000; fruit, \$83,000,000. According to the same report, there were \$404,000,000 invested in fruit farms, as compared with \$5,493,000,000 invested in hay and grain farms, and \$5,691,000,000 in the live stock industry.

These figures reflect the rapidly increasing commercial importance of the fruit industry. Unquestionably the next census will show that 25% or more has been added to the amount of capital invested in fruit growing. The business of fruit growing is expanding more rapidly than most other lines of crop industry.

The rapidly increasing production of fruit has set in motion certain economic forces which the fruit grower of today may well consider. As the area in fruit becomes larger, competition becomes stronger and the prices received for fruit are correspondingly lower. In most cases the larger demand for fruit, due to the increase in population and the more common use of fruit as a staple article of diet, have not fully offset the increasing competition. In general, the prices received for fruit are lower now than they were fifteen years ago; that they will go lower still we have no doubt.

To illustrate the fact that prices received for fruit are tending lower because of increasing competition, and also that this general tendency is continually upset somewhat by fluctuations in the relation between the supply and the demand for fruit, I quote the following market reports on Baldwin apple, Bartlett pear, Concord grape, and "fancy" quince. These quotations were taken from the files of the Rural New Yorker from 1880 to 1905, and are for the general market of New York City. The market quotations taken were those for the week nearest the middle of each month. The price given for the year was secured by averaging the prices quoted for the several months. In all cases the quotations are for "fancy" fruit.

	Baldwin, per bbl.	Bartlett, per bbl.	Concord, per lb. cents.	Quince, per bbl.
1880.....	\$1.55	\$10.50	.....	\$5.00
1881.....	3.50	6.00	.....	6.00
1882.....	3.50	11.65	.....	5.00
1883.....	3.94	5.87	4½	.....
1884.....	2.05	6.66	6¼	.....
1885.....	1.80	4.00	4½	4.25
1886.....	2.75	8.50	4½	9.00
1887.....	2.50	4.25	.....	4.50
1888.....	1.46	7.00	3½	2.13
1889.....	.....	.....	.....	5.00
1890.....	4.40	9.00	.....	6.00
1891.....	1.95	3.37	.....	2.25
1892.....	2.60	.....	3¼	4.00
1893.....	4.00	4.37	2½	3.25
1894.....	2.75	4.12	3	3.62
1895.....	2.35	3.92	2	4.25
1896.....	1.30	4.50	2	2.00
1897.....	3.10	3.00	.....	3.00
1898.....	3.70	4.12	2¼	.....
1899.....	2.70	3.58	.....	3.50
1900.....	2.25	3.16	2¼	3.00
1901.....	4.75	3.83	.....	3.87
1902.....	2.30	.....	.....	.....
1903.....	.....	.....	.....	6.00
1904.....	2.05	4.75	1½	3.87
1905.....	3.50	5.50	3½	4.50

The average price received for Baldwin apples from 1880 to 1895 was \$2.77 as compared with \$2.80, the average from 1895 to 1905; for Bartlett pears, \$6.56 as compared with \$4.04; for Concord grapes, 4c as compared with 2¼c; for fancy quinces, \$4.61 as compared with \$3.78.

The fruit grower of today need not view this descending scale of prices for some fruit with alarm. Reduced prices have been met, and probably will continue to be met for some time to come, by a lower cost of production, so that the profits may still be as large as in earlier years, though the prices received are smaller. But it is evident that he must look forward to the time when fruit growing will be profitable only to the man who can put superior fruit on the market at a very low cost of production. This means congenial climate, favorable soil, varieties that are perfectly adapted to the climate and soil conditions and to the demands of the market, and skill in all the details of culture and marketing. In every trade and industry the man who can produce the goods a trifle cheaper than his competitor has a tremendous advantage over them. So it is in fruit growing.

There are, of course, other things to be considered besides the ability to produce fruit cheaply; nearness to a good market, for example, may be worth more to the grower than a low cost of production. But it is undeniable that there is increasing necessity for the fruit grower to figure on the cost of production as accurately as he can, and to reduce it to the lowest point consistent with market returns. It is not possible for him to estimate the cost of producing his articles with anything like the accuracy of the manufacturer. The raw materials of the fruitgrower are sunlight, air, water, soil, and these are manufactured into fruit under such varying conditions that it is impossible to assign values and predict results accurately. But a fairly reliable estimate can be made, and I urge the necessity for such a calculation in view of the increasing competition in the fruit business.

COST OF LAND.

The main items which enter into the cost of production in fruit growing are land, capital and labor. When the fruit grower buys land, he is really buying its fertility, or its power to produce crops. He is buying nitrogen, potash and other plant foods, soil water, soil texture, the heat and light shed upon that soil by the sun. He is buying, not mere dirt, but all the energies and forces above the soil, as well as in it, that are needed to transform or manufacture plant food into apples, peaches, strawberries. The value of different soils as fruit factories varies greatly; the fruit grower learns that this often depends fully as much upon their texture as upon their chemical composition. He learns, moreover, that while man can do much to improve poor soils, and so increase their productiv-

ity, by tillage, green manuring, irrigation, etc., yet Nature does more to provide a soil with desirable qualities than man can ever do. It is for his interest to get land that already has a large productive capacity, if it can be procured. The need of under drains, for instance, may increase the cost of producing fruit several cents a bushel. There is much fruit planted on land that is so poor, in such bad heart, or so poorly drained that it has not the power to produce fruit economically.

The amount of capital that the fruit grower invests in land is large. The average size of the fruit farms of the United States is 74.8 acres as against 159.3 acres for hay and grain, and 226.9 acres for live stock farms. But the average fruit farm is worth \$71.55 per acre, while the average hay and grain farm is worth \$30.34 per acre, and the average stock farm but \$21.14 per acre; so that the value of the average fruit farm is \$5,374, of the hay and grain farm, \$4,834, and the stock farm, \$4,797. The census shows that 72.4 of the value of the average fruit farm is land, and this constitutes 72.3 of the value of the hay and grain farm, and 59.9 of the value of the stock farm. So it appears that the fruit grower usually has as large an investment in land as other husbandmen.

COST OF CAPITAL GOODS.

Under this general heading are included such items as machinery, implements, buildings, farm animals, fertilizer, spraying materials, cash capital and other things that are needed in growing and handling the crop. Here again the fruit grower has a heavy investment.

A machine or implement that does work formerly performed by hand, and does it cheaper, lowers the cost of production. The fruit grower who uses the most improved cultivators, sprayers, pruning tools, so that the work is done cheapest, produces his fruit for the least money and, to that extent, has an advantage over his neighbor who uses tools poorly adapted for the work. One should not begrudge the price of a new tool if it will do the work in less time or with greater thoroughness.

The fruit grower is a specialist in agriculture, hence he requires more tools than the general farmer. The value of the implements and machinery on the average fruit farm of 74 acres is \$175, or \$2.34 per acre; on the average hay and grain farm of 159 acres, \$166 or \$1.04 per acre; on the average live stock farm of 227 acres, \$151, or \$0.66 per acre.

The point of view of the fruit grower regarding the amount of capital that he can afford to invest in implements should be this: He cannot afford not to have an implement that will enable him to produce fruit cheaper. The investigations of the Labor Bureau have led to the conclusion that in the last twenty years, by the aid of machinery and the substitution of horse, steam and other power for hand labor, the effectiveness of human labor on farms has been increased one-third. The cost of producing a bushel of choice fruit is certainly lower than it was fifteen years ago. Has the fruit grower estimated how much the use of a power sprayer decreases the cost of protecting large orchards from pests, as compared with a hand sprayer?

The amount of capital invested in buildings, machinery and live stock on the average fruit farm is 27.6% of the total investment, as compared with 27.7% of hay and grain farms, and 40.1% on stock farms. The investment in fertilizers is usually much higher, being at the rate of 30 cents per acre for all the fruit farms of the country, while hay and grain farms invest 4 cents per acre, and stock farms but 2 cents. There is, of course, much variation in this point. Most of the fertilizing for fruit is done east of the Mississippi; a very large proportion of the western fruit farms have never been fertilized. In addition to these items of required capital, a certain amount of cash must be kept on hand to run the farm, varying from \$4 to \$30 or more per acre, according to the valuation of the land and the intensity of culture.

COST OF LABOR.

The labor problem enters into the fruit growers budget of expense quite heavily, especially if he grows small fruits. According to the twelfth census there is but one hired farm hand to every three farms. This shows that most of the work on the average farm is done by the farmer and his family. On the large fruit farm hired labor is usually necessary, especially at harvesting. The expenditure for labor is \$2.46 per acre on the average fruit farm as against 47c per acre on the hay and grain farm, and 29c per acre on the stock farm. Although the average fruit farm is only one-half as large as the average hay and grain farm, it requires more labor, largely because it is cultivated more intensively. One of the increasing difficulties in fruit growing, as in other lines of farming, is to get sufficient reliable help. The grower of perishable fruits is most concerned about this phase of the business.

The man who is locating a fruit industry should consider very carefully where he can get labor and what it will cost. There is much difference in localities in this respect.

In general, the nearer to a city or town the fruit farm is located, the more easily the labor problem is solved. This advantage may help to offset higher valuation of land. Human labor is the most expensive item that enters into the cost of producing a bushel of fruit. The effort should be made to reduce the amount of hand labor that is needed by using improved machinery and tools.

FRUIT ZONES.

Besides these three primary factors in the cost of producing fruit—land, capital goods, and labor—several other points bear a very important relation to the problem. The adaptability of the fruit or variety to the location, the site and the soil in which it is grown may have more influence than all the other points that have been mentioned. Fruit growing is bound to become more and more segregated, for increasing competition will make it impracticable to grow a staple fruit except in the locality on the soil where it thrives best, and so can be grown cheapest. The demands of a near-by market, however, will offset this to some extent; and market conditions, cost of land and other factors may sometimes make it expedient to grow a fruit outside its most congenial clime.

What is true of fruits as a whole, is also true of varieties. Certain varieties thrive best in certain localities or on certain soils. It costs less to raise a bushel of fruit if the variety is happy in its environment than if it is not. This one point may have more to do with the cost of production than all others. The man who tries to raise Baldwins in a locality where a tree as hardy as Wealthy is needed, is sure to fail; the man who tries to raise Warfield strawberries on heavy land, better adapted for Parker Earle, must expect the cost of producing his berries to be a little more than if he had fitted the variety to the soil more skillfully. The varieties that succeed best can usually be grown the cheapest, and usually, but not always, they will pay the best.

The expense of fighting insects and diseases is a large item in the cost of producing fruit, and this expense varies widely in different sections. There are irrigated valleys in the west where it costs 40 cents per year a tree to protect apples from codling moth, and there are other areas where apples can be protected from the same pest for 10 cents per tree. Likewise, it costs 15 cents per year to protect a peach tree from San Jose scale in some sections and nothing in others. Fire blight may ruin half the pear trees in one locality; another locality may be exempt. So one of the important points for a prospective fruit grower to look after is the probable cost of fighting pests and diseases, and the probably unavoidable loss because of them. He may find that one locality offers great advantages over another in this respect. This point is of large and growing importance in estimating the cost of producing fruit.

SINGLE CROP OR DIVERSIFIED FARMING.

The cost of producing fruit will be influenced to a large extent by the kind of farming, whether only fruit is grown or mainly fruit with other crops or stock as a side issue. Seventy-five years ago, when most of the population lived in the country, the aim of the farmer was to produce the articles that were necessary to supply the needs of the family. He produced small amounts of all the crops that would grow at all on his farm. Now the farmer grows crops for market, not for his household. The growth of cities and increasing competition have made it necessary for the majority of farmers to specialize along some line and to grow only the crops or raise the stock that succeed best on their farms, and to purchase those necessities that they can buy cheaper than they can raise them. Agriculture is becoming more and more specialized.

The business of fruit growing is one of the most specialized lines of agriculture. It is usually conducted on small farms under intensive culture, and but a few kinds of fruit plants are grown. Many fruit growers have no other business. There are economic advantages in this arrangement, but there are also great disadvantages. In many cases fruit could be produced cheaper if a certain amount of other crops were grown, or some stock kept. It is all right for the manufacturer to produce but one article, for he can work on it all the year. The crop of the fruit grower, however, occupies his attention but part of the year. There is much loss in unused capital, labor, teams, tools and other capital goods during the remainder of the year.

I believe that there is a tendency to specialize too highly in fruit growing, and that in many cases it would be more profitable to the fruit specialist to grow a certain amount of other crops, or keep a certain amount of live stock. He should, of course, make fruit growing his main business, and select such other interests as will most effectively fill in the gaps that appear in all kinds of specialized farming. Even though the crops he selects may not be nearly as profitable in themselves as fruit, yet the total profit from the farm for a series of years may be greater, since machines, labor and capital goods are kept in use. In short, the fruit grower should endeavor to have supplementary work

which will not compete with the fruit crop, that is, which will not need a large amount of care at the time when the fruit crop demands attention. Certain lines of stock husbandry in which the animals are fed in winter and pastured in summer are practicable in some cases. Remember also the value of the manure. Dairying, of course, would come in competition with the fruit crop. In most cases some line of farm work can be found which will not encroach seriously upon the fruit crop, and which will make use of the capital goods and labor of the farm that otherwise would be idle. To that extent it will cheapen the cost of producing fruit.

Added to the cost of producing the fruit is the cost of placing it on the market. Here also are many points that make for profit or loss. The cost of harvesting and packing, the cost of packages, the distance of the orchard from the railroad or shipping point, the character of the roads between the orchard and the shipping point, the cost of transportation and commission, these and other points should be figured on. Every mile that an orchard is distant from a shipping point adds to the price at which the grower can put fruit on the market at a profit. The cost of placing fruit on the market is as fluctuating as the cost of producing it, and is not within the province of this article.

ESTIMATES ON COST OF PRODUCTION.

The foregoing paragraphs have emphasized the fact that the cost of producing fruit is extremely variable, depending upon many factors, most of which the fruit grower can control. Any estimate must be a personal estimate—how much it costs a certain man in a certain locality—and this estimate may be wide of the general average. Merely to show what it costs some men to produce fruit, I quote from some letters received from prominent fruit growers. The figures given includes both the cost of growing the fruit and the cost of marketing it. The estimates are for the first grade fruit.

Apples:

T. A. Farrand, Eaton Rapids, Mich.....	25c	per	bushel.
W. M. Pratt, Benton Harbor, Mich.....	28c	"	"
Benton Gebhardt, Hart, Mich.....	25c	"	"
T. C. Wilson, Hannibal, Mo.....	30c	"	"
L. A. Goodman, Kansas City, Mo.....	20c	"	"
F. Walden, Seattle, Wash.....	40c	"	"

Pears:

T. Farrand, Eaton Rapids, Mich.....	34c	"	"
W. M. Pratt, Benton Harbor, Mich.....	30c	"	"
L. A. Goodman, Kansas City, Mo.....	80c	"	"
F. Walden, Seattle, Wash.....	40c	"	"

Cherries:

T. A. Farrand, Eaton Rapids, Mich.....	\$1.00	"	"
Benton Gebhardt, Hart, Mich.....	75c	"	"
W. M. Pratt, Benton Harbor, Mich.....	1.30	"	"
L. A. Goodman, Kansas City, Mo.....	70c	"	"

Plums:

T. A. Farrand, Eaton Rapids, Mich.....	50c	"	"
Benton Gebhardt, Hart, Mich.....	50c	"	"
L. A. Goodman, Kansas City, Mo.....	50c	"	"
F. Walden, Seattle, Wash.....	46c	"	"

Peaches:

T. A. Farrand, Eaton Rapids, Mich.....	43c	"	"
Benton Gebhardt, Hart, Mich.....	45 to 60c	"	"
W. M. Pratt, Benton Harbor, Mich.....	40c	"	"
L. A. Goodman, Kansas City, Mo.....	40c	"	"
T. C. Wilson, Kansas City, Mo.....	30c	"	"
F. Walden, Seattle, Wash.....	51c	"	"
C. B. Welch, Douglas, Mich.....	37c	"	"

Grapes:

W. M. Pratt, Benton Harbor, Mich.....	4-5 c.	per	lb.
L. A. Goodman, Kansas City, Mo.....	1c	"	"
N. G. Blalock, Walla Walla, Wash.....	2c	"	"

Strawberries:

W. M. Pratt, Benton Harbor, Mich.....	\$1.20	per bushel.
L. A. Goodman, Kansas City, Mo.....	64c	“ “
T. C. Wilson, Hannibal, Mo.....	1.25	“ “
N. G. Blalock, Walla Walla, Wash.....	1.20	“ “
C. B. Cook, Owosso, Mich.....	1.75	“ “
C. B. Welch, Douglas, Mich.....	1.26	“ “

Black Raspberries:

W. M. Pratt, Benton Harbor, Mich.....	\$1.10	“ “
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PROFITS IN FRUIT GROWING.

The profits in fruit growing depend upon the cost of production, the cost of marketing and market conditions. There is more variation in the income from fruits than from most other farm crops. The average income, however, is higher than the income from other common lines a husbandry. The last census shows that the average incomes in different lines of farming are: Fruit, \$915; live stock, \$787; dairy, \$787; cotton, \$430. But the gross income means nothing, it is the per cent received on the capital invested that counts. Census statistics show that the average fruit farm returns 9.6% interest on the investment. Very much larger returns than this are common. On the whole, the returns in fruit growing are apt to be larger than the returns in general farming, provided the same degree of intelligence, energy and capital is invested in each case. The fact that 83% of the fruit farms of the country are owned by the men who own them, as compared with 48% of hay and grain farms, and 68% of dairy farms, is further evidence that the fruit growers of the country are making their business pay. The census says: "Fruit farms have a value above the average, and a higher per cent of them are owned than of farms of any other class."

I have purposely left until the last the most important item in the cost of producing fruit. This is the personality and skill of the man. This counts more than all else, for the right sort of a man can over-ride obstacles, avoid mistakes and make fruit plants respond where a less skillful or less energetic man would fail. The fruit grower is so closely dependent upon physical conditions, which are unstable, and upon soil and market conditions, which change from year to year, that it is not possible for him to do this work by rules, or estimate his expenses with the mathematical exactness of the manufacturer or merchant. It is constantly necessary for him to adjust himself to new commercial and physical conditions. There is, of course, an element of chance in the business, but this is very small as compared with the almost unflinching regularity with which success follows energy, skill and judgment.

A VARIETY LIST FOR NORTHERN MICHIGAN.

(LEO M. GEISMAR, SUPT. UPPER PENINSULA EXPERIMENT STATION.)

After eight years of experimental work with fruit, and a much greater number of years of close observations in all other parts of the Upper Peninsula, I can give the following lists as those of varieties which are safe to plant and sure to bear profitable crops under ordinary conditions of care and cultivation and regardless of occasional "test winters." This applies to average conditions of soil and location, and not to such where the profitable production of fruit is rendered impossible either temporarily or permanently owing to present unfavorable conditions of surface or air drainage. There are many portions where the average conditions, especially of location, are more favorable than they are here, for the Upper Peninsula is a mighty big "village." There are none, however, where the conditions represent more nearly than they do here the average as it obtains throughout this vast region. I am safe to state that the apple and most of the small fruits will comprise exclusively the list of those which will become profitable when raised on a commercial scale, and I am probably equally safe in stating that the cherry, at least the Morellos, and the Blackberry will be added to this list whenever some of the lighter soils will be taken up for horticultural development.

STRAWBERRIES.

To give a list of the varieties of strawberries which will succeed throughout this region would be equal to giving a list of all the standard varieties which are grown elsewhere. The fact that they are grown successfully in every county, and that the early varieties

yield even better than those which blossom late, offers ample evidence that the question of hardiness need not be taken into consideration. Occasionally some varieties are reported as poor yielders in certain localities, and then again the same varieties are reported as the most profitable in other localities; all of which merely emphasizes the fact that here as elsewhere certain varieties of strawberries show a preference or a dislike for certain kinds of soil.

RASPBERRIES.

The Loudon and the Cuthbert are the main, if not the only, varieties planted, and these only on a very small scale owing to the great abundance of the native fruit, which is generally equal in size and always superior in flavor.

BLACK AND PURPLE CAPS.

The Older and the Columbian have been tested and may be considered safe varieties when given proper cultivation.

CURRANTS.

Practically all the leading varieties have been tested and all can be safely recommended.

GOOSEBERRIES.

The Houghton, Downing, and, to some extent, the Pearl and the Red Jacket, being quite free from mildew, may be considered profitable.

BLACKBERRIES.

If light, sandy soils are available the Snyder and the Eldorado can be recommended, for these two, even upon the better grade of soils, are less subject to the fungous diseases which attack the canes of other varieties at the time the fruit begins to ripen and thus render the fruit worthless.

APPLES.

Considering hardiness to be of prime importance, the following list of varieties which have been sufficiently tested or nearly so, may be recommended in the order herewith named: Hibernial (synonym, Yellow Arcadian), Patten's Greening, Duchess of Oldenburg, Yellow Transparent, Anisim (sometimes offered as Good Peasant), Tetofsky, Patten's Fameuse, Charlamoff, Wolf River, Gideon, Borowinka, Lubsk Queen, Okabena, Wealthy, Lieoland Raspberry, Alexander, McMahan, Longfield, Dudley Winter (offered here as North Star), Haas, McIntosh, Zoloboreff, Tolman, Pewaukee, Shiawassee, Northwestern Greening, Scott's Winter.

CHERRIES.

For sandy soils the Early Richmond, English Morello, Ostheim, Montmorency and Wragg can be recommended.

PLUMS.

While tests have been very limited in extent, observations in various parts show that the Japanese varieties, practically all the Hybrids, and the European varieties, with the possible exception of Shropshire Damson, are next to worthless. There are several native varieties of good quality which might be propagated with profit, and in favorable locations other American varieties such as Weaver, Wolf, Wyant, Hawkeye, DeSoto, Stoddard, Forest Garden and Surprise may be recommended. Further tests will no doubt show that still other American varieties can be added to this list and can be recommended for general planting. Japanese and similar varieties are occasionally found to succeed in specially favored locations of the portage canal zone in Houghton county, and in others where the lakes afford ample air drainage. The same applies to several varieties of pears and grapes.

PEARS.

At this time, and with the exception just noted, only the Flemish Beauty can be recommended, and even then not as a commercial proposition.

GRAPES.

In average locations, varieties of the Concord type grow and bear every year, but seldom ripen the fruit properly. A native Fox grape is found along the Sturgeon River in Baraga county, and thus indicates that future tests may show that certain cultivated varieties can be recommended for general planting.

A VARIETY LIST FOR LOWER MICHIGAN.

(T. A. FARRAND, EATON RAPIDS.)

In looking over this list the reader must take into consideration the fact that the value of this or that variety depends somewhat upon the purpose for which it is wanted, and also very much upon local or long distance markets. The list must necessarily be long to cover all conditions and the different sections of the state and those varieties should be chosen which have the characteristics most desirable for the purpose for which they are being planted. The recommended variety list is also subject to change more or less as the years go by. The popular variety of today may not be such ten years hence.

The lists should be divided, one list being for market purposes and one for home use. The list for home use should contain those varieties best adapted for cooking and dessert purposes and should cover the season. Some of the desirable characteristics for market fruits are hardness of tree and early bearing tendencies, high color, reasonably firm in texture, coupled with good quality if possible.

APPLES.

Why should we in Michigan plant varieties of good quality, eliminating varieties of the Ben Davis type? For the very reason that we cannot compete with many other sections, where this is a standard variety, but we can grow many other varieties of fine quality to perfection.

For market:—Yellow Transparent, Duchess of Oldenburg, Gravenstein, Wealthy, Wagener, Hubbardston, McIntosh or Fameuse, Grimes Golden, Jonathan, Baldwin, Northern Spy, Red Canada, King, Rhode Island Greening, Ontario.

For Home Use:—Yellow Transparent, Sweet Bough, Primate, Jefferies, Wealthy, Oldenburg, Fameuse, McIntosh or Shiawassee, Wagener, Spitzenburg, Jonathan, Spy, Grimes Golden, Red Canada, Hubbardston, Tolman Sweet.

Crab Apples:—For market, Hyslop; for home use, Martha and Dartmouth.

PEARS.

For market:—Gifford, Clapp's Favorite, Bartlett, Howell, Duchess, Anjou, Bosc, Seckel, Dana's Hovey, Clairgeau, Keiffer.

For home use:—Summer Doyenne, Bloodgood, Clapp's Favorite, Bartlett, Manning Elizabeth, Duchess, Bell Lucrative, Sheldon, Bosc, Seckel, Lawrence, Dana's Hovey.

PEACHES.

For Market:—Admiral Dewey, Lewis (white), St. Johns, Champion (white), Conklin, Early Crawford, Engle Mammoth, Crosby, Kalamazoo, Elberta, Gold Drop, Hill's Chili, Smock, Salway.

For Home Use:—Admiral Dewey, Lewis, Engle, Champion, Kalamazoo, Gold Drop.

PLUMS.

Market Varieties:—Japan—Red June, Abundance, Burbank, Satsuma, October Purple; European—Lincoln, Lombard, Bavay Green Gage, Bradshaw, Geuii, Grand Duke, Black Diamond, Monarch, Coe's Gold Drop, Shropshire or French Damson.

For Home Use:—Red June, Abundance, Lincoln, Columbia, Lombard, Bavay Green Gage, Fellemborg or Italian Prune, Shropshire Damson.

CHERRIES.

Market Varieties:—Richmond and Montmorency for sour, Dukes, Montreuil, May Duke. Sweet—Gov. Wood, Napoleon Royal Ann, Windsor, Black Tartarian, Smith's Bigarreau, Yellow Spanish, Bing, Lambert.

For Home Use:—Early Richmond, Montmorency, May Duke, Montreuil, Eugenie, Gov. Wood, Tartarian, Windsor, Yellow Spanish.

QUINCES.

Orange, Rea Mammoth, Missouri Mammoth.

GRAPES.

Market Varieties:—Moore's Early, Worden, Concord, King, Diamond, Niagara, Delaware.

For Home Use:—Winchel or Green Mountain, Moore's Early, Diamond, Worden, Niagara, Delaware, Brighton, Ulster.

STRAWBERRIES.

Market Varieties:—Senator Dunlap, Wm. Belt, Haverland, Clyde, Bubach, Uncle Jim or Dornan, Brandywine, Sample, Aroma, Gandy, Kittie Rice, Downing's Bride.

For Home Use:—Marshall (very best quality), Senator Dunlap, Brandywine, Wm. Belt, Michel's Early, Gandy.

RASPBERRIES.

Market Varieties:—Black—Eureka, Conrath, Cumberland, Kansas, Gregg.

Red—Early King, Marlboro, Cuthbert, Miller.

Purple—Columbian, Shaffer.

For Home Use:—Eureka and Cumberland, black; Early King and Cuthbert, red; Columbian, purple.

BLACKBERRIES.

Market Varieties:—Early King, Erie, Minnewaska, Snyder, Wilson, El Dorado.

For Home Use:—Early Harvest, Eldorado, Snyder (very hardy).

GOOSEBERRIES.

Downing, Champion, Chautauqua.

CURRANTS.

London Market, Fay's Prolific, Wilder.

A CHAPTER ON LAWNS.

(DR. W. J. BEAL, AGRICULTURAL COLLEGE.)

Trees and grass are two great elements of landscape gardening. The finest lawn will retain a surface of uniform color and growth—no mingling of light and dark spots nor of grasses which grow at different rates of speed.

"Grass is the most lowly, the simplest, and the loveliest element to be used in the adornment of home. A smooth, closely shaven surface of grass is by far the most essential element of beauty on the grounds of a suburban home."—(F. J. Scott.)

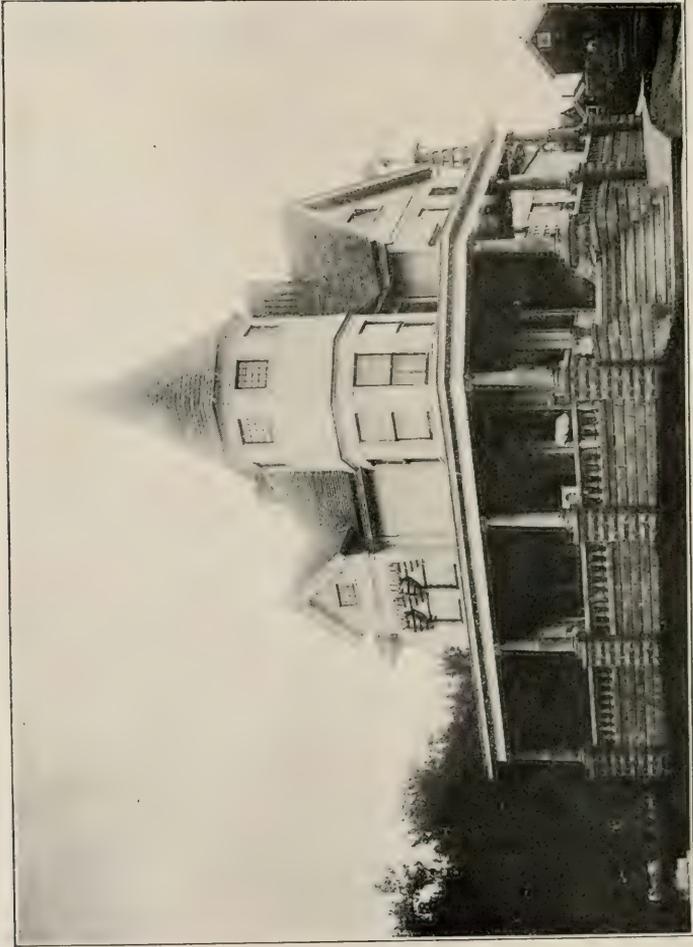
"It would be a great gain to horticulture if ten out of every twelve 'flowerbeds' in Europe were blotted out with fresh green grass."—(Robinson's Parks of Paris.)

"A lawn is the *ground work* of a landscape garden."—(H. W. Sargent.)

Listen to A. J. Downing: "For this purpose we do not look upon grass with the eyes of the farmer who raises three tons to the acre. We have no patience with the tall and gigantic *jodder* by this name, that grows in the fertile bottoms of the West, so tall that the largest Durham is lost to view while walking through it. No, we love the soft turf which is thrown like a smooth natural carpet over the swelling outlines of the smiling earth.

"Fine lawns are possible in all the northern half of the Union, although an American summer does not, like that of Britain, ever moist and humid, naturally favor the condition of fine lawns. The necessary conditions for a good lawn are *deep soil, the proper kinds of grasses, and frequent mowing*. Let the whole area to be laid down be thoroughly moved and broken up two feet deep. Let the surface be raked smooth and entirely cleared of even the smallest stone. The object of a lawn is not to obtain a heavy crop of hay, but simply to maintain perpetual verdure. Rich soil would defeat our object by causing a rank growth and coarse stalks, when we wish a short growth and soft herbage. Let the soil, therefore, be good, but not rich; depth, and the power of retaining moisture are the truly needful qualities.

"Now for the sowing, and here a farmer would advise you to 'seed down with oats,' or some such established agricultural precept. Do not listen to him for a moment. Do not suppose you are going to assist a weak growing plant by sowing along with it a coarser growing one to starve it.



Solid Cement Porch on Kingsley and Bassett Residence, Fennville
Cheapness and simplicity in the use of cement have solved many problems in farm construction



Single Plant of Sample Strawberry Grown in Double Hedge Row, by President C. B. Cook, Owosso

"Trees—delicate, beautiful, grand or majestic trees—pliantly answering to the wooing of the softest west wind, like the willow; or bravely and sturdily defying centuries of storm and tempest, like the oak—they are indeed the great 'princes, potentates and people' of our realm of beauty.

"With such a lawn and large and massive trees, one has indeed the most enduring sources of beauty in a country residence. Perpetual neatness, freshness and verdure in the one; ever expanding beauty, variety and grandeur in the other—what more does a reasonable man desire of the beautiful about him in the country? Must we add flowers, exotic plants, fruits? Perhaps so, but they are all, in an ornamental light, secondary to trees and grasses, where these can be had in perfection."

The extensive lawns at the Agricultural college have received many favorable comments—perhaps too many, when the details are carefully examined, for there are many noticeable defects. There is a great variety of soil, ranging from light sand to stiff clay, from dry knolls to moist hollows. For many years past different portions have been seeded at different times by different persons, some sowing a complicated "lawn-grass" mixture, others making use of only one or two species of grass. Existing in the ground or sown with the grasses were seeds of many kinds of weeds.

Let us visit portions of the lawn that have certainly been seeded for forty years, and probably some of them for a longer period. The lawn is extensive, fertilizers costly, and for these reasons very little has been done except to apply a lawn mower from summer to summer.

For a time the land was "new," grass grew luxuriantly, and was mowed for hay. A steady decline has been noticeable, especially in dry seasons, and with the decline the better grasses were less and less capable of maintaining a struggle with each other and a supremacy over numerous kinds of weeds. The lawn has become spotted with large numbers of patches where each kind grows more or less by itself.

In places, June grass maintains its hold very well, but it is interrupted by light patches of sweet vernal grass which was highly spoken of at the time the lawn was seeded. Patches of a small, fine red top, much like Rhode Island bent grass, have held their own very well for the past thirty years. Under the shade of trees where the limbs do not rest on the ground, are numerous patches of a fine-leaved grass having a bright green color. Here are some nearly in the form of circles, ranging from a foot to four feet in diameter, where the roots have apparently gone farther and farther out from the growth of a single seed, and here some of these circles have merged into each other. This is the best grass I have found to sow in the shade of trees on ground that is not very strong. It is red fescue, from Europe, technically known as *Festuca rubra*, *genuina* Haekel, not to be found in any market that I know of. Yonder, growing in the open on a sandy and gravelly soil, are patches of considerable size of a hard, blue-leaved bunchy grass, though not very bunchy where the seed was sown thickly and mowed often. This is our best grass for a lawn on dry land, where it is liable to be much trampled in dry weather. It is a variety of sheep's fescue, from Europe, without a common name, known to botanists as *Festuca ovina marginata*.

The best grass for lawn in the open for nine-tenths of home grounds in Michigan is June grass, known also as Kentucky blue grass, *Poa pratensis*. It is not the flat-stemmed wire grass that early settlers called blue grass. In wet seasons, especially if cool, white clover will appear in generous quantity with the June grass, its creeping habit enabling it to spread with great rapidity from a comparatively small number of centers. If the season be dry and hot, little white clover will be seen.

In too many places, I am sorry to say, quack grass, *Agropyron repens*, is abundant in the lawn. The leaves are broad and coarse, giving a lawn much the appearance of a field of timothy. All of the lots, or nearly all, of those in Oakwood, north of the College, are thoroughly overrun with this worst of weeds. It has staying qualities to commend it.

If lawns are thin, several annual grasses, such as smooth crab-grass and two fox-tails, stink grass, barnyard grass, and others, work their way in during the summer and disappear in September, leaving many unsightly open places.

For more than ten years I have been watching several pieces of lawn where June grass and Bermuda grass together have been occupying the ground. In the spring, for four to six weeks or more, as long as the weather is cool, nothing is seen except a dense growth of June grass, but later, when the weather becomes hot and dry, June grass is made to retire, and one sees nothing but Bermuda grass. On the arrival of frosts and cool weather, in autumn, Bermuda retires and June grass reappears, covering the ground. Thus from early spring to late autumn, the lawn is a perpetually green, soft carpet, a delight to the person who walks upon it. Even on light land no dead spots appear in dry weather as is the case with June grass and many others.

One of the prettiest lawns I ever saw was north of a house on a lot of moderate size on Euclid Avenue, Cleveland, Ohio where trees shaded most of the area and free use

was made of the hose. The leading ingredient was spear grass, *Poa annua*, a small annual grass that will grow three or four crops in succession during a single year, these successions mingling with each other. The color is emerald green, and very pleasing. I doubt not the seeding was purely accidental.

Under different names there are many lawn grass mixtures extensively advertised and sold, often at two or three times the cost of the best one of all of them. Most of the mixtures contain some seeds of timothy, sheep's fescue, white clover, brown bent, sweet vernal, perennial rye grass, meadow fox-tail, June grass and weeds, while some of them contain seeds of taller fescue, orchard grass and red canary grass, which are very objectionable in any lawn. In this country, perennial rye grass starts very promptly after spring sowing, making a fine show, but most of it never lives through a second winter, leaving large open spaces to be filled by slower grasses or by weeds. A mixture of many sorts of grasses is about sure to look spotted in rate of growth and in color, especially after a few years. The mixture I recommend to all of my students and inquiring friends is as follows: A bushel and a half or two bushels of equal parts of these five: June grass, June grass, June grass, June grass, June grass, these five and nothing more. One can sow a little white clover if he chooses.

If the lawn isn't too large and one is in a hurry, or if dry weather is liable to appear, he may get quicker results by scattering over a well-prepared surface small bits of closely mown sod of June grass from an old pasture or roadside. These may be perhaps six to ten inches apart, each way, and the ground rolled or tread down. This does not cost as much as some might suppose.

In the old college lawn referred to are many patches of common speedwell, *Veronica officinalis*, or thyme-leaved speedwell, *Veronica serpyllifolia*, some of which are ten to twenty feet and even forty feet long. These look fairly well, but they are soon disfigured when stepped on. In one place I counted twenty-two patches of creeping thyme which are spreading, some of them in groups twelve feet long, with scattering June grass mixed in. They are interesting little plants.

Narrow leaved plantain, *Plantago lanceolata*, is more or less abundant in different places. The small tufts of leaves can be tolerated, but the central flower stalks run up so very quickly after the mower clips them off that they are unsightly and too tall for the lawn mower to cut. Dandelions, too, are abundant, and disliked except by children in early spring.

Prunella vulgaris, self-heal, of the mint family, is as common as any of the above and a weedy plant. If you had never seen it, you could have little conception of the unique appearance of patches of the common yarrow in the lawn. Such yarrow is very pretty. I know of several patches, one of which is circular and eleven feet in diameter, with others smaller and all spreading as June grass and sweet vernal give way.

There are patches of plantain-leaved everlasting that disfigures the lawn. If, perchance, some of it had been introduced, we should see in this lawn many other creeping weeds, such as gill-over-the-ground, bouncing bet, several chick-weeds, St. John's wort, *Geranium pusillum*, wild madder, oxeye daisy, tansy, two or three hawkweeds, moneywort, periwinkle, toad-flax, cyprus spurge, and others.

About thirty years ago, after the present State Capitol was completed, the ground was thoroughly drained, trenched, graded and seeded with a lawn grass mixture, two of the chief ingredients of which were perennial rye grass and June grass. The rye grass made a good show at once, but gradually disappeared during a space of three or four years. The ground is stiff clay, and has apparently not been enriched since the lawn made a start.

In July, 1905, I made a careful examination of the lawn. The June grass is thin, liberally interspersed with large patches of some other grasses and weeds, giving the lawn a pale and spotted appearance. In the spaces most shaded by trees, red fescue is most prominent. On the west side, mixed with other plants, narrow-leaved plantain is abundant, scattered about, nowhere forming dense mats. It was a great pity the lawn grass seed was not examined by an expert, to prevent mistakes of this sort. The common mouse-ear chickweed is conspicuous in numerous patches, also the creeping crowfoot, the latter bearing some yellow flowers, Canada thistle and bull thistle, common mallow, broad-leaved plantain, spotted spurge, *Geranium pusillum*, knot grass, common chickweed, and very likely many more. Black medick appears in many places, creeping about much like white clover, which makes more or less display, depending on the nature of the season. Common and thyme-leaved speedwell are conspicuous in certain places. Of all the patches of weeds on the lawn, none are so large as those covered by self-heal, *Prunella vulgaris*, a weed of the mint family. In some places these are one hundred feet long by ten feet wide and of an irregular shape, with an increasing number of smaller patches scattered liberally about.

Perhaps the most interesting portion of this paper concerning lawns will be an answer to the question, "How to secure a good lawn after it has become thin and weedy?"

Through the results of experiments made by Mr. Lawes and his associates in England, I am able to give a remedy that shall be inexpensive and satisfactory.

During the growing season apply at two or three different times a commercial fertilizer, consisting of ammonia salts, nitrate of soda and fine bone meal. Unleached wood ashes are very valuable. A commercial fertilizer on a lawn is preferable to barnyard manure for two reasons: No weed seeds are introduced, and the front yard is not converted into an unsightly barnyard for several months in the year. The proportions and amount of fertilizer needed cannot be given exactly, because soils differ so much in different places.

"On general principles, all manures tend to drive out the weeds by increasing the better herbage."

SOME FARMING EXPERIENCES OF TWO CITY WOMEN.

(ISABEL MC ISAAC, BENTON HARBOR.)

During the past ten years we have been reading many accounts of the wonderful successes of amateur farmers who reap large paying harvests the first year, and go abroad on the proceeds of their fourth or fifth crops. We have no such success to record, indeed we do not claim any greater degree of success than any of you who have been farming all your lives. We hope you fully appreciate the modesty of that statement, because the temptation to boast is not unknown to farmers, and being women we might make claims which men would hesitate to dispute.

The migrations of men from the country to the city have been the subject of much recent discussion, many theories have been advanced and many suggestions made, but the migration goes on without hindrance. Such movements obey some natural law or force which we often fail to recognize, but speaking from the standpoint of both experiences, it seems perfectly natural that young people, both men and women, should yearn for the greater activity and opportunity which the city affords. The migration of mankind from the city to the country has really only begun in this country, and should it continue to increase at the present rate, another generation will find us a much better balanced nation than we have been during the period which has followed the civil war. As yet we city emigrants are uncommon enough for city friends to declare us crazy, and our country neighbors to give us two years to fail and return to town.

Thus far we two have not yet been sent to an insane hospital, and our neighbors have been obliged to extend the time to four years, and in one or two instances have actually admitted that we might possibly escape the poor house.

We came to the country after twenty years of strenuous life in the great hospitals of a great city, a life that knew no hours of relief from responsibility and anxiety, which brought us in contact with every phase of men and women, good and bad, rich and poor, high and low, wise and ignorant, all in an atmosphere of physical disability to which was often added mental disturbance and moral degradation. There came a time when we felt that some far away corner where men were well, and we might have at least one hour in the twenty-four to call our very own, where the air was fresh, the sun unclouded by soot and smoke, and where we might once more be our own masters, would be all we could ask; and thus it was that in spite of remonstrances of friends we bought ten acres of fruit land in your midst.

We came to the country entirely ignorant of what it meant, the only glimmer of intelligence on the subject that we seem to have had was that we were old and experienced enough to predict that it would take at least five years for us to learn how to make farming pay. But in this we were happily surprised to find the farm self-supporting at the end of three years.

There have been many times when we have been thoroughly disgusted and would certainly have abandoned farming but for the fact that we could not afford to lose our investment, and because of the innate obstinacy which has always compelled us to overcome rather than submit to obstacles.

One of the things which has given us as much hope as anything else, has been in seeing a number of farmers who appeared to us to be both lazy and lacking in intelligence who managed to make their bread and butter and tobacco at farming, and if they could do it why may we not do as much.

Our little farm is very favorably situated for our purpose, being surrounded on three sides by deep ravines, on the fourth by golf links, and is far from the highway, our entrance

being through a long private road, which enables us to work without an audience, a very desirable thing with the amateur farmer. Its situation is also good because of the ravines which prevent our chickens bothering our neighbors and vice versa, and we have no reason for complaining of near neighbors who do not spray, which seems to us to be a great advantage.

We are also greatly favored in being near town and upon an excellent road. But all of these things are mere accidents; we thought of none of them until we came to live on the farm. It is only in books that the city farmer is very far seeing.

Our place had long been in the hands of renters, and it is unnecessary to tell you of the impoverished soil, the peach trees far beyond their usefulness, the sassafras which encroached upon the outer row of trees until they were lost to sight, the blackberry vines running riot, the endless weeds, with a flourishing crop of Canada thistles, a vineyard hopelessly smothered in sod and on so steep a hill that spraying and cultivation were impossible. Another hillside which had once been cultivated was an almost impossible thicket of scrub oaks and sassafras with Canada thistles between. The barn was so close to the house that it was about all we could see from our living rooms window, and behind it a mountain of brush from the prunings of many seasons and a huge pile of rubbish containing every thing imaginable from an old tar paper roof and a rocking chair to a beer keg and a man's old coat. We recently heard of another city farmer who found the only thing we have not yet plowed up on our place, and that was a set of false teeth.

The one thing upon the place which was in good condition was the apple orchard of about two and one-half acres, the trees were about fifteen years old, Baldwins, Duchess and Hubbardston, and with the care they have had, have responded very well. The crop was very short this year after the repeated freezings, but we lost no trees, only the fruit.

The old peach trees were mostly of the white varieties and too old for profit, and were all removed; the trees which replaced them were in their second year, and also survived the October freeze. We have two acres of young pear trees, and about one acre of grapes set out last year, besides half an acre of asparagus; the latter we feel very proud of, and look forward to good returns from it. We attribute its unusual vigor to the heavy fertilizing from the poultry and we are indebted to the hens also for keeping down the asparagus beetles, as we have never been obliged to take any measures for getting rid of them.

We early decided that it would be prudent for us to have a diversity of fruit, both on account of the work, which is much easier to spread over the entire season, entailing far less hired help, and because in all of our experiences in other lines we had been impressed with the wisdom of carrying eggs in more than one basket. We have spent four years of desperately hard work getting rid of sod, sassafras and weeds, including Canada thistles, but by sticking to it every single day from daylight till dark, winter and summer, we feel that we are now driving the work instead of the work driving us, and are ready to declare positively that Canada thistles can be exterminated if the farmer really wishes to get rid of them.

The spraying has been one of the difficult problems, owing to lack of help, but now that we have learned how, we can do it ourselves and feel secure in knowing that every twig and leaf is covered. Our long hospital training made us familiar with germicides, and prepared us to resist the temptation to buy all sorts of commercial preparations, and in consequence San Jose scale has been controlled; this year we have found none.

Proper fertilization is a serious undertaking with the woman farmer; a man can take his wagon and pick up good barnyard manure at all sorts of livery stables and private alleys but this is obviously out of the question for a woman and to hire it done, makes an item of expense to be seriously considered for the small farmer. Our experience with commercial fertilizers has been very indifferent, because we do not yet understand what our soil needs, but by cover cropping and carefully making use of all that comes from a horse, a cow and two hundred and fifty hens, we are beginning to see some excellent results in the soil which evidently was good originally, but was suffering from the exhaustion due to forty years of taking off and putting nothing back.

We yielded to the popular belief that fruit and poultry were an excellent combination, but if we were beginning again we would only keep hens enough for our own use. However there is something to be said upon both sides of the question. First, small fruit is impossible with poultry which has free range, and the poultry suffers if confined. Second, in a country devoted to horticulture, grain is too expensive to allow poultry to be profitable. On the other hand, if the benefits such as have been spoken of with the asparagus, and the really wonderful effects of poultry manure were to be added to the profits from the eggs, etc., we cannot say poultry keeping is unprofitable in horticultural regions, but as before mentioned, if we were beginning again, we would not go to the expense of poultry keeping, nor let ourselves in for so much hard work which is unavoidable if fowls are properly cared for.

The one thing of which we may indulge in a little boastfulness is in the matter of hired help. The first season we had two men most of the time from March to November; the second and third seasons one man for the same time, with extra help for spraying, etc. The last year good help was exceedingly difficult to get, the apple and pear orchards were seeded to grass and clover, so there was less cultivating to do, and we had help for a scant month, through the whole season doing everything ourselves, even to spraying with the lime and sulphur solution. Heretofore we have sprayed with a hand pump, with a man to pump, one of us to spray and the other to attend the boiler. But with the power sprayer we feel perfectly independent of hired help, and can do it ourselves alone if we must. Our spraying arrangements are very convenient and systematic, thus economizing both time and strength. We know of no place of its size in our vicinity which has been worked with so little help as ours.

One of us works out of doors all the time, the other helps as she can, and we have a small boy who waters and feeds the chickens and cleans the hen houses under supervision, but who never misses school.

You are no doubt more curious to know what our conclusions have been regarding women as farmers than to hear these details of our efforts. We will first ask why should they not succeed as farmers? The very heavy out-door work need not be too great an obstacle; a woman may employ help for such work the same as a man, and it is high time some one had courage to say that farmers are not the hardest worked persons in the world. That is a fallacy which ought to have been thrown to the winds long ago, but which a certain class of farmers have always paraded, especially to their wives. Compared to the physical work, long hours, responsibility and nervous strain endured by us in our former occupation, or compared to the work of farmers' wives, who bear their children, do their own house work and help with picking and packing fruit, the farmers' work is far easier.

In past generations men impressed upon their women kind that business was entirely beyond their limited comprehension, and for countless ages woman accepted this as wonderful wisdom, but that time has passed, and business men in other lines fully understand and accept the fact that many women have business faculty, and furthermore that women have a perfect right to work out their own financial salvation in their own way. The farmer has clung to this ancient doctrine and held it over the heads of his wife and daughters longer than most other men, but we predict that in another generation the man farmer will find the woman farmer a worthy competitor.

To such women as are worn out with the strife of work in great cities, and wish to make a home for themselves and renew their health, gardening or farming offers many inducements. But they must first have a fondness for growing things, be young enough to take up entirely new work, old enough to have outlived the hide-bound conventionalities which keep so many women in bondage to their clothes and the petty restrictions of activity, and money enough to live upon until they learn how, and then when they are ready to buy a farm they should secure by some means judgment to decide upon the question of soil and market, and should have strength of mind to resist the temptation to buy too many things the first two years, because by the time they have reached the end of the second year they will have learned enough to enable them to use their money judiciously.

In closing we beg to make a plea for the amateur farmers, both men and women. The city reaches out and eagerly grasps the men and women who have had country training, probably more than two-thirds of the great financiers, statesmen and scientists are country-bred, and in turn the country has as much need of the city trained men who bring habits of system, order and economy which the country needs. The farmer is too much inclined to attribute his failures to Providence and the weather man. He is too extravagant of his time, too much inclined to view his competitor with suspicion instead of feeling that every added farmer strengthens the whole. No individual nor group of individuals are sufficient to themselves alone, therefore the cities need the country boys and girls, and the country has need of the trained methodical city workers.

We take this opportunity to acknowledge our indebtedness to both local and state horticultural societies; without them we would have been hopelessly at sea many times, but having had a wide experience in organization work, we were soon able to recognize the members whose intelligence, experience and measures of success compelled the respect of their neighbors.

Horticultural societies differ very little from other clubs in that respect, such organizations always have a certain percentage of members who speak with authority, and certain others who just talk, and when one learns to discriminate there is an immense amount to be learned. To us they have been wonderfully interesting and profitable; without them, I am sure we could not have continued farming.

WINTER MEETING.

Farmington, March 5 and 6, 1907.

Farmington, famed as the home of Gov. F. M. Warner, was the happy meeting place of the Michigan State Horticultural Society for its winter gathering. Better weather could not have been ordered, which, with the interest exhibited by the people in that vicinity, where apple growing is done on a scale that is not exceeded by any other section in the state, brought out an attendance that surprised the local as well as the outside officials who worked to make the meeting a success. Being so well attended, every speaker seemed to catch the spirit of the occasion and put a vim and earnestness into what he said that made the matter given easily and clearly comprehended by the attentive listeners.

President Cook, of Shiawassee county, called the first session to order, after expressing his pleasure regarding the splendid outlook for the gathering, he called upon Mr. N. A. Clapp, of Wayne county, who addressed the audience upon the topic

PROGRESS OF THE GENERAL FARMER IN FRUIT GROWING.

The subject was very ably handled. It was introduced from the standpoint of health, in which the speaker pointed out how that the boys and girls who had been brought up on the farm had as a rule a constitution that was far superior to that of persons reared under other circumstances, and this condition was attributed largely to the beneficial effect of fresh fruit in abundant quantities, which acted upon the blood and liver and other organs in a way that cleared the body of all waste while it built new healthful tissue that is full of life, resistant of disease and capable of accomplishing the dictates of a will. It gives the country boy and girl a real appearance of health that the city young people get through the application of powders, etc. Iron is put into the liquid flesh that enables it to fill the body with oxygen, giving, thereby, muscle and endurance as well as a clear mind, all of which go to make life pure, healthful, vigorous and useful. Because of these features the speaker impressed his listeners with the importance of giving attention to this phase of the farm work. It has an advantage that is not always found in the dollars and cents represented by the product harvested from the trees. The comfort and happiness of the family is the object to be sought.

In the early days cider was the chief product of the orchard. Trees were planted (and cared for in the rather primitive methods of the time) that the fruit might be ground into pulp from which the juice was pressed to be barreled for the fall and winter use of the farmer as well as to be sold upon the market for cash. Since then there has been a great change, and now the cider part of the business is only an accidental one, and all the knowledge and skill of the grower is bent to produce as few specimens of fruit that is worthy to be made into the liquid as possible. This evolution toward the use of fresh fruit has led to the introduction of more and better varieties which are being planted in positions permitting their best development and which are being placed upon a market by improved transportation facilities nearly every month of

the year. The apple has been and is the chief fruit crop of the state and country, but the same changes that have occurred in the growing and consuming of the "King of Fruits," are present in the history of all other fruits. Strawberries are becoming more common on the average farm and it is not difficult to find pears, plums, grapes, etc., about the agriculturist's home. While there is a general tendency of the commercial grower to become a specialist, it was the observation of the speaker that the general farmer in the more progressive sections of the state is giving this part of his plantation some of its merited attention.

MICHIGAN FRUITS AS COMPARED WITH OTHER FRUITS.

(HENRY C. WARD, PONTIAC.)

Apples grown in California lack juice and flavor, but general appearance is good. The reason why the fruit lacks flavor seems to be the climate and the soil; the lack of juice is caused from long continued dry weather before the fruit is gathered. The fruit being dried or cured on the trees before it is picked usually keeps well.

Apples grown in the Great Salt Lake Valley are high colored, very pretty to look at, and fair quality. I saw and ate Ben Davis there as high colored and beautiful as the Gano. The best Ben Davis I ever ate was grown in the Salt Lake Valley. It was a good apple.

Apples grown in Colorado are high colored, grow perfect when thoroughly sprayed, and have a fine appearance, but lack the rich flavor of the well grown Michigan apple. The western apples disappoint the consumer from their fine color and outward appearance; the quality is not up with the show.

Apples grown in the middle west and Arkansas are generally of the Ben Davis type, which look and keep well but lack juice and flavor.

Apples grow well from Georgia along the Blue Ridge up to the St. Lawrence River Valley. The home of the apple is in the northern states and parts of southern Canada. The Steel Red grows at its best in Oakland Co., Michigan, and in parts of Canada this apple is becoming more extinct because the localities where it succeeds are very limited.

Apples grown in the upper part of the lower peninsula of Michigan, on high elevations, from 900 to 1000 feet above the Great Lakes are usually high colored, good quality and excellent keepers. The summer apple becomes a fall apple and the fall apple an early winter apple, and winter apples have been kept there in solid condition in a common cellar for a period of two years. I have picked Yellow Harvest up there from the tree, solid, in prime condition, in September. The Wealthy is at its best in January, and Snow or Famuse in February.

Oregon, Washington and Idaho apples are high colored, look well, but lack the flavor of the well grown Michigan apple.

I showed some fine specimens of apples grown in my orchards in Michigan to Mr. Ferguson, of Duluth. He remarked they were the finest he had ever looked at, and he advised me if I should ship them to that market it would pay me to brand them as New York apples.

He said that Michigan apples were the poorest fruit that was received in that market, the reason being that the orchards were not usually properly cared for and the fruit not honestly packed. Mr. Ferguson is an Oakland county boy, was born and raised here, and is at the head of the largest fruit house in Duluth. At Minneapolis and St. Paul the dealers generally complained of the way the Michigan apples were packed—poor ones in the middle of the barrels, etc.

California fruit and the fruit on the west coast is outselling the Michigan and the New York fruit in the big markets, the reason being this fruit is carefully picked, honestly packed, and put up in an attractive manner so as to be pleasing to the eye. This overcomes the lack of quality. The Japanese and Chinese usually gather and help pack this fruit, and they are trained to do it carefully and do it as they are told to do.

It is very difficult to secure help in Michigan that will do this work as it should be done. If shown how to pick the fruit carefully with the stems on, and also laid in the basket instead of being dropped or thrown in the basket, and when your back is turned the help will usually commence dropping the fruit instead of laying it in the basket, which bruises

not only the specimen dropped but other fruit already in the basket, and the fruit is all bruised up and not in prime condition to go into the package, and the general markets of the world will not accept it as first class fruit. If you insist on your help picking the fruit carefully, the same as it is done in the west, your help will quit work and insult you and demand what is coming to them.

In order to successfully compete with the western fruit we must secure a better class of labor to gather and pack our fruit. From three years' observation in California, the horticulturists there largely depend on the Japanese and the Chinaman to cultivate and trim their orchards and gather their fruit. The Chinaman, it is claimed, are honest, when you employ him he becomes your friend, he becomes a permanent fixture on the farm, he is steady, reliable, a ready imitator, sober, and usually saves his money and is a respectable citizen. He usually takes a personal interest in his work and reasons that his own prosperity depends on the prosperity of his employer, and that depends on him doing his duty towards his employer. There are over 400 millions of people in China, which is densely populated. The regular day's wages for a workman, boarding himself, is only seven cents a day in American money. Chinamen are good farmers in a crude way, on a small scale, and it is claimed they are the best truck growers or gardeners in the world. They have cultivated the same soil for thousands of years and still it retains its fertility. They usually prefer to live in small houses by themselves and do their own cooking. Their food is very simple, which consists largely of vegetables, rice, fish and fruit. They can live and compete with any class of laborers in the world. Sufficient laborers can be induced to come to this country at a reasonable wage to help the American agriculturist or horticulturist do their work. He is not particular, he will do housework. The most of the housework in California is done by the Japanese and Chinese at the present time, even the cooking is done by them.

During the fall of 1903, when apples were selling for 60 cents a barrel for No. 1 fruit in the orchard, I had my Baldwins picked and carefully packed them myself and carried them in cold storage until about the middle of May. These apples were packed in three grades, fancy, No. 1, and No. 2. The fancy brand was packed strictly fancy. The No. 1 I put in some fancy to sweeten up the No. 1, but no No. 2, and in the No. 2 I put in some No. 1, but none poorer than No. 2. We used baskets lined with cloth to pick in and apples were laid in the baskets carefully.

One barrel opened on the pressed end showed 7 specked and rotten apples, and one specked on the faced end. The second barrel there was two rotten apples on the pressed end, all sound on the faced end, and the third barrel the apples on both ends were sound. Mr. Randle claimed they had kept the best of any Baldwins he ever saw so late in the spring, and he took them without sorting over. He paid me \$3.50 for the fancy, No. 1 and No. 2. I sold some to John Blessed & Sons, and Mr. Blessed recommended the apples to Mr. Randle. Mr. Randle afterwards informed me the only fault he had with the fruit there was not enough of it; that the fruit sold itself, and it was a pleasure to handle it.

I have purchased and eaten all the different kinds of California grapes I could find in the California markets, and have never found a grape as good as a well grown Michigan Concord, Delaware or Catawba.

We must continually spray, cultivate, trim and nourish our fruit trees, carefully pick and honestly pack our fruit in a way so it will be attractive and pleasing to the eye, in order to compete with our competitors in the markets of the world as well as our own local markets. When this is done in an up-to-date manner Michigan apples, although they will not show color as fine as the Colorado, Idaho or other western grown fruit, from their superior quality will compete and sell with any fruit in the market or markets of its class in the world.

In the discussion which followed this interesting talk the question as to what constituted a fancy, No. 1 and No. 2 grade of fruit was the nucleus of a lively debate which showed that the foremost growers of the state differ widely thereon—a fact which argues for the necessity of a standard to which both buyers and sellers can have recourse in case of trouble in defining grades. It was the opinion of many who expressed themselves that at this very point much of the discredit our fruit has gained on the general market during the past few years has come because one grower will pack the best of his fruit as fancy which may only grade as No. 1 when placed beside that of a more careful grower, and all this he may do without a thought of dishonesty. It was the opinion of Mr. Gebhardt, of Oceana county, that the quality of Michigan fruit will recommend it to the general market if the grower will handle it well. Mr. Ward suggested that the regular practice of facing the packages with the choicest specimens be reversed and instead put the poorest there, while the best be placed in the center. Keep the fruit nearer to the grade above rather than trying to squeeze in fruits that are near or quite fitted to go in the grade below the one being packed. Finding superior fruits than those expected is

always sure to please the buyer, who is more than likely to make another call for the same fruit the following year and also tell his friends of his experience.

PLUMS AND CHERRIES.

This was the theme of a well received and highly interesting and valuable talk by Benton Gebhardt, of Oceana county, who has worked out a reputation not eclipsed by any fruit grower of the state. Beginning with plum growing, he pointed out that where one is operating upon light, well drained soil he will profit by grafting his plums upon peach roots, while the plum roots are better for heavy soil that is not so well drained. This fruit is particularly responsive to good culture and care. The trees should be trimmed from the beginning, using that means to partially regulate the amount of fruit that develops on the trees, as unpruned trees are sure to become irregular bearers. Where there is a heavy growth "heading in" should be practiced, and such pruning continued as will let in the sunlight and admit the spraying material to all parts of the trees. By proper attention to spraying the speaker believes that the curculio and the shot-hole fungus can be controlled. He had observed that the curculio troubles his plums worst on the trees located next to the peach orchard. When the trees begin bearing it is wise not to let them mature too large a crop as it is apt to cause the alternate year bearing habit as well as to encourage the production of inferior fruit. By judicious thinning, which means taking off the small fruits till they appear far too thin to the unexperienced, one is able to overcome the tendency toward alternate bearing and make annual production of crops the rule rather than the exception. The crop is picked, packed and graded much the same as peaches. It is the practice of the speaker to cover his best grades with tarlatan, which adds greatly to the appearance of the package. He advised his hearers not to plant too many of the earlier varieties as there is little demand for the fruit at that time of the year, since the city people are then away from home and do not buy in large quantities. It is also a poor time for the fruit to mature well. The Japanese kinds are subject to overbearing, and in his experience they have not been found profitable as compared with European varieties. The best season for ripening is from Sept. 10 to Oct. 10, when the prices are generally good and the quality is superior to that of the earlier varieties owing largely to the favorable weather that prevails. That the speaker has had success with his plums is witnessed by the fact that he has had only one failure in the past ten years.

Regarding cherry culture, Mr. Gebhardt stated that the business of growing sweet cherries has not been overdone. If one can grow one crop every three years he can make the investment profitable. It has been his observation that the larger varieties of sweet cherries of a firm texture are subject to cracking and rotting. Cultivation should be done as early in the season as it is possible to work the soil, but should not be continued late—say to the first of July. Good crops are often grown where the trees remain in sod. Less spraying is demanded by the sweet cherries than by the sour kinds. The pruning should be conducted much the same as for plums—it being the practice of the speaker to head in about one-half of the previous season's growth and to keep the top properly thinned to admit sunlight and spray. There is a splendid market for the sweet cherries. All who are able to produce them need not fear getting rid of them at profitable figures.

Regarding the sour cherries, Mr. Gebhardt stated that many growers made a mistake by picking the crop as soon as the berries began to color. This is sure to result in an inferior quality of fruit. Sometimes it requires two weeks before the fruits are fully matured after they have begun to take on color. It is not at all uncommon with cherry trees as with other fruit trees that a new top improves the quality of the fruit. Where the old limbs are removed and the trunk allowed to develop new tops exceptional changes are often noted in the resulting crops.

Mr. Gebhardt uses barnyard manure, ashes and commercial fertilizers containing a large amount of potash for his orchards. The bone meal is applied about every other year.

The leaves stayed on longest where the shot-hole fungus was troubling when spraying with the Bordeaux mixture was delayed till just before the leaves began falling off. This is contrary to the general belief regarding the treatment of this pest.

The discussion of this topic was led by Mr. J. H. Perry, of Oakland county, who is a very successful grower of plums and cherries as well as of other fruits. He stated that the growers on the eastern side of the state were having the best success with growing the plum upon its own root. A fungous disease causing foliage to turn yellow has been working in the orchards of Mr. Perry, and he has found that those trees sprayed with the lime and sulphur were not troubled while adjacent trees were badly affected. In his section the mid-season varieties were more profitable than the late or early ones. As to the

cultivation of the sweet cherries. Mr. Perry follows the clean method for about four seasons, using cover crops, when the ground is allowed to go to sod. The growth between the rows of trees is cut about twice each season thereafter and the material spread about the trees as a mulch. He does not prune heavy—only the dead limbs are removed after the fourth year. His product is marketed in quart packages and crates.

R. A. Smythe, of Berrien county, said that he had received the same result from the lime and sulphur wash as did Mr. Perry. He followed this with the Bordeaux mixture, and trees thus treated were not badly affected with the disease causing the yellow leaves. Mr. Trebbardt thinks the method of clipping the cherries and allowing them to fall upon a sheet below the tree where they are sorted by women and children is quite as rapid as the old plan of picking directly from the limbs into the basket. The Windsor and Napoleon have given Mr. Perry better satisfaction than any other of his 38 varieties of sweet cherries. He believed the excessive cracking of fruit was largely due to too liberal cultivation.

As to the query, "Would it be desirable for the Michigan fruit growers to establish an agency to divert foreign laborers to the farmers?" it was stated by Mr. Ward that he endeavored to secure Japanese and Chinese while in the west but the little difference in the wages paid there and here was not enough to make it worth while for the men to come. Secretary Bassett reported that Mr. Hale, of Connecticut, is now employing Italians with good success.

"To what extent is it advisable to store the apple crop on the farm?" Let the storage people have that work to do, was the opinion of Edward Hutchins, of Allegan county, who thought the work so exacting in the conditions demanded for the successful keeping of the crop that it called for the full attention of some man, or men, who was particularly prepared for the duty. Another grower was of the opinion that in a series of ten years the man who sold his apples in the fall would be ahead of the one who stored. A third testified that the cold storage paid. His cellar was small, but it permitted him to hold his crop until the price was right, or the very fact that he had a cellar was a good factor in moving the buyer to offer better figures for the apples in the field, since he knew that the grower could store if necessary. Many of the failures reported of fruit rotting in large commercial cold storages are due to the handling that the fruit had previous to the storing. The cellar of Chas. Wilde, of Kent county, was cited as a very successful one. The opinion seemed to prevail that where one is located near a good market he can afford to have a storage, but if his market is some distance it is better to get the fruit in a cold storage near where it is to be sold. The largest number of cellars described did the cooling by letting in cool air during the night and closing all doors and windows during the day time.

GENERAL CARE OF A COMMERCIAL APPLE ORCHARD.

(EDWARD HUTCHINS, FENNVILLE.)

The Michigan apple seems destined to again take its place of prominence in the markets in the near future—at least in point of quality if not quantity. The supply of apples in the principal markets of this country is reported as liberal, but on a recent visit to Chicago, very few Michigan apples were exposed for sale. Many New York apples were there and quite a supply from Missouri, but not so the Michigan fruit. This is probably due to the fact that only a comparatively small number of the Michigan orchards are cared for in a manner to produce apples of the finest quality such as the market now demands, and yet those who are giving the necessary attention to the production of first class apples are realizing good returns for their labor. And the probabilities are that in the very near future only the best grades of apples will be grown, not only in Michigan but in all parts of the country. The various insects and diseases that have thus far attacked the apple have made the production of good fruit difficult but have only lowered the grade and to an extent reduced the quantity. They have not put the negligent grower out of business. The probabilities now are, however, that the San Jose scale, which is rapidly spreading over the orchards of the State, will in a very few years destroy all of the orchards that are not properly cared for. For only the thoroughgoing fruit grower, who gives proper care to his orchards will provide the necessary conveniences for combatting the scale, and others will succumb. There is therefore a bright outlook for the enterprising apple grower who has the courage and confidence to incur the trouble and expense necessary

to grow good fruit. The proper care of a commercial apple orchard is then a live and pertinent subject.

The five fundamental principles of fruit growing all find a place of greater or less importance in handling a commercial apple orchard, viz.: Pruning, spraying, cultivating, fertilizing and thinning. In all of these only general suggestions may be given and much must be learned by experience.

In the work of pruning one may learn profitable lessons by observing the practices and methods of others. In riding through the country it will be noticed that in the older orchards the bearing wood has been trained away from the trunk and away from the earth. Many will be seen that require a ladder at least forty feet long in order to reach the fruit. The bearing branches are pruned to a small tuft on the outer end of long bare limbs, thus forcing the sap to traverse an extensive stretch of rough, dry bark before it can reach the fruit and growing surface. Other instances may be found where the farmers have perhaps improved on this error by neglecting the matter of pruning, with the result that the tops of the trees are more after the fashion of an elevated hedge. Neither class is expected to grow fruit of the best quality. Not the least objectionable feature of such orchards is the extreme difficulty of reaching all parts of the tops with the various spray mixtures. Now, there are a few rules that may be stated that should govern the work of pruning apple trees. Of course all dead or dying branches should be removed. Those that are crossing or chafing should be cut away to prevent this interference, also those growing towards the center of the tops. Water sprouts should be cut out except possibly one that may be trained to fill an unnecessarily large opening. Any branches that are growing more vigorously than the others should be headed back to preserve a symmetrical head. The lower branches may be pruned to suit the grower's convenience in cultivating. If one is provided with tools suitable for reaching under the tops they may be left quite low. The lower the better. In forming the tops while the trees are young care should be taken not to leave too many branches so that the cutting away of large limbs later may be avoided. Then, when the trees have reached a sufficient height the usual practice should be reversed and instead of cutting the wood out of the inside of the tops the cutting should be around the outside, and the trees should be headed back and the thinning out done then. The tops should be open enough and low enough so that all parts of the tree can be readily reached with the spray mixtures and so that the sun can reach every part of the tree at some time during the day. Very large openings should be avoided, however, prune moderately, especially if the trees are old. If pruning has been neglected don't try to do it all at once. Better take two or three years if necessary.

Probably no part of the work of orchard care is more important than spraying. These essentials must be observed, viz.: Timeliness, thoroughness and the proper mixtures. The man who makes spraying an incidental matter, a chore that may be done at most any time when other farm work is not pressing, is sure to make a failure. The work must be done at the proper time to be of much avail—and three or four days will often make a large difference in the results. If one has much orchards a power sprayer will be almost a necessity. In ten acres of large trees it will be found a paying investment. In any case avoid cheap pumps, and good hose, extension rods that do not leak and good nozzles are not less important. While the Vermorel nozzle is the one that is universally recommended and no doubt makes the most ideal spray of any on the market I find little use for them in spraying large apple trees for the reason that they do not carry the spray far enough. It is impossible to reach all parts of the tree with them unless they are carried on a very long rod or on a tower mounted on the spray wagon. It is exceedingly tiresome carrying a long rod and quite difficult getting the tower between the trees where the tops meet. We use a cluster of Vermorel nozzles in the smaller trees but for the large apple trees and with the power pumps we have found nothing that suits us quite so well as the Calla nozzle. With these a man standing on the ground with an eight foot extension rod can reach the top of a tree thirty feet high and with a very fair spray.

The directions for preparing the various spray mixtures are frequently published, or they may be procured from the State Experiment Station. If the San Jose scale is present the lime-sulphur wash should be applied about the time growth starts. If this is not required I like to give an early application of clear copper sulphate solution before any growth has taken place, using $2\frac{1}{2}$ pounds of the sulphate to 100 gallons of water. As the buds begin to show color and before the blossoms open an application of Bordeaux mixture should be made, adding an arsenite if canker worm or other chewing insect is feared. As soon as the petals have fallen another spraying should be given with the Bordeaux and arsenite. Two weeks later the trees should again be gone over, using this same mixture, and should rain wash either of these applications from the trees the sprayings should be repeated. About the first of August the trees should again be sprayed for the late hatched codling moth. For this purpose dis-perene or arsenate of lead is strongly recommended

instead of Paris green. With this work properly done the apple scab and codling moth may be quite thoroughly controlled.

The day has probably passed when apples can be profitably grown on a commercial scale without some attention to the conservation of moisture. If the orchard ground is needed for pasture more of this can be had by cutting down the trees, and perhaps the net profit from the ground will be as large. The method of cultivation will be governed by circumstances. If the orchard areas is not too large and straw can be procured at not too great cost a mulch of this will serve an excellent purpose both as a means of retaining the moisture in the soil and furnishing humus. But in most cases cultivation will be about the only feasible recourse. And there is no danger of commencing it too early in the season after the ground is in suitable condition to work. The production of fine apples requires as careful and thorough attention to cultivation as does that of the best corn. The ground should be stirred early and frequently, though shallow, until August. The grass mulch may serve a good purpose on a steep hill side or other place where cultivation is not practicable but it has not been successfully worked out on a general scale as a substitute for horse cultivation on ground where this is feasible.

And closely allied to the matter of cultivation is that of fertilization, for where this has proper attention the work of maintaining a suitable earth mulch is rendered much easier. But this is probably the most serious problem that the orchardist has to meet. I am convinced that the main demand of cultivated orchards is humus. Any soil that is constantly worked, as orchards are, and nothing added in the way of fertilizers soon loses the vegetable matter in it and satisfactory crops of any kind could not be expected from it. Suppose, for instance, that the attempt were made to grow corn on a piece of ground for a series of years. From no ordinary ground could a profitable crop be grown for very long. But after thus being improvised until it would no longer grow corn it may be put in to oats and seeded down. The oats may be taken off and still further impoverish the soil fertility, and yet if there is enough plant food to produce a sod this may be turned down and corn may be again grown on this ground without the addition of anything in the way of artificial fertilization. Such is the effect of vegetable matter in the soil in the production of crops. Similar results might be secured by the liberal use of green stable manure. But without this element of humus no crop could be grown with very much success even by the application of the various elements of plant food found in commercial fertilizers. This being the case with ordinary farm crops it is not reasonable to expect that orchard trees growing on soils where the humus has been wholly exhausted by a number of years of continuous cultivation will prove an exception to this rule. Where cultivation has been neglected and the orchard allowed to stand in sod the condition is not so serious, but where constant and thorough cultivation is practiced this condition exists and is more and more aggravated as the practice is continued. And if the old sod is broken up and the expectation is to keep up a system of thorough cultivation this condition must be anticipated. The advice is frequently given to apply stable manure to the orchard, and this is good for the orchard soil, but bad for the other ground which produced the crops from which this manure was made. Farmers who make a business of raising stock would not for a moment entertain the suggestion of selling any of their manure off from the farm. Neither stock men nor dairymen make any more manure than they want to put back on their land, and to take it off from that land and put it on the orchard is no better on the land that produced it than is selling it or removing it in any other way. It is evident, then, that dependence on the stable for fertilizer for the orchard is not a wise practice. At home we have to buy much of the feed that we use so we feel justified in putting the manure on the orchards but we keep too few animals to produce very much so that this supply does not go far. We have at different times experimented with commercial fertilizers but without visible results. Last season we only used a ton of a very fair grade of prepared fertilizer in various experiments but so far as we have been able to discover this far we are out just the cost of the material and the cost of applying it. We have used it with the hope of increasing the growth of the cover crop late in the season but could detect no difference between the fertilized and unfertilized ground in this respect. Some may contend that this is because there was plenty of plant food in the soil already, but I am inclined to attribute it to a lack of humus.

We may in part restore this element by the use of cover crops that shall entrap the leaves as they fall, and the deterioration will be less rapid if the work is commenced before humus exhaustion has advanced very far, as a much larger crop of this kind may be grown if the work is taken up early, and systematically carried on from the time the sod is first broken up. And the kind of crop we attempt to grow is important. Last summer I sowed my apple orchards to German millet just after the last good rain in August but a severe drouth succeeded and the seeding was a total failure. The ground was in fine condition to go through the drouth but the loss of the cover crop and the consequent loss

of the leaves was serious. I have thus far found the best success with oats. Next summer I think I shall try mixing rape with the oats.

Perhaps the suggestion that thinning the apples where the fruit has set too thickly can be profitably done will be received with some questioning. After quite a little experience I am convinced that it can be, however. I have found in different instances that from one-half to three-fourths of the apples may be taken off from some trees and yet the quantity of fruit be apparently as large as though none had been removed. Last season a large tree of yellow transparent apples set the fruit so thickly that the fruit was very small. Less than two barrels of fruit was culled out from among the other apples and the rest were left on the tree, they were so small. In fact those that were gathered were hardly large enough to be merchantable. In probably a half day a man would have taken off from three-fourths to seven eighths of the small apples at an expense of 75 cents, and if this had been done at the proper time the result would have been five or six barrels of good apples worth \$2.00 per barrel, or \$1.70 without the barrel. Seventy-five cents expended in thinning would have increased the returns from that tree over \$5.00. One who has practiced making two pickings of the early varieties of apples must have noticed what a remarkable growth the later ones have made after half of the crop has been removed at the first picking.

In counting the cost of thinning fruit men are prone to forget that the picking has to be done in any event if the fruit is harvested, and no more motions are required to pick apples and drop them on the ground than to place them in baskets. Wages are not so high at thinning time as they are at the season of gathering and it is quite probable that it will be found by careful experiment that the entire expense of thinning and gathering combined will be little if any more than that of gathering alone where thinning had been neglected in cases where it was needed. The difficulty is that help is frequently lacking when needed at thinning time.

In conclusion, if you have a good thrifty apple orchard it is worth taking care of. It is the most promising piece of ground on your farm.

The discussion was led by Mr. James Halstead, of Wayne county. The success Mr. Halstead has had in the production of apples made his talk particularly interesting to the audience. He contended that all the diseases put together did not destroy as many trees as excessive pruning. His method of shaping the tops is to permit the limbs to droop as they will and then as the lower limbs die for want of air and sunshine cut them out. Only dead brush and such watersprouts as do not fill up an otherwise open space, are removed. He argues that it is unnecessary to prune so that one can drive underneath trees. Where the limbs come so close to the ground the soil is shaded sufficiently to require no cultivation. This also brings the tops near the pruner, sprayer, and picker. Bordeaux mixture is compounded by using two pounds of lime to every pound of copper sulphate, and 100 gallons of water is mixed with each seven pounds of the copper sulphate. Mr. Halstead believes that excessive lime is beneficial. This opinion was concurred in by many others. He always tries to spray with the wind. His orchards have not been plowed in twenty years. Mulching is practiced. In new plantings corn is grown the first year, the second season the ground is seeded to clover and the soil about the trees is stirred four or five times with the hoe. As to varieties, it was suggested that the best way to get satisfactory results is to learn well the conditions to be met and select kinds to suit.

RENOVATING NEGLECTED APPLE ORCHARDS.

The first point made by L. R. Hunter, of Oakland county, who has had much experience in the production of apples, was that the owner should first decide whether it is worth while to try and renovate the old trees or not. Often the varieties are so poor in quality that the fruit would be worth but little if grown. Or the trees may be so far gone that care given would be wasted by not reviving in them enough life to grow fruit. The renovating should begin with pruning. This is quite essential as was illustrated by the speaker. An old orchard was sprayed four times one season before any pruning was done which gave no beneficial results. Two years later the spraying followed a moderate pruning and \$800 worth of apples were harvested. A space wide enough for the sprayer to pass should be cut clear between the rows of trees each way of the orchard. Restore the humus to the soil. This can be done with barnyard manure, mulch and cover crops if they will grow. Mr. Hunter believes in plowing the ground beneath the trees as it aids in destroying fungous diseases. Cultivating the soil is beneficial even if it cannot be done thoroughly on account of the roots. He argues with many others that the San Jose scale is a blessing to the fruit industry, for it will rid the trade of the product grown by careless men. The ordinary man is not likely to meet the conditions required to successfully combat the scale which will tend to limit the fruit business to those making a specialty of it.

E. P. Simmons, of Wayne county, opened the discussion. Mr. Simmons believes in

mulching. He has received good results from practicing it. If, however, mulching material cannot be had he would then cultivate. From other men who spoke throughout the meeting it seems that the growers on the west side of the State and those on the east side differ generally as to the value of cultivation as compared with mulching—the western men keeping the ground in the orchard clean in the spring and early summer, following with cover crop, while the eastern men lean toward sod culture. It should not be assumed from this that the eastern men are behind the times but that the conditions they have to meet appear to warrant what they do. Mr. Simmons impressed his hearer with the necessity of thorough spraying and favored light pruning annually to heavy cutting away of tops every three or four years.

In the general discussion following a rather humorous argument took place in which a grower stated that he did not mix his Paris green with the Bordeaux mixture as he thought it gave the spray a taste that was not to the liking of the millers (codling moth). Prof. Taft then said that the millers did not eat because they had no mouth parts but rather sucked up their food through a tube-like appendage. The grower then reported that if the miller, "which he was still after" sucked, he would surely get the liquid upon the limbs while they were in the moistened condition. Prof. Taft closed the debate by stating that the control of the scab and fungous diseases was more essential during the early part of the season than the spraying for the codling moth and therefore the Bordeaux should be given first consideration. It was also argued that if the Bordeaux was distasteful to the moth it would act as a repellent.

THE SAN JOSE AND OTHER LITTLE THINGS.

In his characteristic clear and logical manner, Prof. Taft, of the Agricultural College, dealt with this important subject. He asked all those who were able to identify the San Jose scale to raise their hands, whereupon about one-fourth of the audience responded. When asked, "Who have it in their orchards?" a very large majority of the right hands in the room were in the air. This, with the close attention given to Prof. Taft's talk, showed that the pest is the one great concern of the fruit growers of that section of the State. The scale attacks all kinds of fruit and a very large number of our ornamental plants. There seems to be some varieties that are more enjoyed than others by the little insects—for example, the sour cherry is not likely to be badly attacked although cases are known to the contrary.

On the fruit the scale may be seen as a red spot with a black dot in the center. There are similar black dots and red spots that are the result of a fungous disease. The scale can be told from the fungous by passing the thumb nail over the spot and if the black dot is easily removed it is the scale.

The oyster shell bark louse was next described so that it would not be mistaken for the San Jose scale. The shell of this louse is long and much larger than that of the scale. If the scale is crushed, oil exudes, which is not the case with the oyster shell. The scurfy scale is about eight or ten times as large as the San Jose scale.

In treating for the scale one should first prune away all parts of the tree that can be wisely removed and burn the prunings. Then if one is sure he can give the time when it is demanded, just before the blossoms begin to swell apply a spray of lime and sulphur wash. If time is pressing then it can be done earlier. The wash is made by using fifteen pounds of sulphur, 25 pounds of lime, to each 50 gallons of water. Place 20 gallons of water in a kettle or barrel, if steam is used for boiling, and heat near to the boiling point. Put in the lime (stone) and allow to slake when the sulphur which is made into a paste by the addition of a little water, is added and the mixture thoroughly stirred. The liquid is then boiled for about an hour, after which sufficient water is put in to make up the required 50 gallons. This water need not be warmed. If, however, one can secure warm water for this purpose he can cook a more concentrated solution and thereby manufacture a larger amount of the spray at one time.

Bordeaux need not be mixed with the lime and sulphur as it is a fungicide of merit. This saves the spraying with the Bordeaux just before blossoming time. The lime and sulphur cleans the trees of old bark. One should go over the trees and allow the spray to dry, after which all parts that are seen uncovered can be readily coated.

BEAUTIFYING THE HOME SURROUNDINGS.

Prof. L. R. Taft very kindly took up the discussion of the theme in a manner that was greatly enjoyed. After a short preliminary talk on the general consideration that should be given to the home surroundings, the speaker dwelt upon the importance of a good lawn and the care of the same. It is the background of the whole landscape and for this reason should receive the best attention. Often in the towns and cities it becomes necessary

to terrace the lawn next to the street so as to prevent washing away during storms. This arrangement makes it difficult to run the lawn mower well as it is essential to mow the grass often to get a good lawn and keep it so, the condition should have consideration and if convenient to overcome such a course would be wise. It was suggested that if the slope be extended more, terracing can often be done away with. In the opinion of Prof. Taft blue grass generally gives better satisfaction under ordinary circumstances than mixed grasses as the latter are quite apt to contain noxious seeds and grow unevenly. Prepare the ground thoroughly and clear it of all obstacles, stones, sticks, roots, etc. Do not allow the grass to become too large as in cutting the excessive growth will need to be removed, which will lessen the fertility of the lawn or if left to remain on the ground will smother the roots.

Where the front yard is small the shade tree should not be placed between the house and the road or street but should at least be as far back as the line of the house. Use hardy perennials for decorating. Allow the vines to run over the porch and its supports and the walls of the house. Border plants are used along the edges of the lawn. If it is desired to cut the lot off from a neighbor's or to cover the back yard from public view it can be accomplished with the border plants. Some of the plants mentioned were the hardy phlox, Japanese barberry, which was recommended for hedge plantings as it is beautiful healthful and free of insects, and hydrangia. This last plant makes a good shrub when allowed to grow unhampered, but if one desires to produce large flowers it is necessary to feed it well and head it heavily so as to force the food from the roots into a few vigorous shoots. One should avoid shrubs that are subject to attack by the San Jose scale. The hardy perennials require but little care.

In using bedding plants do not make the mistakes of so many in breaking up the lawn with flower beds. Place them along the borders where they will harmonize the house or shrubbery with the lawn and where the lawn mower will not be bothered by them. Prof. Taft closed his interesting address by recommending the use of window boxes, which are made attractive during their season and when not in use can be removed and put away out of sight.

The subject was thrown open for discussion, whereupon Mr. Graley, of Oakland county, described his lawn and flower garden and methods of caring for the same. His grounds are so planned that a great deal of the work can be done with a horse; for example, his flower garden is so situated that he can cultivate it when the garden crops are worked. Then, too, his plan of having a certain time of each week to care for this part of the farm is one that should be recommended to all who desire to get the best out of the plantings about the farm buildings. He does this work each Saturday afternoon.

DEAD LEAVES OR GROWING GRAIN.

(E. L. KEASEY, SOUTH HAVEN.)

This life is a lease that is given us mortals,
 To test us as tenants upon God's great farm.
 We move through our term—pass from portal to portal—
 And at death leave our records of worth or of harm.
 Yes, we pass down the furrows of Michigan's acres,
 Producing her harvests, and binding her sheaves,
 While others hang back; and as loafers or fakirs,
 Leave naught to the world but a bunch of dead leaves.

The fences and ditches along life's great highway
 Are choked with the waste from the wood and the field.
 And the dead leaves that flutter cross your way, and my way,
 Are teachers of nature; a lesson revealed.
 They are remnants of greatness—a past, robed in splendor.
 But, in death, idly tossed by each hurrying breeze;
 Yet, in passing us by, this thought they engender,
 That they once were a part of our beautiful trees.

Let's compare this grand thought to the slothful ones round us.
 To those men who're as dead as the leaves in their path.
 They are blocks to all progress—and often confound us—
 And are seldom remembered in life's aftermath.

Yet, they once played a part in some fond mother's yearnings.
 Were once a sweet babe on some fair mother's breast.
 They were leaves on life's tree; and the mother's discernings
 Seen hopes for the babe that she loved and caressed.

But, the weak germ of manhood had dwarfed in his growing.
 He *failed* as a power, and *jell* like the leaves.
 And today he stands idle; no life or light showing—
 While his farm and home stands as but tares among sheaves.
 These tumble down homesteads are poor advertisers.
 They blurr every landscape, and fetter all pride.
 And their owners, like leaves, if, in ground fertilizer,
 Would spell all their worth to our state fair and wide.

Our trees will soon wake to the voices of springtime;
 And the earth will grow mellow beneath the warm sun.
 The ice fettered streamlet will break from its moorings
 And hustle away on its long ocean run.
 So awake and be ready to start with the season.
 Arise with the lark; and past losses retrieve.
 For to falter in this is but one form of treason—
 Thus clogging life's stream with a bunch of dead leaves.

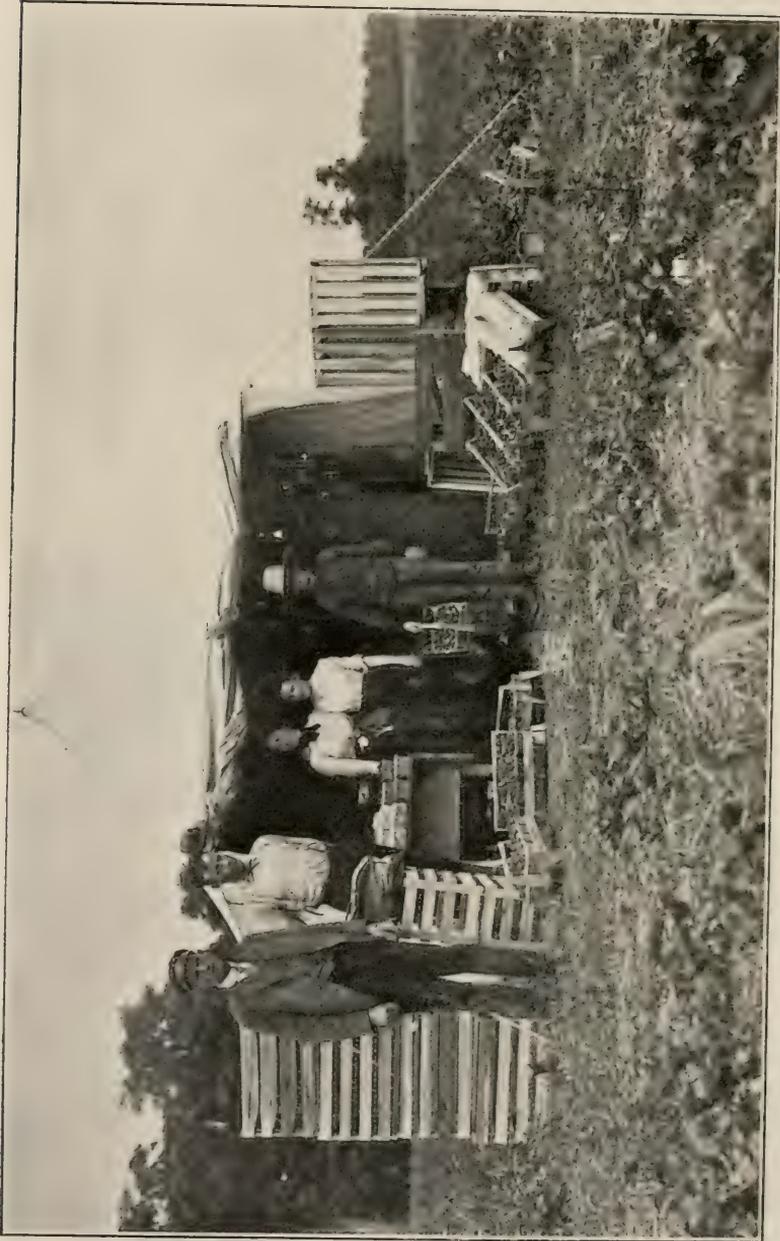
These are not idle words put in rhyme for your pleasure,
 But a true urgent plea from a farmer like you.
 I suffer life's hardships and cares without measure;
 And I know how you feel when you're down and look blue.
 Yet, I've found for these ailments a great panacea.
 And, before I apply it—I roll up my sleeves,
 And I fly into *work* with the single idea,
 That sunshine lurks somewhere among my dead leaves.

How oft; when I rise in the bright early mornings,
 And hark to the waking of nature's great world,
 How my heart leaps in rapture at earth's fair adorning—
 Its homes, from whose chimneys the smoke upward curled.
 And the welcoming birds from the branches above me,
 Inspires my days with their sweet glad refrain.
 Yes, I lose every thought of the dead leaves about me,
 And see but the fields with their rich growing grain.

There's joy in the thought that we're part of creation,
 And to *know* that we're first at the Giver's right hand.
 We fashion the food for the entire nation—
 Through the fruits from our orchards, and grains from our land.
 Aye, it seems that *this* fact would arouse every being
 To strive for the highest there is in success.
 It seems that 'twould coax every soul into seeing—
 The intrinsic worth of the realm we possess.

From the loftiest throne, or the kings gilded palace—
 From the capitol's dome to the laborer's cot,
 Comes the voices of millions who sip from our chalice
 Or feed from the stores that our labors have brought.
 We are *kings under bondage!* Yet, we stay the world's hunger!
 And the deep laden ship—and the long winding train—
 Would rot at their moorings or rust as waste plunder
 Should the farmer cease raising his fruit, stock, and grain.

Could I say the one word that would start into action,
 The hearts of discouraged ones here in this room—
 Could this poem contain the one central attraction;
 Of brushing the shadows from some body's gloom—
 Could I roll back the curtain that shuts out the sunlight;
 And place in each path but a single sweet rose—
 I'd return to my home a keen satisfaction
 In doing my mite toward the weary's repose.



Packing Tent of President C. B. Cook, Owosso
Quart baskets of fancy strawberries are wrapped in paraffin paper



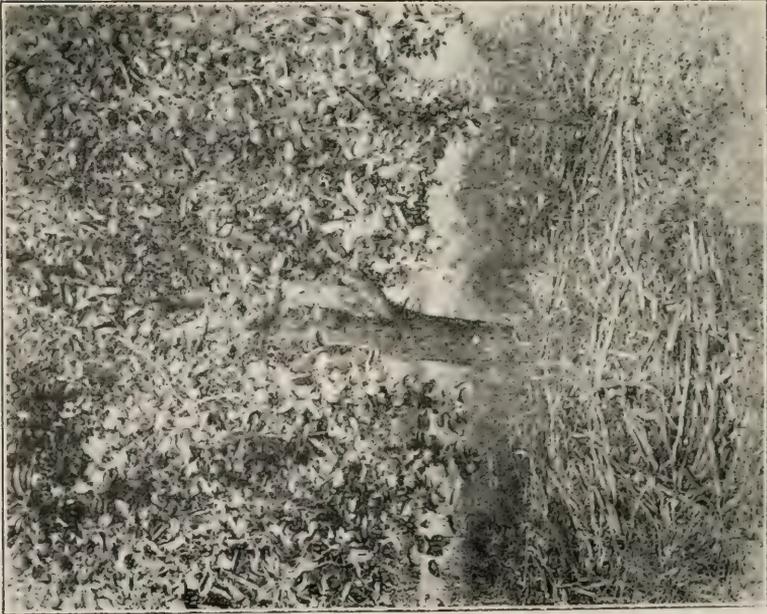
A Prolific Delaware Vine in the Munson Vineyards



"Vinecroft" Vineyards of W. K. Munson, Grand Rapids



Pringle Damson Plum, An Oceana County Seedling



Sad Mulch Orchard of J. H. Perry, of Goodison, Oakland County



Fancy Strawberries Grown By Chas. B. Welch, Douglas



An Ideal Low Headed Peach Tree in Orchard of Chas. B. Welch, Douglas



We are only beginning to realize the horticultural possibilities of the Northern Peninsula of Michigan. The sales of fruit from this 20 acre lot exceeded \$8,000 during the past season. Two years ago Mr. Nehmer sold over \$2,600 from seven acres of strawberries

I want the vast ranks of our great rural nation,
 To awake to the power that lies in our hands,
 We are no longer serfs! Let us rise in our station—
 And stand for the dignity due our broad lands.
 I want the farm home to be wreathed in the beauty
 That's told through the notes of dame Nature's refrain.
 And I want every farmer to feel it his duty
 To cradle his swath down through Life's golden grain.

That cold chisled marble that stands as a heading,
 To mark the lone grave of the mortal below,—
 Is a mighty poor tribute—and a cheap sleazy spreading,
 To fling o'er a life that has shed its last glow;
 But, to him who has lived with an eye to earth's beauties—
 And has studded Life's pathway with flowers and trees,
 He has builded his monument out of his duties
 And they whisper his requiem, when touched by the breeze.

'Tis the home with its trees; its lawn and its flowers;
 That stand as an index to those neath its roof,
 'Tis the clean tasty farm with its cool shady bowers
 That builds up its owner—and writes out his proof—
 And the same thing holds true with the man void of spirit.
 He's a *slip* in life's cogs—and a blurr on God's plans!
 His home's a disgrace; and we see—as we near it—
 But a bunch of dead leaves that is left on our hands.

I've a picture to hang 'fore your eyes before parting—
 'Tis a lawn, checked by sun spots that sifts through green trees.
 There are children at play; their long journey—just starting—
 Life's sunbeams—midst flowers—all tossed by the breeze.
 There's a cottage—not grand—yet, its home like surroundings
 Are welding gold links in the child's memory chain—
 And, when time sets her brake—and the footsteps cease bounding,
 Green paths will lead back to sweet childhood's refrain.

Friends, what's *your* life mission; wasted effort, or sheaves?
 Is it rich growing grain, or a drift of dead leaves?

SECOND DAY.

The first session of the second day was opened with invocation by Rev. Collins, of the local M. E. church, who also favored the audience with a few well chosen words touching upon the relation of horticultural work of the state and community to the work in which he was interested—holding that such an occupation tends to develop the saner element in man more than those vocations that keep men away from nature.

As the local growers and those from different sections of the State were vitally interested in the San Jose scale the discussion of the afternoon previous was continued. Regarding the advisability of mixing Bordeaux with the lime and sulphur wash, Prof. Taft urged that such a combination was unnecessary as the lime and sulphur was a very efficient fungicide and accomplished every purpose of the Bordeaux mixture. It is therefore a waste of time and expense to combine these two materials. The professor then drew attention to the importance of using iron apparatus for handling the lime and sulphur as brass and copper is easily corroded by the mixture.

What varieties of apples, if any, are least subject to the San Jose scale? To this Prof. Taft responded that kinds with slender firm wood are generally less liable to be affected than those having soft wood. The Northern Spy was mentioned as one not much troubled by the scale. The Keiffer pear is also avoided by the insect as it often is by man.

As to the standard of quality to be considered in the planting of commercial apple orchards, it seems to be the general opinion that the future market is going to demand a fruit that has the quality. While at the present time color, fine appearance and size seem to be the leading factors in the trade, yet it is gradually coming to be observed that

the consumer is getting wise, is less often tempted by the color, and "wants to be shown." However, the varieties that combine these attractive features with a desirable flavor and keeping quality are sure to secure first place on the future market. Some of the varieties named during the discussion were Steels Red, Wagener, Northern Spy, Hubbardston, Shiawassee Beauty, Grimes Golden and Winter Banana.

ESSENTIALS FOR FRUIT GROWING.

"The first thing to be considered in determining whether to take up the fruit business is the man himself," was the opening thought of an able address by Mr. T. A. Farrand, of Eaton county, upon the above subject. And in making this determination the man's love for fruit is the most important part of his fitness. He will also need to be persistent, for the many trials and disappointments that are in the path of the successful fruit grower will certainly overcome a faint-hearted man. Good judgment is of the same advantage here as it is in all businesses. The party contemplating pursuing this work should be so situated that he can be on the ground and he should have capital to perform duties on the moment when they will do most good for a delay often defeats the purpose of the work. After satisfying one's self that he is the right kind of a man to perform horticultural pursuits he should proceed to find out what fruit is particularly adapted to the conditions at hand. If some kind is fitted that is not to the liking of the person then he would wisely change to a place where his choice can be grown to the best advantage, or not attempt at all if he desires to succeed commercially. Besides studying conditions for selecting the kind and varieties of fruit the grower should make it a part of his duties to get acquainted with the insects and diseases that he is to combat, get in touch with the successful producers in his locality and State, build up a horticultural library, keep before himself current horticultural literature, and in fact bring everything that will make him a master of the situation to focus upon the business.

IN AND AROUND THE HOME.

In dealing with this theme Mrs. S. C. Taylor, of Oakland county, defined the relation of farm homes to the country, emphasizing the point that the country citizens are the "stay of the land." The people of the cities are speculative and would blindly lead us on to no one knows where, were it not for the conservatism of the rural folk. But to keep ourselves as "the salt of the land" it is important that our rural homes be protected from the evil that is rampant in our towns and cities, for the close intercourse brought about by the rapid means of communication is certain to acquaint our country youth with the evil as well as the good of the centers of population. We must, therefore, see to it that our homes are made strong against invasion by filling them with the purest manhood and womanhood that education, culture, and devotion to the highest things in life can make, which will resist the temptation to do wrong and permit the building of a citizenship that will outdo the craftiness of evil. She closed her most excellent paper with the thought that such work as fruit growing makes men and women more capable of uplifting society because of the independent and healthful life it tends to promote.

PEACHES FOR PROFIT.

(ROBERT A. SMYTHE, BENTON HARBOR).

When the subject "Peaches for profit" was first assigned to me, I must confess I was at a loss to know what view of the subject to take; but as no other paper to be read before this meeting was devoted to the peach, I decided to present as much matter as possible on the subject in the time allowed me.

We will first consider peaches from a commercial standpoint, since information in this line is as necessary to a successful peach grower as to a man in any other occupation.

I consider peaches to be one of the most profitable fruit crops grown, even in the face of the recent October freeze, San Jose scale, Yellow and Little Peach; and I further believe that peaches will pay better in the next ten years than they have in the ten years just past; I am not attempting to tell you any short road to success, or any quick-get-rich scheme.

No doubt you have all read enough in the recent magazines and periodicals of the short road to riches through poultry raising, squabs, mushrooms, etc.; but strange to say these wonderful successes lie beyond our ken. I smile to myself when I know of people going into poultry raising, counting on what this or that old hen will do in the way of egg pro-

duction—what young “fries” will bring in the early season, etc. The saying, “Don’t count your chickens before they are hatched” must have had its origin with some learned chicken fancier; but putting aside all jesting, no doubt there *is* money in the chicken business if one understands how to mine the gold.

I once heard our worthy president say, “that he believed a man to be successful with chickens should be half hen,” and perhaps this may account for the success many women have along this line.

Now I am not at all certain *what* a man should be made of to be successful with peaches—surely not half tree—and still when one sees some men growing (or not growing) peach trees, one is sorely tempted to call them *sticks*.

Many of the failures made in peach growing might be traced to stupidity; please do not imagine that I am posing as a model peach grower, as I must too confess to having done many stupid things. However I am not here to tell you of my failures, or those of any other person, but that peach raising is a profitable business.

Since I am to talk on the profit in peaches, I will give you as definite information on the subject as I have been able to secure.

A gentleman who gave me the following figures is not, strictly speaking, in a peach locality; still as the result shows he has succeeded in making money and we must concede that his location is not bad.

He had 50 acres in peaches that were 12 years old. From the 50 acres he took during that period 38,000 bushels of good, bad and indifferent peaches that sold for enough money to pay all expenses, taxes on the land, six per cent interest on the valuation of \$100.00 per acre and allowed him a salary; leaving him besides all this 33 cents net per bushel. Thirty-eight thousand bushels at 33 cents per bushel gave him a profit of \$12,540 or \$250.80 per acre for the 12 years; or \$20.90 per acre per year—which is 20 per cent on \$100.00.

Do you know of any legitimate business that a man can engage in for a term of 12 years, in which he can make more money? The gentleman who gave me the above figures said the trees bore only five crops in the 12 years; a tree doesn’t bear fruit until it is five years old, and if it lives until it is 15 years old it will hardly bear oftener than each alternate year, making six crops in 15 years; we cannot figure on trees living to be 15 years old, still many live 20 years and many die before eight seasons have passed over their heads so that the average is about 12 years.

I am indebted to Prof. Fletcher for the following figures, which were compiled by Mr. T. A. Farrand giving the probable cost of an acre of trees from the time the trees were set, through a period of ten years.

Cost of production.

First Year.

One acre land at \$100.00 per acre with interest at 6 per cent....	\$6 00	
Fitting land.....	3 00	
104 trees at 7 cents (20 feet apart).....	7 28	
Setting trees.....	3 00	
Harrowing 5 times, allowing one hour with team for each time..	1 50	
1½ bushel oats, 45 cents, cover crop.....	45	
	\$21 23	

Second Year.

To interest on land.....	\$6 00	
To spraying trees.....	1 50	
To pruning trees.....	1 50	
To ploughing orchard and harrowing five times.....	4 50	
To putting in cover crop.....	75	
	14 25	

Third Year.

To interest on land.....	\$6 00	
To spraying trees.....	3 00	
To pruning trees.....	3 00	
To ploughing and cultivation.....	4 50	
To putting in cover crop.....	75	
	17 25	

Fourth Year.

To interest on land.....	\$6 00	
To spraying trees.....	4 50	
To pruning trees.....	4 50	
To plowing and cultivating.....	4 50	
To putting in cover crop.....	75	
To 50 bushels wood ashes at 5 cents per bushel.....	2 50	
		\$22 75

Fifth Year.

To all expenses.....	28 00	
Total for five years.....	\$103 48	
I estimate that for the next five years the cost will be \$40.00 per acre per year or.	\$200 00	
First five years expenses.....	103 48	
Total expenses on one acre for ten years.....	\$303 48	
The average yield per tree for ten years would be some where around 10 bushels with 104 trees an acre, bushels.....	1,040	
Cost of production \$303.50 ÷ 1,040 bushels equals per bushel.....	\$0 29	
Bushel baskets at 12 cents.....	12	
		\$0 41
Packing and marketing.....	04	
Total.....	\$0 45	

The additional cost of fertilizing would bring it 50 cents total.

While the above cost of production is higher than many growers would figure it; however it is the actual cost of putting first class fruit upon the market which should leave a net of from 60 to 75 cents per bushel or a net of from \$60.00 to \$75.00 per acre per year.

Prof. Fletcher also gave me the following prices on the cost of *production*, which were obtained from different sources: Prices are for fruit in package at orchard and include the average cost of the life of the orchard.

Mr. Benton Gebhardt, Hart, Mich., 45 to 60 cents per bushel.

T. C. Wilson, Hannibal, Missouri, 30 cents per bushel.

W. M. Pratt, Benton Harbor, Mich., 40 cents per bushel.

T. A. Farrand, Eaton Rapids, Mich., 50 cents per bushel.

L. A. Goodman, Kansas City, Missouri, 30 cents per bushel.

In questioning many different growers, I find that the majority would be satisfied with 50 cents net, even on land worth \$200.00 per acre.

The outlook for the peach business was never better to the man who is in position to wait a few years and possesses the other requirements as well, i. e.—location and soil.

Location is the first point to consider; all other things being favorable, a bad location means certain failure; an ideal location for peach trees is a high, rolling elevation where the very best air drainage is obtainable; and if the land slopes toward the northwest, so much the better; never set peach trees in a hollow, because they are very liable to late frost, and the fruit does not color up as well as on trees having a high location; also if the weather should be rainy and muggy about ripening season, the peaches will rot very quickly; early varieties seem much more susceptible to rot, than later varieties.

The next point to consider, is *soil*. This is a great factor in profitable peach growing; the best soil is a warm, sandy, loam type, the soil on which oak trees have previously grown seems to be the ideal peach soil; it is a mistake to plant peach trees in soil containing too large a per cent of nitrogen; the trees grow vigorously, but rarely yield enough fruit to more than pay the expense of production.

Growers from different parts of the State have told me that peaches cannot be profitably grown on *new land*; but after the land has been farmed a few years, trees can be again set, and will prove most profitable; this fact is no doubt due to a superabundance of nitrogen in the soil, and might not apply to any other kind of fruit trees.

Now that location and soil have been disposed of, the next consideration is the *tree* to be planted; get the very best tree you can buy, as much depends on the vitality of the tree. I prefer small trees, having none of the fibrous roots removed, as they start quicker

and make better trees than larger ones with a few large roots which may have been broken or injured in being dug out of the nursery, as is so often the case with large trees; such trees are not in a condition to grow and prove profitable, as the root system is not adequate to support the top.

I would prefer a nice straight tree, be it ever so small, with none of the buds removed, so it can be started to branch whenever one wishes, to a large tree with the fibrous roots destroyed, and the buds all trimmed off up to the few branches left to form the top of the tree.

I like the branches started low, not more than 18 inches from the ground; in other words, a low branched tree; the expression "low headed" tree, I consider a misnomer, as the top and not the trunk of a tree, is the head, and a low headed tree, is one that has been kept low by frequent prunings; the combination of the two is desirable, without too much of the head being cut off.

I hear you say, "how shall we cultivate these low trees?" Until the trees are three or four years old they can be plowed, harrowed and cultivated without much trouble; after that it is not so easy; but with a disc harrow having an extension, you can get as close to the tree as necessary, using an ordinary harrow for smoothing the ground; keep the soil as level as possible in your orchard.

If you grow a "cover crop" and you must if you expect the trees to live their allotted term of years, you may find difficulty in turning the "cover crop" under *close* to the tree but you can devise some plan for doing this. I am a great advocate of a "cover crop" to retain fertility in the soil; we cannot afford much expensive fertilizer, but most grow green crops to turn under; the land cannot be so exhausted but that with proper growing of green crops its original fertility can almost be restored; for this purpose, I like winter or sand vetch, as it makes the best crop I can raise on a light, sandy soil, and will do equally as well on heavier land; I have tried the different clovers, but find them difficult to grow; sometimes they germinate, but if the season chances to be dry they kill out, whereas the vetch will lie in the ground until sufficient moisture comes to start it; since the seed is about the size of a sweet-pea seed and very hard, there is not much danger of sowing it too deep; it makes quite a start in the fall and in the spring following makes a splendid growth, and gives a great quantity of humus to plow under; as vetch is one of the legumes its roots are covered with the little nodules the same as clover.

Usually cultivation in the orchard ceases early in July, and vetch is planted as soon after as conditions will allow; as there has been a rainy spell in July for several seasons past, it is wise to choose this time, thus following the advice of some of the old seed-catalogues that tell us to "sow just before a damp spell."

The starting of young peach trees in the same soil from which old ones have been removed, has often been discussed in these meetings. I know of nothing better to add on this subject than to give you an account of my own success after several failures.

Last spring after the field had been staked out, and the holes dug large and deep, some good, fresh, virgin soil was hauled from a piece of timber land and about a bushel of it was put at every hole; the trees were set right in the new soil; they started in a very short time and made a splendid growth. These trees were set in a field that had been planted to vetch the previous fall, so after the trees started and the vetch was large enough it was plowed under; the weeds were kept down with frequent harrowing, until it was again time for the sowing of vetch, which in turn will be turned under; it is my belief that the trees will develop finely if the application of vetch is continued, even though the soil is of the lightest sandy texture.

As to profitable varieties of trees; this is always a perplexing proposition and one is naturally prejudiced in favor of the varieties that he himself has successfully grown. No white peach would find a place on my farm, unless the Lewis Seedling be excepted, it is the best of its kind, but the *kind* is not of the best; this peach might do for a local market, but if it must compete with the southern yellow peaches which flood the market at the same season, it is not profitable.

The first *yellow* peach to ripen in our vicinity, is the St. John; but as it is a very shy bearer, it should not be set in large numbers.

Just following comes the Engels Mammoth; to me this is the finest peach grown; a perfect fruit in every respect, except being a little tender for shipping; but if picked at just the right time, it will stand up well; it bears very regularly and you are certain of having Engels if you have a peach on the farm.

Following next in order comes the Kalamazoo and Fitzgerald; the former has proven very satisfactory with some of my acquaintances, but personally I do not know enough about it to recommend or condemn it; the Fitzgerald has not been satisfactory and I will not reset it.

Very closely following these comes the peach that appears to be the breadwinner wherever it grows well, and it seems to be well adapted to many localities and conditions. No

doubt you are all familiar with the Elberta and it needs no recommendation from me; it is what the peach buying public prefers and willingly pays a good price for.

A number of good varieties follow the Elberta; where the Gold Drop is well grown and the trees very closely thinned, there is nothing better; and this is the peach the housewife dotes on for canning purposes.

Following the Gold Drop is the Lemon Free, a very excellent quality, but not largely grown; the Smock, which comes next, is one of the best of all late peaches and always proves profitable, coming as it does after the main peach crop is harvested; it bears well, but the tree is very brittle, so must not be allowed to carry too heavy a load, as it will break badly.

The latest variety of value is the Salway; it will hardly ripen before the first or middle of October, but where it is possible for it to ripen the peach is sure to be fine and the price likewise.

This is no large list, as you see; I do not believe in growing a great number of varieties, but just enough and of the *right* varieties to have peaches for shipping throughout the season.

The peach business is such an elaborate one that I might talk on indefinitely; I have said nothing in regard to spraying, pruning, thinning, packing and marketing and shall not, for if you grow peaches, these are all points on which you must work out your own salvation.

At the present time there is so much good literature by practical authorities on all these subjects, that a man has no excuse for not being well posted; the Department of Agriculture at Washington, and our own State department are ever ready to give aid, and a postal card requesting a bulletin on almost any subject connected with the farm, will bring you the best practical advice you can have.

Let me say in closing, the cost of raising peaches or anything else for profit is "eternal vigilance."

DISCUSSION.—Mr. Farrand stated that it would likely be best to prune and cultivate less on the east than on the west side of the State. Some varieties need more pruning than others, as for example the Engles Mammoth, Elberta, Crosby and Gold Drop. From the discussion it was evident that the two sections of the State differ in the varieties demanded by the conditions. One should acquaint himself with the kinds that are doing best in his immediate locality when determining what to buy.

BEES WITH THE ORCHARD AND THE GARDEN.

Because flowers are a common factor in the business of the fruit man and the apiarist it is important that the horticulturist consider the keeping of bees, was the first point of a very entertaining paper by E. M. Hunt, of Wayne county. He described a swarm of bees, how they organize their work, the life history of the workers, etc. Pollen, he said, is the ideal food for the young insects which while being gathered by the bees as they go about securing it and the nectar is also transmitted to the stigmatic surface of other flowers than the one on which it was produced—resulting in the development of superior fruit to that grown from cross fertilization in greenhouses. This busy worker has been charged with doing harm to grapes; but the truth is not fully known as it is contended by many that they only gather the juices after the fruit has been injured. Spraying during full bloom of the trees harms the bees and should be avoided. Bees are the fruit growers' insurance. They should be kept for the fruit's sake alone if not for the profit secured from the honey.

BENEFITS OF COOPERATION.

David Gage, of Oakland county, was the happy choice of the committee for presenting this subject. He pointed out how important it was to work together wherever there is a great work to be done. He cited the great struggle between the north and the south as an example of cooperation toward one end. It is needed in our home, church and schools. A man that goes into the fruit business should not forget to take his wife into partnership with him—let her understand what you are striving to do, permit her to consider the details with you and then when the profits come allow her a reasonable portion of the harvest. In communities there should be an effort to acquaint one another with the condition of the crop so that each will be in a position to talk with buyers when they come to contract for the fruit. If the men of the north had been selfish during the civil war they could have stayed at home and gained for themselves considerable wealth; but many men of such minds would have made a failure of the great cause for which Lincoln and his advisers were striving. A failure in the larger work would have made property insecure; thus bringing upon the selfish man punishment for his narrow-mindedness. So with the

fruit man; if he is selfish he is more than likely to bring failure upon his own business should he try to outdo his neighbor by having nothing in common with him. We desire that broad liberal loyalty that is always sure of victory in the end. Our government is a cooperative one and its spirit should also be found in our business.

BLOSSOMS AND FRUIT.

(KITTIE C. MCCOY, WALLED LAKE.)

It is generally conceded that with the approach of the new year comes the time for new plans and new resolutions, but after all there are better plans and more earnest resolutions made with the coming of spring.

As when the softly stepping dawn
Brings gladness when the night is gone;
Shakes out her sun-kissed robes of light,
And puts the shadows all to flight,
So spring draws near.

From winter's hands so icy cold
She plucks the treasures which they hold;
With gentle touch, yet firm withal,
Thrusts back the gloom of winter's pall
And gives us cheer.

As one by one the leaves unfold and the swelling buds open into the full beauty of the perfect blossom, hopes which may have slumbered, or may have been buried beneath the cares and perplexities of life, spring into new being and whisper of the fulfillment of the promises which the buds and blossoms contain.

There is so much in the spring tide which is suggestive of new life, so much in the re-adornment of our beautiful earth that awakens ambition and inspires effort in every true lover of nature. Emerson says that "the lover of nature is he whose inward and outward senses are perfectly adjusted to each other, who has retained the spirit of infancy even into the era of manhood."

The woods, the rocks, the hills, the plains each have a charm of their own, but there is an indescribable fascination in the beauty and fragrance of the flowers, for be the blossom ever so frail and delicate, and ever so ready to give its petals to the passing breeze, still it holds the promise of further blessing in the fruitage of bye and bye.

There is in every heart a love and admiration, more or less strong, for nature in its primal state. The hidden possibilities of garden, field and wood should appeal to every one, and there is surely something defective in the makeup of that individual who sees no beauty in the flowers, no grandeur in the rocks and hills, no charm in the silence and solitude of the woods.

The flowers are nature's *lingerie*, whose bright hues lend touches of color to her robe of green and whose perfumes gives sweetness to the breath of the winds. The fruits are nature's jewels which gleam with the dew-diamonds upon her bosom with a value untold.

It should be considered a wonderful privilege to be allowed to plant the vine, the bush, the tree whose bloom may charm the eye and whose fruit may refresh as nothing else can. Many a favorite fruit tree was planted by ancestral hands and the custom of tree planting should be established by law if sentiment is wanting.

Oliver Wendell Holmes gave expression to this beautiful sentiment, "When we plant a tree we are doing what we can to make our planet a more wholesome and happier dwelling place for those who come after us if not for ourselves," and this should be taught to every boy and girl on the farm and they should be encouraged to put the thought in practice.

A man who was feeble and bent and old,
Delved by the wayside one bright spring day.
Trembling, he scarce could his shovel hold,
Yet patiently ever he toiled away.
A child, light hearted and blithe and gay,
Untouched as yet by the hand of care,
Came merrily singing along the way
And wondered, seeing the toiler there.

"Oh what are you doing, old man?" he cried
 "And why do you dig in the earth so deep?"
 "I am planting a tree," the man replied,
 "I fashion a place which its life will keep."
 "And what is the tree which you plant, old man?"
 "And why is it put by the wayside here?"
 "'Tis an apple tree, as I plant I plan
 It may some weary traveller cheer."

"Ha! Ha!" and the child laughed merrier yet,
 "Ere it blossoms once you'll be dead and gone."
 "Ah yes," he answered, "life's sun will set,
 But life's good deeds will live on and on.
 I may not know when it blossoms fair;
 Its ripened fruit I may never see;
 And others its bloom and its fruit may share
 With never a kindly thought of me.

"There may be those who will turn aside
 In its cooling shade for a while to rest.
 They will never know how my strength was tried
 As over its roots the damp earth I pressed.
 I am old I know, and feeble and bent,
 In life's great triumphs I may not be.
 But I plant this tree and am quite content
 It is something done for posterity."

Has the fruit tree any special value? In the Mosaic law there is a paragraph expressly forbidding the cutting down of a fruit tree to employ it in the siege of a city, "for the tree of the field is man's life." "Only the trees which thou knowest that they be not trees for meat, thou shalt destroy and cut them down and thou shalt build bulwarks against the city that maketh war with thee."—And God was the law maker.

There are many things in life typical of the tree, the blossom, the fruit, and perhaps none more so than are to be found within the home. In the home nursery, under the direction of the heavenly gardener, the wise horticulturist, the creator of beautiful ideals, may be developed the human trees which will bless the dwellers of earth with a bloom and fruitage beyond compare.

In the home nursery
 "Thoughts are the roots
 Words are the blossoms
 Deeds are the fruits."

Thoughts are the roots, and as many times the growth of a transplanted tree is the better secured if some of the home soil is left on its roots, so the influences and impressions of home left on the thought roots of the human tree will insure a better development when it is planted in a new place.

Deep in the heart there are hidden
 Motives which rule and control,
 Giving new life as they govern
 These are the roots of the soul.
 Nearer the surface, scarce covered,
 Impulses many we find,
 Swiftly inciting to action,
 These are the fibres of mind.

Words are the blossoms, how many trees bear beautiful blossoms whose fruitage is imperfect and undesirable. So too, we find many human trees whose fruit-bloom seems complete and charming, but only words, words, words, tending to a fruition of failure and disappointment, but

Out of the hearts great abundance
 Cometh the words which we speak;
 Words which should waken ambition,
 Words which should never be weak;
 Words which should ever be forceful
 Power and fruitage to find;
 Crowning our lives with their beauty;
 These are the blossoms of mind.

Deeds are the fruits, the achievements resulting from proper planting, careful training and judicious pruning, with sometimes the grafting of a better variety, for the human tree is ever susceptible to the pure and good in others.

More than the root and the blossom,
 More than the thought and the speech,
 There is a wonderful fruitage
 Souls that are noble may reach.
 Deeds are the fruits, earnest doing
 Seeking the truth, not renown,
 Wins for the soul a fair garland
 Better than king's jewelled crown.

Ah, in the home nursery are possibilities greater than can be measured, for not only does the training, the pruning, the grafting, the development of the young trees reach out through the earth-life with promise and blessing, but also stretches out through the vastness of an eternity which is beyond all human comprehension.

SMALL FRUITS ON THE FARM.

The last number on the program was an interesting discussion of the above by Mr. A. J. Crosby, of Oakland county. Small fruits should be in every farm garden and are worthy to be given the same regular consideration that is furnished the corn crop. The table can be more economically provided, besides the health of the family better insured and the pleasure of living much increased with the fresh fruit direct from nature. Farmers often neglect the small fruit because they think the products can be purchased easier and cheaper than they can be grown; but where it is thus left the universal result is that the family goes without and eats salt pork and beans instead. We should not become discouraged because enemies exist in the form of insects and fungi, for they do not as a general rule trouble the small patch in the general farming district as much as large areas in fruit growing sections. Go at the work systematically, have a regular time for the work and do not leave it to the children alone but all work together to make this the best spot on the farm.

SOUTH HAVEN AND CASCO POMOLOGICAL SOCIETY.

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PROGRAM FOR 1908.

- January 7th. "Making the Most of Difficulties," James Hosking.
 January 15th. Annual Dinner. "Some Farming Experience of Two City Women,"
 Isabel McIsaac, Benton Harbor.
 January 21st. "Commercial Grape Growing," Wm. K. Munson, Grand Rapids.
 January 28th. "Peaches," C. C. Chesebro.
 February 4th. "Growing Vegetables for Canning Factories," E. A. Hartman. An
 Experience meeting.
 February 11th. "The Helpful Hen," H. F. Douseman and James L. Bonar.
 February 18th. "Apples," Edward Hutchins, Fennville.
 February 25th. "Good Roads," Wilson A. Smith.
 March 3rd. "Pears," B. G. Green.
 March 10th. "Forage Crops for the Fruit Grower and their Management and Care,"
 C. D. Smith, Agricultural College.

BERRIEN COUNTY HORTICULTURAL SOCIETY.

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| E. B. Jewett, Benton Harbor. | C. H. Brace, Benton Harbor. |
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| C. A. Pratt, Benton Harbor. | R. C. Thayer, Benton Harbor. |
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| Merwin & Farmer, Benton Harbor. | Geo. Dryer, Benton Harbor. |
| Harry L. Bird, Benton Harbor. | Tim O'Brien, Benton Harbor. |
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| J. H. Watson, Benton Harbor. | W. W. Bean, Benton Harbor. |
| E. L. Hall, St. Joseph. | Aug. Schneider, Benton Harbor. |
| John Mess, Benton Harbor. | J. G. Wright, Benton Harbor. |
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| B. Bartram, Benton Harbor. | I. McIsaac, Benton Harbor. |
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| L. M. Clove, Benton Harbor. | P. M. Mueller, Benton Harbor. |
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| F. L. Ashman, Benton Harbor. | C. H. Godfrey, Benton Harbor. |
| Henry Pump, Benton Harbor. | |

GRAND RIVER VALLEY HORTICULTURAL SOCIETY.

(Organized in 1874).

OFFICERS FOR 1908.

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Mrs. M. E. Campbell,	-	-	-	-	-	-	Vice-President.
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EXECUTIVE BOARD.

Charles W. Wilde, Mrs. Sarah Smith, Charles W. Garfield, William N. Cook,
George E. Rowe, John B. Martin.

Regular meetings are held at 1:30 P. M. on the first Saturday in each month. Annual dues are 50c.

SCHEDULE OF TOPICS FOR 1908.

February—In charge of John B. Martin. "Children and Horticulture." Guidance of the sand play. The country child's garden and its possibilities. The city child's garden and its possibilities. Gardening on a vacant city lot. Value of co-operation. Respect for property. Beauty in the child's garden. Summing up of character points to be secured through the child's garden.

March—In charge of Chas. W. Garfield. "Glass Farming." In miniature. The window garden. The hot bed. The greenhouse as a house attachment. Some of the forward movements in glass farming. The outlook. Who will succeed?

April—In charge of J. Pomeroy Munson. "The Planting Business." Planting seeds. Depth. Packing soil. Crusting. Forwarding germination. The economy of rows. Wasting time and movements. Figures concerning planting. Devices to assist in quick planting. The problem of moisture. Preparing trees for planting. Planting large trees.

May—In charge of Harry L. Creswell. "Water in Horticulture." Applying water in sprinkling as applied to transplanting lawns, etc. Irrigation in our Michigan gardens and orchards. Will it pay? Organized water and values. Cultivation and conservation of moisture. Value of clear water. Spray. Interesting irrigation facts.

June—In charge of Mrs. M. E. Campbell. "The Home Instinct." Illustrations from animal life. The development of home instinct in evolution to the human animal. Methods of stimulating the love of home. Horticulture a factor. The home town celebrations. Spiritual aspects.

July—In charge of F. C. Schneider. "Heat and Horticulture." Climate and range of horticultural products. The heat factor in the seasons as affecting horticultural success. House temperature and house plants. Soils and temperature. Shade and temperature. Sterilization by heat. Heat and germination.

August—In charge of Chas. W. Wilde. "Plant Nutrition." Enunciation of germ principles. Mineral fertilizers. The story of the nodules. Plants reaching for food. Illustrations. Water culture. Experiments. Lessons in application of plant food.

September—In charge of John F. Nellist. "Soils and Horticulture." Adaptation of varieties to soil. Comparative ability of soils to hold water. Illustrations. The making of soils. Handling different soils. Economy of mixing soils. What soils will not pay in horticulture.

October—In charge of Mrs. Julia L. Fletcher. "Feminine Interest in Horticulture." Some illustrations from literature. The relation of the garden to domestic economy. Health and beauty, subserved by interest in the green things growing. The practice of horticulture by women a broadening process. Some women who have succeeded in commercial horticulture and how.

November—In charge of C. S. Udell. "The Problem of Waste." In the soil. In the house. As applied to manual processes. Of plant food. In handling of help, indoors and outdoors. Husbanding natural resources. An apology for the idler.

December—In charge of Robert D. Graham. "Legislation and Horticulture." As affecting education. Promoting an interest in horticulture. In fighting enemies. Advertising resources. Any present needs.

ALPENA FRUIT GROWERS' ASSOCIATION.

(Organized in 1907.)

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James Wade, Atlanta.	George Giar, Dafoe.
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LENAWEE COUNTY HORTICULTURAL SOCIETY.

Meetings held at Horticultural Hall, Adrian Court house, second Wednesday of each month.

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W. G. Porter,	-	-	-	-	-	-	-	-	Treasurer.
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A. Sigler,	-	-	-	-	-	-	-	-	Librarian.

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| Chas. E. Bassett, Fennville. | Andrew Haberer, Fennville, Route 2. |
| Edward Hutchins, Fennville, Route 1. | James Chase, Fennville, Route 2. |
| E. P. Leland, Fennville, Route 1. | Arthur Howland, Fennville, Route 2. |
| W. A. Moore, Fennville, Route 1. | Ed. Wark, Fennville, Route 2. |
| F. W. Robinson, Fennville. | M. Goodeve, Fennville, Route 2. |
| A. O. Kingsbury, Fennville, Route 3. | H. L. Miller, Fennville, Route 2. |
| T. L. Gooding, Fennville, Route 1. | Geo. Pshea, Fennville, Route 2. |
| T. G. Payne, Fennville, Route 3. | Will Lamb, Fennville, Route 1. |
| W. B. Stillson, Fennville, Route 1. | E. E. Paine, Fennville, Route 1. |
| J. P. Chapman, Fennville, Route 1. | A. Wightman, Fennville, Route 1. |
| Arthur Welch, Fennville, Route 2. | H. H. Goodrich, Ganges. |
| H. A. Gray, Fennville, Route 2. | C. Lloyd Goodrich, Ganges. |
| P. Purdy, Fennville, Route 2. | A. R. Knox, Ganges. |
| J. H. Crane, Fennville, Route 1. | Dr. E. E. Brunson, Ganges. |
| D. H. Kitchen, Fennville, Route 1. | A. Hamilton, Bangor. |
| M. S. Bennett, Fennville, Route 1. | J. C. Fabun, Glenn. |
| Cephas Weed, Fennville, Route 2. | A. H. Tracy, Glenn. |
| Geo. Weed, Fennville, Route 2. | J. B. Eddy, Glenn. |
| Miss Grace Taylor, Fennville, Route 2. | B. Williamson, Glenn. |
| Chas. Van Valkenburg, Fennville, Route 2. | D. D. Tourteloutte, Glenn. |
| C. H. Davis, Fennville, Route 1. | Mack Tourteloutte, Glenn. |
| W. H. Plummer, Fennville, Route 3. | J. K. Barden, South Haven, Route 6. |
| W. B. Kibby, Fennville, Route 2. | J. M. Funk, Bravo, Route 2. |
| E. H. Atwater, Fennville, Route 1. | Amos Tucker, Bravo. |
| W. E. Rouse, Fennville, Route 1. | E. G. Lyman, Kibbie, Route 1. |
| Edward Hawley, Fennville. | James G. Wark, Douglas. |
| Geo. Brandt, Fennville, Route 2. | Chas. Gaylord, Douglas. |
| S. L. Conrad, Fennville, Route 3. | Wm. Kerr, Douglas. |
| G. D. Dean, Fennville, Route 1. | Wm. Drought, Douglas. |
| W. F. Ferguson, Fennville, Route 1. | Peter Lackie, Douglas. |
| M. W. Kitchen, Fennville, Route 1. | D. M. Gerber, Douglas. |
| W. H. Dunn, Fennville, Route 1. | Willis Bryan, Douglas. |
| J. H. McCartney, Fennville, Route 1. | H. C. Tillinghast, Douglas. |
| Perry Weed, Fennville, Route 2. | Fred Herbert, Douglas. |
| A. T. St. John, Fennville, Route 2. | S. Simeson, East Saugatuck. |
| Geo. Chase, Fennville, Route 2. | E. H. House, East Saugatuck. |
| Eli Ream, Fennville, Route 2. | Arthur Twiner, Saugatuck. |
| Will Weed, Fennville, Route 2. | Hugo J. Haub, Saugatuck. |
| Peter Moran, Fennville, Route 2. | A. Thompson, Saugatuck. |
| Guyon Fisher, Fennville, Route 3. | E. E. Weed, Douglas. |

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.
Allis, E. W.....	Adrian.....	Lenawee.
Allis, Miss Mary C. (Mrs. Beal).....	Townley.....	Lenawee.
Ansley, C. F.....	Iowa City.....	Iowa.
Archer, Thomas (deceased).....	St. Joseph.....	Berrien.
Armitage, James.....	Monroe.....	Monroe.
Arnold, W. D.....	Ionia.....	Ionia.
Avery, C. P.....	Old Mission.....	Grand Traverse.
Bagley, John J. (deceased).....	Detroit.....	Wayne.
Bailey, L. H.....	South Haven.....	Van Buren.
Bailey, L. H., Jr.....	Ithaca.....	New York.
Baldwin, H. P. (deceased).....	Detroit.....	Wayne.
Baldwin, J. D. (deceased).....	Ann Arbor.....	Washtenaw.
Baldwin, O. A. D.....	Bridgman.....	Berrien.
Ball, John (deceased).....	Grand Rapids.....	Kent.
Ballard, Ralph, R. F. D. 4.....	Niles.....	Berrien.
Barnett, G. W., 159 South Water St.....	Chicago.....	Illinois.
Bassett, Chas. E.....	Fennville.....	Allegan.
Bates, T. T.....	Traverse City.....	Grand Traverse.
Baxter, W. J. (deceased).....	Jonesville.....	Hillsdale.
Beal, W. J.....	Agricultural College.....	Ingham.
Becker, Albert J.....	Saginaw.....	Saginaw.
Bidwell, H. E.....	Plymouth.....	Wayne.
Blodgett, D. A.....	Grand Rapids.....	Kent.
Blue, George.....	Traverse City.....	Grand Traverse.
Brackett, G. B.....	Washington.....	D. C.
Bradfield, Edward (deceased).....	Ada.....	Kent.
Bragg, L. G. (deceased).....	Kalamazoo.....	Kalamazoo.
Bristol, O. S.....	Almont.....	Lapeer.
Bruchner, George W.....	Monroe.....	Monroe.
Bryant, C. T.....	South Haven.....	Van Buren.
Bullock, R. D. (deceased).....	Jackson.....	Jackson.
Burham, W. P.....	Ionia.....	Ionia.
Burrows, George L.....	Saginaw City.....	Saginaw.
Caie, Robert.....	Yarmouth.....	Nova Scotia.
Castello, George.....	Saginaw City.....	Saginaw.
Chandler, Z. (deceased).....	Detroit.....	Wayne.
Chapman, H. B. (deceased).....	Reading.....	Hillsdale.
Chapman, Alvin.....	Bangor.....	Van Buren.
Chapman, Austin B.....	South Rockwood.....	Monroe.

Name.	P. O. Address.	County.
Chilson, Nathaniel.....	Tower City.....	Dakota.
Chilson, Miss Ida.....	Tower City.....	Dakota.
Clark, M. W.....	Jackson.....	Jackson.
Cook, A. J.....	Claremont.....	California.
Cook, C. B.....	Owosso.....	Shiawassee.
Cook, W. N.....	Grand Rapids.....	Kent.
Cooley, Elisha (deceased).....	Jackson.....	Jackson.
Cooper, George S.....	Ionia.....	Ionia.
Crane, John H., R. F. D. 1.....	Fennville.....	Allagan.
Crosby, M. S.....	Grand Rapids.....	Kent.
Crozier, A. A. (deceased).....	Washington.....	D. C.
Curtis, H. W.....	Old Mission.....	Grand Traverse.
Cushman, E. H.....	Sylvania.....	Ohio.
Davidson, C. M. & Co.....	Rockwood.....	Ohio.
Davis, P. C. (deceased).....	Kalamazoo.....	Kalamazoo.
Day, Benjamin (deceased).....	Ann Arbor.....	Washtenaw.
Dayton, J. H.....	Painesville.....	Ohio.
Dean, A. J.....	Adrian.....	Lenawee.
DeLisle, Wm. H.....	Bay City.....	Bay.
Dickinson, G. W. (deceased).....	Grand Rapids.....	Kent.
Dieckman, Mrs. Josephine M.....	East Saginaw.....	Saginaw.
Dietrich, C. J.....	Chicago.....	Illinois.
Dixon, A. S.....	East Saginaw.....	Saginaw.
Dorr, S. W.....	Manchester.....	Washtenaw.
Doyle, Thomas.....	Monroe.....	Monroe.
Dyckman, A. S. (deceased).....	South Haven.....	Van Buren.
Dykman, J.....	East Saginaw.....	Saginaw.
Edmiston, D. G.....		California.
Edwards, O. C. (sanitarium).....	Battle Creek.....	Calhoun.
Farrand, T. A.....	Eaton Rapids.....	Eaton.
Ferry, D. M. (deceased).....	Detroit.....	Wayne.
Ferry, T. W. (deceased).....	Grand Haven.....	Ottawa.
Field, Wm. A.....	South Chicago.....	Illinois.
Fields, Miss Jennie E.....	East Saginaw.....	Saginaw.
Flowerday, Robert.....	Detroit.....	Wayne.
Foster, W. D. (deceased).....	Grand Rapids.....	Kent.
Foster, Mrs. Mary E. (deceased).....	Ann Arbor.....	Washtenaw.
Fowler, S. W.....	Manistee.....	Manistee.
Freeman, Mrs. A.....	Owosso.....	Shiawassee.
Fuller, S. L. (deceased).....	Grand Rapids.....	Kent.
Fuller, S. R. (deceased).....	Eaton Rapids.....	Eaton.
Garfield, Chas. W.....	Grand Rapids.....	Kent.
Gebhardt, Benton.....	Hart.....	Oceana.
Geddes, David.....	Saginaw.....	Saginaw.
Gephart, H. W.....	Hart.....	Oceana.
Gibson, Mrs. W. K.....	Jackson.....	Jackson.
Gilbert, John (deceased).....	Ovid.....	Clinton.
Graham, Elwood.....	Grand Rapids.....	Kent.
Greening, J. C.....	Monroe.....	Monroe.
Griggs, George W. (deceased).....	Grand Rapids.....	Kent.
Guild, E. F.....	East Saginaw.....	Saginaw.
Hale, Charles F.....	Shelby.....	Oceana.
Hall, Alfred R., R. F. D. 4.....	Buchanan.....	Berrien.
Hall, Frederick (deceased).....	Ionia.....	Ionia.
Halstead, J. B.....	Farmington.....	Oakland.
Hanford, H. P. (deceased).....	Bristol.....	Indiana.
Hannah, Perry (deceased).....	Traverse City.....	Grand Traverse.
Hartman, S. B.....	Athens.....	Calhoun.
Hathaway, B. (deceased).....	Little Prairie Ronde.....	Cass.

Name.	P. O. Address.	County.
Havilend, J. B. (deceased)	Traverse City	Grand Traverse.
Hawley, George A.	Hart	Oceana.
Hayden, Mrs. H. A.	Jackson	Jackson.
Heinze, Edward F., R. F. D. 2.	St. Joseph.	Berrien.
Humphrey, J. W. (deceased)	South Haven	Van Buren.
Husted, James D. (deceased)	Vineyard	Georgia.
Husted, Noah P.	Lowell	Kent.
Hutchins, Edward, R. F. D. 1.	Fennville	Allegan.
Ilgenfritz, I. E. (deceased)	Monroe	Monroe.
Ilgenfritz, C. A.	Monroe	Monroe.
Ives, Caleb	Monroe	Monroe.
Jaquay, Irving	Buchanan	Berrien.
Jerome, Mrs. David H.	Saginaw City	Saginaw.
Johnson, William	Vassar	Tuscola.
Kedzie, R. C. (deceased)	Lansing	Ingham.
Kellogg, R. M. (deceased)	Three Rivers	St. Joseph.
Kelsey, E. P. (deceased)	Ionia	Ionia.
Kidd, J. H.	Ionia	Ionia.
Klein, F. J., 156 St. Aubin Ave.	Detroit	Wayne.
Knapp, S. O. (deceased)	Jackson	Jackson.
Knapp, E. U.	Grand Rapids	Kent.
Kniseley, A. J.	Benton Harbor	Berrien.
Lawton, George W. (deceased)	Lawton	Van Buren.
Lincoln, L. C.	Greenville	Montcalm.
Lincoln, Mrs. L. C.	Greenville	Montcalm.
Linderman, Harvey J. (deceased)	South Haven	Van Buren.
Linderman, A. T. (deceased)	Whitehall	Muskegon.
Littlejohn, F. J. (deceased)	Allegan	Allegan.
Loomis, P. B.	Jackson	Jackson.
Lyon, T. T. (deceased)	South Haven	Van Buren.
Macauley, T. B.	Montreal	Canada.
Mann, S. B.	Glenwood	Florida.
Marshall, William A.	Old Mission	Grand Traverse.
Marshall, W. C., 205 LaSalle St.	Chicago	Illinois.
Mason, L. M.	East Saginaw	Saginaw.
Mason, Mrs. Sarah A.	East Saginaw	Saginaw.
McCallam, E. H. (deceased)	Lansing	Ingham.
McClatchie, G. C.	Ludington	Mason.
McDiarmid, James D.		California.
McNaughton, Robert T.	Jackson	Jackson.
Mitchell, W. H. C.	Traverse City	Grand Traverse.
Moore, J. H.	Lansing	Ingham.
Monroe, C. J.	South Haven	Van Buren.
Monroe, Judge (deceased)	Lawrence	Van Buren.
Montague, A. K.	Traverse City	Grand Traverse.
Nabors, Nellie S.	Flint	Genesee.
Newhall, Benj., 131 South Water St.	Chicago	Illinois.
Newhall, John, 131 South Water St.	Chicago	Illinois.
Nichols, W. W., Geddes Ave.	Ann Arbor	Washtenaw.
Noble, W. A.	Monroe	Monroe.
Odell, Samuel W.	Muskegon	Muskegon.
Overton, F. J.	Bangor	Van Buren.
Palmer, W. S.	Kalkaska	Kalkaska.
Palmer, Thomas W.	Detroit	Wayne.
Parmelee, George (deceased)	Old Mission	Grand Traverse.
Parmelee, Mrs. George (deceased)	Old Mission	Grand Traverse.
Parke, Mrs. Amos S.	East Saginaw	Saginaw.
Parsons, Philo (deceased)	Detroit	Wayne.
Partridge, B. F.	Bay City	Bay.

Name.	P. O. Address.	County.
Pearsall, S. M. (deceased)	Grand Rapids	Kent.
Perry, George L.	Mt. Pleasant	Isabella.
Perry, Jacob H.	Goodison	Oakland.
Petty, Thomas	Spring Lake	Ottawa.
Pierce, N. B.	Ludington	Mason.
Post, L. J.	Lowell	Kent.
Potter, E. M. (deceased)	Manderson	Nebraska.
Ramsdell, J. G. (deceased)	Traverse City	Grand Traverse.
Ramsdell, Mrs. J. G.	Traverse City	Grand Traverse.
Ransom, W. D.	St. Joseph	Berrien.
Renwick, T. R.	Grand Rapids	Kent.
Reynolds, E. H.	Monroe	Monroe.
Reynolds, H. G.	Pasadena	California.
Rich, Hampton	Ionia	Ionia.
Richmond, E. D.	Pentwater	Oceana.
Root, Amos	Jackson	Jackson.
Rose, D. Forsyth	East Saginaw	Saginaw.
Rose, Mrs. Sophie E.	East Saginaw	Saginaw.
Rowe, Geo. E., R. F. D. 11	Grand Rapids	Kent.
Rowe, William (deceased)	Grand Rapids	Kent.
Rowe, William N.	Grand Rapids	Kent.
Russell, Dr. Geo. B.	Detroit	Wayne.
Rust, C. E.	Ionia	Ionia.
Satterlee, James	Lansing	Ingham.
Savidge, Hunter (deceased)	Spring Lake	Ottawa.
Scott, J. Austin (deceased)	Ann Arbor	Washtenaw.
Scott, Dr. Austin	New Brunswick	New Jersey.
Scott, E. H.	Ann Arbor	Washtenaw.
Scudder, C. B.	Augusta	Kalamazoo.
Sessions, Charles A.	Mears	Oceana.
Sessions, Alonzo (deceased)	Ionia	Ionia.
Sessions, William	Ionia	Ionia.
Shirts, E. J. (deceased)	Shelby	Oceana.
Shoop, Rev. D. R.	Hastings	Barry.
Simmons, F. P., R. F. D. 1	Northville	Wayne.
Simpson, E. P.	Melbourne	Florida.
Sinclair, W. G.	Grand Rapids	Kent.
Sigler, Artimus	Adrian	Lenawee.
Slayton, Asa W. (deceased)	Grand Rapids	Kent.
Sleeper, F. S. (deceased)	Galesburg	Kalamazoo.
Smith, Howard B.	Winona	Ontario.
Smith, E. T.	Ionia	Ionia.
Smith, N. E.	Ionia	Ionia.
Smith, H. H.	Jackson	Jackson.
Smythe, R. A.	Benton Harbor	Berrien.
Snyder, Wm. E.	Hart	Oceana.
Soule, J. B.	Fruitport	Muskegon.
Staunton, G. W.	Grand Rapids	Kent.
Stearns, J. N.	Kalamazoo	Kalamazoo.
Stearns, Ida L. (deceased)	Kalamazoo	Kalamazoo.
Stearns, W. E.	Chicago	Illinois.
Steere, B. W.	Carthage	Indiana.
Sterling, F. S.	Monroe	Monroe.
Sterling, J. M.	Monroe	Monroe.
Sterling, J. C. (deceased)	Monroe	Monroe.
Sterling, W. C.	Monroe	Monroe.
Sterling, W. P.	Monroe	Monroe.
Sterling, Mrs. Emma M.	Monroe	Monroe.
Stockbridge, F. B. (deceased)	Kalamazoo	Kalamazoo.

Name.	P. O. Address.	County.
Suttle, John (deceased).....	Grand Rapids.....	Kent.
Taylor, George (deceased).....	Kalamazoo.....	Kalamazoo..
Taylor, George C.....	Kalamazoo.....	Kalamazoo.
Thomas, H. F.....	Jackson.....	Jackson.
Thompson, W. D.....	Jackson.....	Jackson.
Thompson, J. P. (deceased).....	Detroit.....	Wayne.
Towles, George W. (deceased).....	Benton Harbor.....	Berrien.
Tracy, Will W.....	Washington.....	D. C.
Vick, James (deceased).....	Rochester.....	New York.
Vick, James, Jr.....	Rochester.....	New York.
Vick, Frank H.....	Rochester.....	New York.
Vick, Charles H.....	Rochester.....	Colorado.
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.
Walker, S. S. (deceased).....	Old Mission.....	Grand Traverse.
Watkins, L. Whitney.....	Manchester.....	Washtenaw.
Watkins, L. D.....	Manchester.....	Washtenaw.
Webber, William L. (deceased).....	East Saginaw.....	Saginaw.
Webber, George W.....	Ionia.....	Ionia.
Webber, Miss Frances E.....	East Saginaw.....	Saginaw.
Welch, Chas. B., R. F. D. 2.....	Fennville.....	Allegan.
Wells, H. G. (deceased).....	Kalamazoo.....	Kalamazoo.
Wells, Frank D., R. F. D. 3.....	Rochester.....	Oakland.
White, O. K., R. F. D. 3.....	Hart.....	Oceana.
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.
Winchester, A. O. (deceased).....	St. Joseph.....	Berrien.
Wooding, Charles F.....	Lowell.....	Kent.
Woodward, David.....	Clinton.....	Lenawee.
Wundt, K. R.....	Burlington.....	Iowa.
Wurtz, Elias H.....	East Saginaw.....	Saginaw.
Zeigler, J. C.....	Saginaw City.....	Saginaw.

HONORARY MEMBERS.

Name.	P. O. Address.	State.
Barker, A. S.....	Lincoln.....	Nebraska.
Collingwood, H. W.....	New York.....	New York.
Farnsworth, W. W.....	Waterville.....	Ohio.
Hale, J. H.....	South Glastonbury.....	Connecticut.
Hedrick, Prof. U. P.....	Geneva.....	New York.
Hilborn, J. L.....	Leamington.....	Ontario.
Kellogg, Dr. J. H.....	Battle Creek.....	Michigan.
Kellogg, L. G.....	Ripon.....	Wisconsin.
Smith, Howard B.....	Winona.....	Ontario.
Woodbury, Prof. C. G.....	Lafayette.....	Indiana.
Wundt, K. R.....	Burlington.....	Iowa.

ANNUAL MEMBERS.

Name.	P. O. Address.	County.
Adams, W. D.....	Shelby.....	Oceana.
Allen, R. E., R. F. D. 2.....	Paw Paw.....	Van Buren.
Allyn, E. H.....	Traverse City.....	Grand Traverse.
Anthony, H.....	Hart.....	Oceana.
Babeck, M. C., 219 West Main.....	Battle Creek.....	Calhoun.
Bagley, Wm. D, R. F. D. 1.....	Old Mission.....	Leelanau.
Baldwin, C. E., 51 Mechem Ave.....	Battle Creek.....	Calhoun.
Ballard, Harry, R. F. D. 4.....	Niles.....	Berrien.
Ballard, Mrs. Ralph, R. F. D. 4.....	Niles.....	Berrien.
Barden, F. M., R. F. D. 6.....	South Haven.....	Van Buren.
Barden, J. K., R. F. D. 6.....	South Haven.....	Van Buren.
Barrow, Fred G., R. F. D. 3.....	Allegan.....	Allegan.
Barwise, Miss Eva.....	Rochester.....	Oakland.
Bale, W. F., R. F. D. 45.....	Ada.....	Kent.
Barker, I. M.....	Lawton.....	Van Buren.
Barnhard, Herbert, R. F. D. 1.....	Fremont.....	Newaygo.
Bauman, F. A.....	Mears.....	Oceana.
Beach, J. H.....	Crystal Valley.....	Oceana.
Beckett, M. J.....	St. Joseph.....	Berrien.
Bedford, John W.....	Cushing.....	Cass.
Beebe, W. H.....	Mears.....	Oceana.
Bishop, A. J.....	Millington.....	Tuscola.
Bishop, Frank.....	Almont.....	Lapeer.
Bishop, Dr. H. A.....	Millington.....	Tuscola.
Biteley, Miss Josephine.....	Paw Paw.....	Van Buren.
Blain, A. W., 131 Elmwood.....	Detroit.....	Wayne.
Bos, A.....	Forest Grove.....	Ottawa.
Boyd, C. H.....	Reeman.....	Newaygo.
Boyditch, C. B., Soldiers' Home.....	Grand Rapids.....	Kent.
Brace, George W.....	Bangor.....	Van Buren.
Bragdon, E. H.....	Traverse City.....	Grand Traverse.
Braithwaite, Chas.....	Benton Harbor.....	Berrien.
Brant, Marion, R. F. D. 3.....	Benton Harbor.....	Berrien.
Brassington, James.....	Hart.....	Oceana.
Bregger, L. A.....	Bangor.....	Van Buren.
Brewster, Oscar.....	Pontiac.....	Oakland.
Brillhart, E.....	Pentwater.....	Oceana.
Brinkman, H. K.....	Old Mission.....	Leelanau.
Bristol, W. H.....	Almont.....	Lapeer.
Brunson, Dr. E. E.....	Ganges.....	Allegan.
Bullock, A. M.....	Lapeer.....	Lapeer.
Burger, F. A.....	Bangor.....	Van Buren.
Burnmeister, Wm. C.....	Shelby.....	Oceana.
Burnham, W. C.....	Augusta.....	Kalamazoo.
Butterworth, Clarkson.....	Grand Rapids.....	Kent.
Caldwell, James, R. F. D. 1.....	Fremont.....	Newaygo.
Campbell, M. L., 114 S. Water St.....	Chicago.....	<i>Illinois.</i>
Cannon, H. B.....	Rochester.....	Oakland.
Carpenter, George, R. F. D. 2.....	Caro.....	Tuscola.
Carter, J. F.....	Benton Harbor.....	Berrien.
Chamberlin, Ezra, R. F. D. 2.....	Orion.....	Oakland.
Chandler, L. F., R. F. D. 1.....	Almont.....	Lapeer.
Chapman, C. H.....	Frankfort.....	Benzie.
Chatfield, Geo., R. F. D. 1.....	South Haven.....	Van Buren.
Chesebro, C. C., R. F. D. 3.....	South Haven.....	Van Buren.
Chidester, C. P., R. F. D. 1.....	Penfield.....	Calhoun.
Clark, G. C.....	Troy.....	Oakland.

Name.	P. O. Address.	County.
Clark, Lew B., 38 W. Fort St.	Detroit	Wayne.
Coates, E. C.	Beulah	Benzie.
Coith, A.	South Haven	Van Buren.
Colling, James C.	Colling	Tuscola.
Collins, G. H.	Hartford	Van Buren.
Converse, Will H., R. F. D. 22	Augusta	Kalamazoo.
Converse, H. C., R. F. D. 22	Augusta	Kalamazoo.
Cook, Mrs. C. B.	Owosso	Shiawassee.
Cook, M. S.	Paw Paw	Van Buren.
Coryell, R. J.	Birmingham	Oakland.
Cowles, C. S., R. F. D. 37	Sand Lake	Kent.
Crisp, F. J., 320 Broadway	Benton Harbor	Berrien.
Crosby, Andrew J.	Farmington	Oakland.
Crozier, Mrs. O. R. L.	Grand Rapids	Kent.
Crydemon, V.	Millington	Tuscola.
Curtis, M. S., 163 Calhoun St.	Battle Creek	Calhoun.
Cutter, Augusta W.	Grand Rapids	Kent.
David, Thomas J., R. F. D. 3.	Fremont	Newaygo.
Davis, Caleb	Mears	Oceana.
Dean, M. L.	Pontiac	Oakland.
Dobson, A. S., R. F. D. 2	Traverse City	Grand Traverse.
Decker, A. M.	Ferry	Oceana.
Deming Co., The	Salem	Ohio.
Dewey, O. W., R. F. D. 3	Battle Creek	Calhoun.
Dibble, Daniel E., R. F. D. 1	Battle Creek	Calhoun.
Dickerson, George E., Stage Route	Ionia	Ionia.
Dickerson, Mrs. George E., Stage Route	Ionia	Ionia.
Dickerson, C. C., R. F. D. 1	Ionia	Ionia.
Dickinson, Miss M., R. F. D. 2	St. Joseph	Berrien.
Dickinson, W. Woodbridge, R. F. D. 2	St. Joseph	Berrien.
Dietrich, M. J.	Hickory Corners	Barry.
Dodd, R. C.	Millington	Tuscola.
Dowd, H. W., R. F. D. 4	Hartford	Van Buren.
Doyle, C. D.	Augusta	Kalamazoo.
Dukesherer, Fred, R. F. D. 4	Benton Harbor	Berrien.
Duncan, A. S.	Germfask	Schoolcraft.
Dunham, C.	Lawton	Van Buren.
Dunlop, David, R. F. D. 4	Grand Rapids	Kent.
Durkee, H. E.	Lawton	Van Buren.
Edgerton, M. F.	Petoskey	Emmett.
Eminons, E. V., R. F. D. 6	Battle Creek	Calhoun.
England, J. J., R. F. D. 4	Caro	Tuscola.
Farley, C. K., R. F. D. 1	Almont	Lapeer.
Farnsworth, W. W.	Waterville	Ohio.
Farrand, R. A.	South Haven	Van Buren.
Ferguson, George, R. F. D. 2	Otisville	Genesee.
Finehout, J. A., R. F. D. 3	Millington	Tuscola.
Flint, W. D.	Novi	Oakland.
Fisk, S. W., R. F. D. 1	Mattawan	Van Buren.
Fitch, John H.	Ludington	Mason.
Fitts, C. B.	Beulah	Benzie.
Ford, I. H.	Hart	Oceana.
Forney, C. C.	Frankfort	Benzie.
Fowler, B. H.	Benton Harbor	Berrien.
Fowler, C. C.	Hart	Oceana.
Fuller, S. D.	Mears	Oceana.
Gamber, Leonard, R. F. D. 2	Chesterfield	Macomb.
Garthy, S. C.	Northport	Leelanau.
Gee, J. J.	Whitehall	Muskegon.

Name.	P. O. Address.	County.
Geisler, Wm., R. F. D. 2.....	St. Joseph.....	Berrien.
Geismar, Leo M.....	Chatham.....	Alger.
Giddings, E. E.....	Fremont.....	Newaygo.
Graham, R. D.....	Grand Rapids.....	Kent.
Getty, J. B.....	Barker Creek.....	Kalkaska.
Gibb, John A.....	Beulah.....	Benzie.
Gibson, J. A.....	Battle Creek.....	Calhoun.
Gleason, H. L.....	Hartford.....	Van Buren.
Goulds Manufacturing Co.....	Seneca Falls.....	<i>New York.</i>
Grasselli Chemical Co.....	Cleveland.....	<i>Ohio.</i>
Gray, W. B., R. F. D. 1.....	Traverse City.....	Grand Traverse.
Gray, A. P., R. F. D. 1.....	Traverse City.....	Grand Traverse.
Greenfield, John, R. F. D. 2.....	Benton Harbor.....	Berrien.
Greening, C. E.....	Monroe.....	Monroe.
Gregg, O. I.....	East Lansing.....	Ingham.
Greenman, Dr. N. H.....	Fairmount.....	<i>North Dakota.</i>
Griffen, A., 41 Lyon Place.....	Grand Rapids.....	Kent.
Griffin, George W., R. F. D. 2.....	South Haven.....	Van Buren.
Gronso, D. J., R. F. D. 1.....	Fremont.....	Newaygo.
Gunson, Thos.....	Agricultural College.....	Ingham.
Gurney, C. A.....	Hart.....	Oceana.
Gurney, T. S.....	Hart.....	Oceana.
Hadsell, C. E.....	Troy.....	Oakland.
Hallowell, S. T., R. F. D. 1.....	Fremont.....	Newaygo.
Hall, E. L., R. F. D. 2.....	St. Joseph.....	Berrien.
Hamilton, W. L.....	Bangor.....	Van Buren.
Hamilton, Alex.....	Bangor.....	Van Buren.
Hamilton, H. E.....	Bangor.....	Van Buren.
Hardie, H. H.....	Hudson.....	Lenawee.
Harper, John.....	Troy.....	Oakland.
Harris, R. G.....	Cleveland.....	<i>Ohio.</i>
Hart, W. A.....	Caro.....	Tuscola.
Hatton, C. F.....	Farmington.....	Oakland.
Hawley, Edward.....	Fennville.....	Allegan.
Hawley, H. E.....	South Haven.....	Van Buren.
Haughey, Dr. Wilfred.....	Battle Creek.....	Calhoun.
Hayden, E. V.....	Lawton.....	Van Buren.
Hess, Juan, R. F. D. 3.....	Benton Harbor.....	Berrien.
Hilborn, J. L.....	Leamington.....	<i>Ontario.</i>
Hilton, C. H.....	Benton Harbor.....	Berrien.
Hoffman, Max, R. F. D. 2.....	St. Joseph.....	Berrien.
Holmes, C. B.....	Benton Harbor.....	Berrien.
House, E. H., R. F. D. 1.....	East Saugatuck.....	Allegan.
Howard, John H., R. F. D.....	Arcadia.....	Manistee.
Howe, O. C.....	Lansing.....	Ingham.
Humphreys, J. E.....	Casnovia.....	Kent.
Hunziker, M. J.....	Kent City.....	Kent.
Hunter, L. R.....	South Lyon.....	Oakland.
Irwin, John.....	Copemish.....	Manistee.
Jacklin, J. R.....	Fremont.....	Newaygo.
Jennings, C. D.....	St. Joseph.....	Berrien.
Johnson, E. S.....	Arcadia.....	Manistee.
Johnson, Albert.....	Battle Creek.....	Calhoun.
Jones, A. L.....	Lake Odessa.....	Ionia.
Jones, Mrs. Alice Van Hoosen.....	Rochester.....	Oakland.
Keasey, E. L.....	South Haven.....	Van Buren.
Keenan, Martin, R. F. D.....	Redford.....	Wayne.
Kellogg, L. M.....	Three Rivers.....	St. Joseph.
Kellogg, L. G.....	Ripon.....	<i>Wisconsin.</i>

Name.	P. O. Address.	County.
Kelly, J. C.	Ferry	Oceana.
Kenfield, Frank	New Era	Oceana.
Ketchum, Wm.	Millington	Tuscola.
Kimbell, Carl	Fremont	Newaygo.
Kingsley, H. J.	Fennville	Allegan.
Knapp, S. J., R. F. D. 4	Grand Rapids	Kent.
Krause, Herman A., R. F. D. 2	St. Joseph	Berrien.
Keyes, S. A.	Omena	Leelanau.
Kolvoord, John	Augusta	Kalamazoo.
Lawrence, Frank E., R. F. D. 1	Cressey	Barry.
Lee, F. L.	Farmington	Oakland.
Loeffler, C. W.	Solon	Leelanau.
Ladd, E. O.	Old Mission	Grand Traverse.
Lawton, C. D.	Lawton	Van Buren.
Leonard, George, R. F. D. 1	Fremont	Newaygo.
Lewis, C. E.	Lawton	Van Buren.
Lillie, Colon C.	Coopersville	Ottawa.
Loveridge, George, R. F. D. No. 1	Fennville	Allegan.
Low, George M.	Bangor	Van Buren.
Maguire, John	Jackson	Jackson.
Markham, W. D.	Hart	Oceana.
Marvin, O. F.	Holtou	Muskegon.
Matheson, Peter	South Frankfort	Benzie.
Maurer, R.	Frankfort	Benzie.
Maxson, Chas. A.	Kalamazoo	Kalamazoo.
May, F. E.	Edwardsburg	Cass.
Mead, A. F., R. F. D. 11	Battle Creek	Calhoun.
Merry, A. J., R. F. D. 1	Benton Harbor	Berrien.
Meyers, F. W.	Mears	Oceana.
Miller, E., R. F. D. 2	Birmingham	Oakland.
Miller, Frank A.	Northville	Wayne.
Miller, George	Montague	Muskegon.
Miller, Jonas W., R. F. D. 2	Fremont	Newaygo.
Mitchell, James, R. F. D. 1	Almont	Lapeer.
Monroe, Mrs. C. J.	South Haven	Van Buren.
Molloy, Wm., 15 S. Pine St.	Grand Rapids	Kent.
Morris, Miss Laura N.	Lawton	Van Buren.
Mortenson, R.	Arcadia	Manistee.
Mulheron, Dr. J. J., 73 High St. E.	Detroit	Wayne.
Mullen, James	Irondale	Washington.
Munson, J. P.	Grand Rapids	Kent.
Munson, W. K., R. F. D. 4	Grand Rapids	Kent.
McCallum, J. B.	Hart	Oceana.
McClay, M. L.	Benton Harbor	Berrien.
McCormick, C. J.	Monroe	Monroe.
McEwing, Wm.	South Haven	Van Buren.
McHardy, A. J., R. F. D. 2	Almont	Lapeer.
McIsaac, Miss E. M., R. F. D. 4	Benton Harbor	Berrien.
McIsaac, Miss Isabella, R. F. D. 4	Benton Harbor	Berrien.
McLeran, J. B., Box 447	Duluth	Minn.
McMullen, D. H.	Traverse City	Grand Traverse.
Nelson, George H.	Whitehall	Muskegon.
Newcombe, George K.	Traverse City	Grand Traverse.
Newton, H. S.	Hart	Oceana.
New Way Motor Co.	Lansing	Ingham.
Nicholson, Clement	Kalamazoo	Kalamazoo.
Nickerson, D. S.	Traverse City	Grand Traverse.
Noble, Lee S., R. F. D. 1	Oxford	Oakland.
O'Dell, Dr. B.	Paw Paw	Van Buren.

Name.	P. O. Address.	County.
Olney, B. J.	Reeman	Newaygo.
Ostrom, H. W.	Rochester	Oakland.
Osgood, Frank	Arcadia	Manistee.
Palmer, H. C.	Traverse City	Grand Traverse.
Parker, B. R.	Frankfort	Benzie.
Parker, E. J.	South Frankfort	Benzie.
Pearce, J. A.	Grand Rapids	Kent.
Pearce, L. B.	Grand Rapids	Kent.
Pearce, Peter D.	Grand Rapids	Kent.
Pease, F. D.	Sparta	Kent.
Pechuman, Dr. W. F.	Ramona	Newaygo.
Perkins, Mrs. T. J.	Northville	Wayne.
Pettit, Prof. R. H.	East Lansing	Ingham.
Pierce, W. R.	Bangor	Van Buren.
Powers, David, R. F. D. 2	Fremont	Newaygo.
Prater, G. E.	Paw Paw	Van Buren.
Pratt, W. M.	Benton Harbor	Berrien.
Pratt, B. B.	Benton Harbor	Berrien.
Prentiss, Wm.	Bravo	Allegan.
Prentiss, Mrs. Wm.	Bravo	Allegan.
Pringle, Asa	Mears	Oceana.
Pugsley, M. H.	Paw Paw	Van Buren.
Purdy, P., R. F. D. 2	Fennville	Allegan.
Quackenbush, O.	Ludington	Mason.
Read, Dr. J. A., R. F. D. 4	Battle Creek	Calhoun.
Reeks, George W., R. F. D. 2	Fennville	Allegan.
Rhodes, C. D., R. F. D. 10	Battle Creek	Calhoun.
Rockey, Clyde W., R. F. D. 2	St. Joseph	Berrien.
Rockwell, L., 79 Paris Ave.	Grand Rapids	Kent.
Rood, Frank E.	Covert	Van Buren.
Roush, Geo.	Traverse City	Grand Traverse.
Rice, L. B.	Port Huron	St. Clair.
Robertson, James, R. F. D. 1	Fremont	Newaygo.
Rottier, John, R. F. D. 1	Fremont	Newaygo.
Rouse, F. O.	Shelby	Oceana.
Rowe, G. E.	Grand Rapids	Kent.
Rowland, O. W.	Paw Paw	Van Buren.
Sabin, R. C., R. F. D. 3	Ludington	Mason.
Salisbury, H., R. F. D. 3	Paw Paw	Van Buren.
Scamehorn, John M., R. F. D. 2	Bloomington	Van Buren.
Schettler, E. J.	Muskegon	Muskegon.
Schmidt, August	Frankfort	Benzie.
Schultz, Chas. L.	Birmingham	Oakland.
Seel, Henry	Benton Harbor	Berrien.
Sessions, Horace	Shelby	Oceana.
Shackelton, George, R. F. D. 5	Grand Rapids	Kent.
Sherwood, R. H.	Watervliet	Berrien.
Smith, A. M.	Bangor	Van Buren.
Smith, Henry, Cor. Monroe and Division	Grand Rapids	Kent.
Smith, Chas. J., R. F. D. 1	Colling	Tuscola.
Smith, Ed. J.	Penfield	Calhoun.
Smith, Wm. B., R. F. D. 3	Battle Creek	Calhoun.
Snook, John J.	Rochester	Oakland.
Snook, Miss Nellie M.	Rochester	Oakland.
Spencer, A. G., R. F. D. 1	Kibbie	Van Buren.
Sprague, E. S., R. F. D. 1	Farmington	Oakland.
Straight, G. W., R. F. D. 11	Holland	Ottawa.
Sprague, H. T., R. F. D. 4	Paw Paw	Van Buren.
Starr, Edwin A.	Royal Oak	Oakland.

Name.	P. O. Address.	County.
Stevens, W. S.	Grand Rapids	Kent.
Stoddard, L. H., R. F. D. 12	Kalamazoo	Kalamazoo.
Stout, A. G., R. F. D. 3	South Haven	Van Buren.
Stray, George J., R. F. D. 3	Tekonsha	Calhoun.
Stuart, W. C.	Fremont	Newaygo.
Taft, Prof. L. R.	East Lansing	Ingham.
Taylor, Wm. A.	Washington	D. C.
Taylor, T. C.	Almont	Lapeer.
Taylor, W. C., R. F. D. 5	Caro	Tuscola.
Thayer, Paul	Benton Harbor	Berrien.
Thomas, E. O.	Millington	Tuscola.
Thompson, T. G., R. F. D. 1	St. Joseph	Berrien.
Thompson, W. H.	Benton Harbor	Berrien.
Thwaites, James	Mears	Oceana.
Tibbits, Karl, R. F. D. 3	Farmington	Oakland.
Tinney, E. C., R. F. D. 1	Fremont	Newaygo.
Travis, C. A., R. F. D. 22	Augusta	Kalamazoo.
Trout, W. C.	East Lansing	Ingham.
Trumbley, Joseph	Fremont	Newaygo.
Tucker, George, R. F. D. 1	Fennville	Allegan.
Turner, Wm. H.	Hart	Oceana.
Ulbright, F. H., R. F. D. 1	Benton Harbor	Berrien.
Van Deman, John A.	Benzonla	Benzie.
Van Hess, A. G.	Zeeland	Ottawa.
Van Valkenburg, C. F., R. F. D. 2	Fennville	Allegan.
Van Wickle, F. W.	Hart	Oceana.
Voorheis, W. G.	South Frankfort	Benzie.
Wade, Theo	Fennville	Allegan.
Wait, Walter J., 124 15th St	Toledo	Ohio.
Wait, W. S.	Benton Harbor	Berrien.
Walton, Herbert, R. F. D. 2	Dryden	Lapeer.
Walton, L. B.	Attica	Lapeer.
Ward, Wm.	Millington	Tuscola.
Ward, H. C.	Pontiac	Oakland.
Wark, James	Douglas	Allegan.
Warner, F. E., R. F. D. 5	South Haven	Van Buren.
Welch, H. G., R. F. D. 2	Fennville	Allegan.
Wermuth, B.	Detroit	Wayne.
Weston, J. W., R. F. D. 2	Fennville	Allegan.
Westphal, Paul, R. F. D. 1	Benton Harbor	Berrien.
West, W. E., 1616 East St	Lansing	Ingham.
Wheelock, Mrs. C. H., 92 N. McCamley St.	Battle Creek	Calhoun.
Wiese, C. W., R. F. D. 4	Benton Harbor	Berrien.
Wilder, Carson	Hunter's Creek	Lapeer.
Wiley, D. W., R. F. D. 2	Fennville	Allegan.
Willard, M. W., R. F. D. 2	Grand Rapids	Kent.
Willison, J. M.	Battle Creek	Calhoun.
Willis, M. H., Route 1	Caro	Tuscola.
Wilson, A. N.	Romeo	Macomb.
Wilson, James	Bingham	Leelanau.
Wilson, Wm.	Beulah	Benzie.
Winterburn, C. L., R. F. D. 10	Kalamazoo	Kalamazoo.
Woodley, W. H.	Benton Harbor	Berrien.
Woodruff, M. S.	Benton Harbor	Berrien.
Wolverine Cooperative Nursery Co.	Paw Paw	Van Buren.
Woolman, D. S.	Millington	Tuscola.
Yoder, C. V., R. F. D. 2	Almont	Lapeer.
Yonker, Wm., Box 466	Traverse City	Grand Traverse.

CONSTITUTION AND BY-LAWS.

ARTICLE I.—NAME, TERRITORY AND OBJECTS.

The name of the society shall be the Michigan State Horticultural Society, and its territory shall be the State of Michigan. Its objects shall be the development of an adequate appreciation of the peculiar adaptation of the soils and climate of the State to the pursuit of horticulture in all its branches; and the collection and dissemination of information bearing upon the theory and practice of the same, as well as upon the arts and sciences directly or indirectly associated therewith, or calculated to elevate or improve the practice thereof.

ARTICLE II.—OFFICERS AND MODE OF ELECTION.

The officers of the society shall be a president, a secretary, and a treasurer, together with an executive board of six members, aside from the president, secretary and treasurer, who shall be ex-officio members of the said board. Any one who has held the office of president or member of the executive board for two consecutive terms or parts of terms shall be ineligible to re-election until after the expiration of one full term.

Said board shall designate one of its members as vice president. The officers shall be elected by ballot.

The society may, at its discretion, elect an honorary president, whose term of office shall be for life, said office to be an honorary one, without duties, and established to express the sense of obligations which the society may feel to one of its members who may unselfishly give a lifetime of earnest effort to promote its interests, to further the horticultural interests of this State.

ARTICLE III.—A QUORUM.

Four members of the executive board shall constitute a quorum for the transaction of business at any meeting of said board: Provided, That each of the members thereof shall have been notified, in the usual manner, of the time, place, and object of such meeting.

ARTICLE IV.—ANNUAL MEETING AND ELECTION OF OFFICERS.

The annual meeting of the society, for the election of officers specified in Article II, shall occur upon the first Wednesday of December in each year.

ARTICLE V.—TERMS OF OFFICE.

The officers specified in Article II shall hold their offices until the thirty-first day of December of the year for which they were elected, and thereafter until their successors shall have been elected, and shall have signified to the secretary their acceptance: Provided, That the terms of office of the six members of the executive board shall be so arranged that but two regular vacancies shall occur in each year.

ARTICLE VI.—ANNUAL AND LIFE MEMBERS.

Any person may become a member of the society for one year by paying to the treasurer the sum of fifty cents; and the yearly term of all annual memberships shall expire on the thirty-first day of December of the year for which they were taken, but be regarded as continuous, and the annual dues cumulative, except as may be provided by the by-laws. Any person may become a life member by the payment at any one time of the sum of five dollars into the treasury of the society.

ARTICLE VII.—AMOUNT OR LIMIT OF PROPERTY.

The society may hold real and personal estate to an amount not exceeding twenty thousand dollars.

ARTICLE VIII.—BY-LAWS.

By-laws for the government of the society shall be framed, and when needful, amended by the executive board; but changes thereof may be at any time proposed by the society in general meeting.

ARTICLE IX.—AMENDMENTS.

This constitution may be amended at any regular meeting of the society by a vote, by ballot, of two-thirds of all the members present and voting: Provided, That notice of such proposed amendment, specifying its purport, shall have been given at the last previous regular meeting.

BY-LAWS OF THE MICHIGAN STATE HORTICULTURAL SOCIETY.

I.—THE PRESIDENT.

1st. The president shall be the executive officer of the society and of the executive board; and it shall be his duty to see that the rules and regulations of the society, and of the executive board, are duly enforced and obeyed.

2d. He may, in his discretion, and in the lack of needful rules, during the recesses of the society and of the board, prescribe rules for the management of the interests or business of the society such rules to continue in force till the next session of the executive board, and until, by its action, they shall have become no longer necessary.

3d. He shall act in conjunction with the secretary in the preparation of programmes or orders of business, for the sessions of the society; and in the devising of plans and processes for the maintenance of its interests.

4th. He shall have the best interests of the society at heart, and shall lead in forwarding any and all enterprises calculated to add to its permanency or to increase its usefulness, and establish it more firmly in the public confidence.

II.—VICE PRESIDENT.

The vice president shall perform the duties of the president in case of the absence or inability of that officer; and may be called upon by the president to assume the duties of the chair at any meeting of the society or executive board.

III.—THE SECRETARY.

1st. The secretary shall be the recording, corresponding, and accounting officer of the society, and he shall also be, jointly with the business committee, its financial and auditing officer.

2d. He shall incur no expenditure of a large or doubtful character except with the sanction of the executive board or of the business committee.

3d. He shall submit all bills or claims against the society to the business committee for approval, and indorsement to that effect, before drawing his order upon the treasurer for the payment of the same.

4th. He shall attend all meetings of the society, and of the executive board, and shall keep a faithful record of their proceedings.

5th. He shall sign all certificates of membership, and all diplomas and certificates of merit awarded by the society.

6th. He shall have charge of the society's books and papers, excepting only such as, by the advice or direction of the executive board, shall be placed in charge of the librarian, and he shall be responsible to the board for the safe keeping of the property placed in his charge.

7th. He shall be the custodian of the seal of the society and shall have authority to affix the same to documents when needful.

8th. He shall seek by all suitable means to secure the fullest announcement of the meetings of the society in this State, as well as in adjacent states, when such shall be found desirable.

9th. He shall, so far as practicable, cause the transactions of the society, together with such valuable or interesting papers as shall be read at its sessions, to be properly published, and thus placed within reach of the State.

10th. It shall also be his duty, yearly, to prepare for publication the annual report

of the society, together with such other matter as he shall deem proper—he being aided in the selection of such matter by an advisory committee of the executive board.

IV.—THE TREASURER.

1st. All the funds of the society shall be paid into the hands of the treasurer.

2d. He shall disburse the moneys of the society that shall come into his hands only upon the order of the secretary, countersigned by the president.

3d. He shall keep the moneys received by the society for life memberships as a distinct fund, and shall invest the same under the advice and direction of the executive board, applying only the interest accruing thereon to the purposes of the general fund.

4th. Immediately upon assuming his office, and before entering upon its duties, he shall execute to the society an official bond with sufficient sureties, conditioned for the safe keeping and disbursement of the moneys of the society, and for the proper discharge of the further duties of his office, in such sum as shall be specified by the executive board. Such bond shall receive the approval of the president and shall be deposited with the secretary.

5th. He shall at the close of each year, report to the executive board the amount of money that shall have come into his hands during the year, the sources from which it has been derived, and the disposition made of the same.

V.—THE LIBRARIAN.

1st. The librarian shall have the custody of the library of the society. He shall be appointed by the executive board, and may be displaced at its pleasure.

2d. He shall act jointly with the secretary in the care and arrangement of the same, and in the reception, custody, and disposal of the volumes of the transactions annually supplied to the society by the State.

3d. He shall have the custody of the rooms assigned to the society at the State capitol, together with such books and other property as the society or the board shall direct to be deposited therein.

4th. He shall report annually, at the close of the year, to the executive board the amount and condition of the property in his hands.

VI.—THE EXECUTIVE BOARD.

1st. The executive board shall enact all rules and regulations for the management of the affairs of the society, determine the salaries of its officers, and assume the control and management of its exhibitions.

2d. It shall have power to displace any officer of the society for neglect of duty or abuse of position, and to fill all vacancies by appointment, to continue till the next annual election.

3d. The board shall hold four regular sessions during the year, to occur at the times and places for the regular meetings of the society.

4th. Other meetings may be called by the secretary under the advice or direction of the president, or of a majority of its members, at such times and places as may be deemed most convenient; but in all such cases each member must be notified of the time, place, and object of such meeting.

5th. It shall be the duty of the board to carefully guard the general interests of the society, to watch over its finances, and to provide for its necessities as they shall arise.

6th. All important measures shall be submitted to this board, but they may by the board be resubmitted to the society for recommendations.

7th. The board shall, at the annual meeting, submit through the secretary, in connection with the reports of officers, such further report upon the condition, interests, and prospects of the society as it shall judge necessary or expedient.

8th. Two members of the executive board are to be elected each year, to hold the office for three years, but if any member shall absent himself from two or more consecutive meetings of the society and of the board, without reason satisfactory to the board, the said board may, in its discretion, consider the office vacant, and proceed to fill such vacancy by appointment, to continue to the next annual election.

VII.—THE BUSINESS COMMITTEE.

1st. It shall be the duty of the executive board annually, upon entering upon the duties of the new year, to appoint from their own number three members who shall constitute a business committee for the year.

2d. All accounts or claims against the society, when presented to the secretary for payment, shall, before payment, receive the sanction and indorsement of the business committee.

3d. Such claims shall be submitted to this committee and approved in duplicate, one copy to remain with the secretary as his warrant for the payment of the same, and the other to be transmitted by him to the president, along with his order upon the treasurer, as his warrant for countersigning the same.

4th. It shall be the duty of the business committee, upon application of the secretary, during the recess of the executive board, to advise with him as to the expediency of making any contemplated but questionable expenditure for which occasion may arise during such recess.

VIII.—STANDING COMMITTEES.

1st. There shall be a standing committee on revision of the catalogue, to be composed of one member from each of the five districts into which the State is, for this purpose divided, with one member chosen from the State at large, who shall be the chairman of the committee.

2d. Each member of said committee (except the chairman) is empowered and expected to choose a sub-committee for his district, of which he shall be chairman.

3d. It shall be the duty of each sub-committee to collect and report, each year, to the general chairman, such facts respecting fruit culture in the district as shall promise to be of value in the revision of the catalogue.

4th. There shall be a standing committee on new fruits, to consist of a chairman, with as many associates as such chairman shall find it desirable to appoint.

5th. Such other standing committees may from time to time be appointed by the executive board as, in its discretion, it shall deem desirable or necessary.

6th. All standing committees are expected to report at the annual meeting in December any information of value to the society or its members that may have come to their knowledge during the year as well as any scientific theories, deductions, or facts that, in their opinion, may be useful in advancing the objects for which the society is laboring.

IX.—LIFE MEMBERSHIP FUND.

1st. All moneys coming into the treasury of the society in payment for life memberships shall constitute a perpetual fund, to be known as the life membership fund.

2d. The principal of this fund shall be invested by the treasurer under the advice and direction of the executive board.

3d. All interest accruing upon any portion of said fund shall constitute and become a part of the fund of the society devoted to the payment of its ordinary expenses.

X.—MEETINGS OF THE SOCIETY.

1st. The society shall hold its first regular meeting for the year during the month of January or February for the inauguration of the officers chosen at the annual meeting held the previous December, as provided in Article IV of the constitution and also to arrange its plan of operation for the year.

2d. Its second regular meeting shall be held in the month of June at such date as shall best accommodate an exhibit of the early summer fruits.

3d. Its third regular meeting shall be at its annual exhibit of autumn and winter fruits, in the month of September or October.

4th. Its fourth regular meeting shall occur in connection with its annual election of officers, in December, as provided in Article IV of the constitution.

5th. The times and places for the occurrence of these regular meetings (excepting only the *time* of the annual meeting), shall be determined by the executive board.

6th. Other meetings may be called by the secretary, under the advice or direction of the members of the executive board, at times and places by them deemed expedient.

7th. In case of the calling of a special meeting for the election of officers of the society, in consequence of any failure to elect at the annual meeting, as provided in section IV of the constitution, all persons entitled as members to vote at such annual meeting shall be considered as retaining such membership for such purpose until such election, and until such officers so elected shall have been inducted into office.

XI.—RULES FOR DISCUSSION.

The deliberations and discussions of the society shall be conducted in accordance with ordinary parliamentary usages.

XII.—AUXILIARY SOCIETIES.

1st. The society shall, in all reasonable and proper ways, encourage the formation of local horticultural or pomological societies auxiliary to this society in all such counties or other municipalities of this State as shall afford a reasonable prospect that they will be able to effectually maintain the same.

2d. It shall be the policy of this society in supervising the organization of such local societies to secure an identity of constitutional provisions throughout, and in so doing to insure harmony among them; but at the same time it will not discourage the including by them of special or local objects in cases in which such shall be found desirable, so long as the introduction of the requisite provisions therefor into the constitution and by-laws of the auxiliary society shall not be deemed likely to interfere with the harmonious workings of the whole.

3d. Any person who shall become a member of an auxiliary society for one year, and comply with its regulation as to fee, shall thereby become an auxiliary member of this society also for the same time, and entitled to all the rights and benefits of full membership, except that he or she shall not have the right to vote at the annual election of officers or upon questions of the expenditure of money.

4th. On receipt by the secretary, from the secretary of such auxiliary society, of a list of officers and members of that society, he shall file the same; and upon issuance of the annual report shall supply such auxiliary society with a sufficient number of volumes to provide one for each of its members. He shall also transmit the names of such officers and members, with their postoffice addresses, to the secretary of any and all experiment stations and societies willing to supply bulletins and reports; and to the national department of agriculture for the same purpose; and the secretary shall issue to such auxiliary society a certificate of membership for the year.

5th. Reports of auxiliary societies shall be made to the secretary of this society on or before the fifteenth day of January of each year, and shall include the officers for the ensuing year and a statement of the proceedings of such society during the past year, which shall be incorporated into the annual report of the preceding year.

6th. Any local horticultural society in the State may become auxiliary to this society by the annual payment of twenty-five cents for each of its members. Such auxiliary society will be entitled to send one delegate to the annual meeting of this society, said delegate's expenses to be paid by this society.

XIII.—AMENDMENTS, ADDITIONS, SUSPENSIONS.

1st. Amendments or additions to these by-laws may be made by a majority vote of the executive board, at any meeting; but if objection shall be made the same shall "lie upon the table" till the next regular meeting of the board.

2d. These by-laws, or any one or more of them, may be suspended for the time, by order of a majority of all the members of the society present and voting.

3d. A proposition in the general meeting of the society, for the amendment or addition to these by-laws shall be referred to the executive board for consideration and decision; but the society may submit therewith its advice or request.

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