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1908

THE

Fruit Growers Association

of Adams County

Pennsylvania

ORGANIZED DECEMBER 18, 1903

PROCEEDINGS

of the

FOURTH ANNUAL CONVENTION

held in

FRUIT GROWERS HALL, BENDERSVILLE, PA.

WEDNESDAY, THURSDAY AND FRIDAY

DEC. 16, 17, 18, 1908

Officers

President,	Robert M. Eldon,	Aspers
Vice President,	A. I. Weidner,	Arendtsville
Recording Secretary,	Josiah W. Prickett,	Biglerville
Corresponding Secretary,	Edwin C. Tyson,	Flora Dale
Treasurer,	Wm. S. Adams,	Aspers

Executive Committee

Robert M. Eldon,	Aspers
Josiah W. Prickett,	Biglerville
Chester J. Tyson,	Flora Dale
Robert Garrettson,	Aspers
John H. Peters,	Bendersville

Membership Roll

Adams, Wm. S.,	Aspers, Pa.
Asper, D. C.,	Aspers, Pa.
Anderson, H. W.,	Stewartstown, Pa.
Adams, Mrs. W. S.,	Aspers, Pa.
Asper, Chas. F.,	Aspers, Pa.
Bream, Samuel,	Biglerville, Pa.
Bream, Dill,	Bendersville, Pa.
Bream, Wm. E.,	Biglerville, Pa.
Boyer, W. W.,	Arendtsville, Pa.
Black, Wm. H.,	Flora Dale, Pa.
Bream, H. J.,	Aspers, Pa.
Baugher, H. G.,	Aspers, Pa.
Bucher, John,	Bendersville, Pa.
Bender, Lee M.,	Martinsburg, W. Va.
Baugher, Martin,	Aspers, Pa.
Baugher, Ira,	Aspers, Pa.
Boyer, Martin,	Biglerville, Pa.
Belt, J. E.,	Wellsville, Pa.
Butt, J. L.,	Gettysburg, Pa.
Cocklin, Miss Alice,	Bowmansdale, Pa.
Cook, Arthur E.,	Aspers, Pa.
Cook, Harris,	Aspers, Pa.
Cox, U. T.,	Proctorsville, O.
Crawford, Jno. B.,	Fayetteville, Pa.
Cushman, G. R.,	Baltimore, Md.
Deardorf, Anthony,	Mummasburg, Pa.
Eldon, Robert M.,	Aspers, Pa.
Engle, E. B.,	Harrisburg, Pa.
Eldon, Miss Margaret,	Aspers, Pa.
Eppleman, John,	Aspers, Pa.
Finnefrock, Thos.,	Bendersville, Pa.
Fohl, Geo.,	Biglerville, Pa.
Fiddler, F. B.,	Aspers, Pa.
Forney, D. J.,	Gettysburg, Pa.
Griest, C. Arthur,	Guernsey, Pa.
Griest, C. S.,	Guernsey, Pa.
Garrettson, J. V.,	Aspers, Pa.
Garrettson, Frank,	Aspers, Pa.
Garrettson, Eli P.,	Biglerville, Pa.
Grove, W. E.,	York Springs, Pa.
Garrettson, J. B.,	Aspers, Pa.
Garrettson, Robert,	Aspers, Pa.
Garrettson, John,	Aspers, Pa.
Griest, A. W.,	Baltimore, Md.

Gardner, L. M., Jr., ... York Springs, Pa.
Griest, Frederic E., ... Philadelphia, Pa.
Griest, Mrs. C. A., ... Guernsey, Pa.
Gochnauer, S. B., ... Bendersville, Pa.

Haskell, H. F., ... Uriah, Pa.
Hoffman, W. C., ... Biglerville, Pa.
Hoffman, E. N., ... Biglerville, Pa.
Hiester, Gabriel, ... Harrisburg, Pa.
Heyser, Wm., ... Jack's Mountain, Pa.
Harrison, Orlando, ... Berlin, Md.
House, O. P., ... Aspers, Pa.
Harris, Edwin, ... Aspers, Pa.
Hoffman, Clarence, ... Biglerville, Pa.

Keller, H. M., ... Gettysburg, R. F. D. No. 5, Pa.
Klinefelter, U. S., ... Biglerville, Pa.
Kane, J. A., ... Biglerville, Pa.
Koons, Dr. P. R., ... Mechanicsburg, Pa.

Longsdorf, C. L., ... Flora Dale, Pa.
Lawver, Rufus W., ... Biglerville, Pa.
Longsdorf, Dr. H. H., ... Dickinson, Pa.
Longsdorf, Paul W., ... Flora Dale, Pa.

Michener, Chas., ... Guernsey, Pa.
Myers, George, ... Biglerville, Pa.
McIlhenny, Wm. B., ... Gettysburg, Pa.
McDermad, John A., ... Aspers, Pa.
McKay, Geo. H., ... Philadelphia, Pa.
McClean, Wm. Arch. .... Gettysburg, Pa.
Mayer, Dr. I. H., ... Willow Street, Pa.
McKay, Miss Harriett, ... Philadelphia, Pa.
Michener, Mrs. Chas., ... Aspers, Pa.
Morrison, Mrs. W. S., ... Aspers, Pa.
McBeth, Jas. A., ... Aspers, Pa.
Miller, John H., ... Aspers, Pa.
Minnich, D. N., ... Chambersburg, Pa.

Osborne, C. L., ... Aspers, Pa.
Oyler, Geo., ... Gettysburg, Pa.
Ogden, David, ... Aspers, Pa.

Prickett, J. W., ... Biglerville, Pa.
Peters, J. H., ... Bendersville, Pa.
Petrey, Thos. W., ... Bendersville, Pa.
Peters, Earl, ... Mt. Holly Springs, Pa.
Peters, W. R., ... Aspers, Pa.
Pitzer, Harry C., ... Aspers, Pa.
Patterson, Jas. A., ... Stewartstown, Pa.
Pratt, B. G., ... New York City.
Peters, Curtis, ... Biglerville, Pa.
Prickett, Mrs. E. M. G., ... Biglerville, Pa.

Raffensperger, Chas. E.,	Arendtsville, Pa.
Raffensperger, Mrs. Lizzie J.,	Arendtsville, Pa.
Rice, E. E.,	Aspers, Pa.
Routzahn, George R.,	Bendersville, Pa.
Routzahn, Harry,	Bendersville, Pa.
Rice, C. E.,	Biglerville, Pa.
Rice, C. S.,	Arendtsville, Pa.
Rice, Oscar C.,	Arendtsville, Pa.
Rinehart, E. S.,	Mercersburg, Pa.
Sandoe, H. P.,	Biglerville, Pa.
Satterthwaite, A. F.,	Harrisburg, Pa.
Snyder, W. L.,	Bendersville, Pa.
Stover, Dr. J. G.,	Bendersville, Pa.
Stover, Mrs. Dr. J. G.,	Bendersville, Pa.
Slaybaugh, E. B.,	Aspers, Pa.
Slaybaugh, Elmer,	Aspers, Pa.
Smith, G. Frank,	Aspers, Pa.
Shank, C. G.,	Biglerville, Pa.
Smith, J. H.,	Biglerville, Pa.
Sheely, Mrs. Angelina,	Aspers, Pa.
Schlosser, Ira,	Aspers, Pa.
Shull, Jno. A.,	Tillie, Pa.
Shull, Robt. H.,	Tillie, Pa.
Stoner, C. A.,	Gettysburg, Pa.
Tyson, Edwin C.,	Flora Dale, Pa.
Tyson, Chester J.,	Flora Dale, Pa.
Tyson, Wm. C.,	Guernsey, Pa.
Taylor, I. P.,	Biglerville, Pa.
Thilow, J. Otto,	Philadelphia, Pa.
Turner, Chas. L.,	Philadelphia, Pa.
Tyson, Mrs. B. H.,	Aspers, Pa.
Tyson, Mrs. M. W.,	Flora Dale, Pa.
Tyson, Mrs. M. E.,	Guernsey, Pa.
Weidner, A. I.,	Arendtsville, Pa.
Wolfe, C. A.,	Aspers, Pa.
Weaver, Mrs. C. M.,	New Oxford, Pa.
Wilson, B. F.,	Biglerville, Pa.
Weaner, Chas. C.,	Bendersville, Pa.
Wert, R. S.,	Biglerville, Pa.
Wertz, D. M.,	Quincy, Pa.
Weidner, Geo.,	Aspers, Pa.
Wolfe, Harry,	Aspers, Pa.

CONSTITUTION

PREAMBLE.

Being interested in fruit growing and believing that, by organization, we may materially advance our common interests, we hereby adopt the following Constitution and By-Laws:

ARTICLE I.—*Name.*

This Association shall be known as The Fruit Growers' Association of Adams County.

ARTICLE II.—*Object.*

The object of this Association shall be to encourage the co-operation of the fruit growers of Adams County for the protection and advancement of their common interests.

1st. By securing and disseminating such scientific and practical information as shall promote the general advancement of the fruit growing interests in this county, and shall tend to the improvement of the quality and quantity of our products.

2d. By securing such legislation as may be advantageous, and preventing that which may be detrimental.

3d. By securing such improved facilities in transportation as shall tend to give us more expeditious and economical distribution.

4th. By endeavoring to secure a better and more uniform system of packing and package.

5th. By devising some system of marketing our products which will open up and develop the markets and give to the grower a fair and remunerative return.

6th. And by endeavoring to obtain such improved systems of crop reporting as shall furnish, through co-operation with other similar Associations, accurate information concerning production; thereby enabling the fruit grower to know the exact situation.

ARTICLE III.—*Membership.*

1st. Candidates for membership may be elected by a majority vote of the members present, and upon the payment of $1.00 into the treasury shall be entitled to membership until the next Annual Meeting.

2d. Any member may renew his membership by the payment of annual dues, but upon failure to pay dues within three months after Annual Meeting, shall require re-election.

3d. No member shall receive the benefit of commissions or of co-operative buying by the Association, to an amount greater than $1.00 for the term of one year after election to membership.

ARTICLE IV.—*Dues.*

The annual dues of this Association shall be One Dollar ($1.00) payable to the treasurer at the meeting immediately preceding the annual meeting, for which the treasurer shall issue a receipt, this receipt to constitute a certificate of membership for the succeeding year.

ARTICLE V.—*Officers.*

Its officers shall consist of a President, one Vice President, a Recording Secretary, a Corresponding Secretary, a Treasurer, and an Executive Committee of five (5) members, consisting of the President, Recording Secretary and three others, all of whom shall be elected by ballot at each annual meeting for the term of one year or until their successors shall be chosen.

ARTICLE VI.—*Quorum.*

Five (5) members shall constitute a quorum for the transaction of business.

ARTICLE VII.—*Amendments.*

The Constitution and By-Laws of this Association may be amended at any regular meeting by a two-thirds vote of the members present, a notice of the proposed amendment having been presented in writing at a previous regular meeting.

BY-LAWS

ARTICLE I.—*Duties of President.*

The President shall preside at all meetings of the Association and have a general supervision of its affairs.

ARTICLE II.—*Duties of Vice President.*

The Vice President shall preside at any meeting in the absence of the President, and may act on the Executive Committee in case of the President's absence.

ARTICLE III.—*Duties of Recording Secretary.*

The Recording Secretary shall write the minutes of the meetings of the Association and have charge of its Records and Reports.

ARTICLE IV.—*Duties of Corresponding Secretary.*

The Corresponding Secretary shall conduct the correspondence of the Association and shall receive for so doing his necessary expenses for stationery, postage, etc. He shall also act as Recording Secretary in the absence of that officer.

ARTICLE V.—*Duties of Treasurer.*

The Treasurer shall receive and keep an accurate account of all moneys belonging to the Association, paying out same on an order of the Association, signed by the President. He shall make a report of all receipts and disbursements at the annual meeting or at any time at the request of the Association. He shall mail a notice of dues to all members one week prior to the November meeting, at which time all dues are payable, and shall issue certificates of membership in exchange for all dues received. He shall also keep a roll of members who have complied with Article IV, of the Constitution and embody same in his annual report.

ARTICLE VI.—*Duties of the Executive Committee.*

The Executive Committee shall have general supervision of the affairs of the Association, auditing all bills and accounts and carrying out the purposes of the Association. They shall also prepare a program for each meeting, same to be announced at the preceding meeting.

ARTICLE VII.—*Meetings.*

There shall be a regular meeting of the Association on the second Saturday of each month at 7:30 P. M., unless otherwise ordered. The meeting held in December to be regarded as the Annual Meeting. Special meetings may be convened by the Executive Committee at such time as they may appoint.

ARTICLE VIII.—*Inititation of Officers.*

All new officers shall assume the duties of office at the opening of the meeting immediately following the one at which they were elected. Except that the newly appointed Executive Committee shall prepare and announce at the January meeting the program for the February meeting.

ARTICLE IX.—*Order of Business.*

1st. Reading of minutes of previous meeting.
2nd. Nominations and elections.
3rd. Reports of committees.
4th. Deferred business.
5th. Communications.
6th. New business.
7th. Discussion of questions.

PROCEEDINGS

OF THE

FOURTH ANNUAL CONVENTION

OF THE

FRUIT GROWERS ASSOCIATION

OF

ADAMS COUNTY, PA.

The Fourth Annual Convention of the Fruit Growers' Association of Adams County was called to order by the President, Robert M. Eldon, at 2:00 p. m., Wednesday, December 16, 1908, in Fruit Growers' Hall, Bendersville, Pa.

After prayer by the Rev. J. H. Peters, President Eldon addressed the convention briefly.

PRESIDENT'S ADDRESS.

ROBERT M. ELDON.

We are unable to tell, as we did a year ago, of fat crops in the orchards of Adams County. Several things are to blame for this. First: The off year; it seems that the even numbered years on the calendar are the years of light fruit crops in our county. Perhaps I should say that they are the years of light apple crops. Our friends and kindly critics from a distance will say that the grower is at fault and not the calendar. That if we thinned the fruit thoroughly there would be no "off year." It would certainly improve the fruit and almost as certainly improve the gross returns if we thinned the fruit on our heavy-bearing main crop variety. The red apple of the unmentionable name, which is not built on the bearing plan of the York Imperial, is almost a regular cropper. Let us hope that the "Utilization of Cull Apples," discussion will clearly point to us the way to avoid producing that large volume of fruit now directed towards the dry-house and vinegar-still.

Second. The poor spraying season. Too much storm and rain at spraying time. This was true at the time of spraying for scale as well as at the time of spraying for fungi and codling moth. We need variable breezes to do a good job of spraying, and during last season the winds had the directional consistency of the trades. The continuous rains and fogs rendered abortive the application of even the best-sticking arsenites.

Owing to the light setting of apples many of our growers did not think it worth while to spray a second time for the codling moth, which omission resulted in many otherwise fine apples being nibbled on the outside by the apple worm. The late dry summer and autumn allowed the scale to take an extra turn in its geometrical progress. Most of our growers report the apparent ineffectiveness of their operations against this enemy.

Much interest has been shown by our members at the monthly meetings in the handling of orchards, especially the young orchard, the discussion centering about tillage and cover crops. But as a special resume of the minutes of these meetings is to be given by one of our members as a part of the convention program, I need not dwell on this item.

Your chairman is especially pleased with the fruit exhibit. With its quality, which in his judgment is the best that has been seen at these conventions, and with the increasing number of exhibitors. There are a number of new names on plates of very creditable fruit. We begin to feel that there is a possibility of getting the award for the best display by a county at the State Society's meeting. There are indications that other counties are awakening to the advantage of having the best fruit in the best order at these meetings, and it is certain that the others are not going to allow us to win by default. We must have the best fruit and I want to urge upon our members as individuals to help along with our display at Harrisburg. You can get no better advertising at any price. In intending to enter a competition of this kind it seems to me that there is a definite course to follow. Do the work yourself. Don't trust to the help in this particular, and do not imagine that the fruit taken from your barrel or bin *at exhibition time* is going to be tagged with a best label. Go to the trees *at picking time* and get the apples that you have had your eye on all summer before the picking gang has had an opportunity to maltreat them. Put them in your own private basket. Tote them personally from the orchard to a convenient place and see that they are carefully packed and forthwith sent to a responsible storage place. If you are going to exhibit fruit on PLATES don't use the modern flimsy apple box or the still more flimsy basket, but get a good and strong old hayseed variety of a box, one that the expressman can do his worst on, you are not going to sell them by the box anyway, and your turn to laugh will be last and best. If you carefully follow these simple directions, and had in the beginning the best fruit, the chair sees no reason for disappointment.

Attend the State Society's meeting and have your name placed on its roll. It is in no sense our rival, and it does not matter in the least whether our own convention may chance to be as good or even better, you can get some things there that you cannot get here. Enough to make it well worth your trouble and the slight expense. To those present who are not members of the Fruit Growers Association of Adams County, I would say, become members at once. It is worth while.

You are all cordially welcomed to this Fourth Annual Convention of Adams County fruit growers. I feel confident that you will be pleased with the work of our very excellent Convention Committee.

I will appoint the following committees:

In Charge of Evening Sessions:

Dill Bream, Bendersville, Pa.
Robert Garretson, Aspers, Pa.
M. E. Snyder, Bendersville, Pa.

To Report on Fruit:

Horace Roberts, Moorestown, N. J., New Jersey State Horticultural Association.
D. Gold Miller, Inwood, W. Va., West Virginia State Horticultural Association.
U. T. Cox, Proctorville, O., Ohio State Horticultural Association.

On Resolutions:

Chester J. Tyson, Flora Dale, Pa.
Dr. I. H. Mayer, Willow Street, Pa.
A. I. Weidner, Arendtsville, Pa.

SYNOPSIS OF 1908 MINUTES FRUIT GROWERS ASSOCIATION OF ADAMS COUNTY.

W. H. BLACK.

With the thought that a short review of the work of the Association during the past year may prove of interest to visitors and to those of our members who by reason of distance have been unable to regularly attend the monthly meetings, I have been requested to prepare a synopsis of the 1908 minutes. I shall refer briefly to various matters concerning our business of growing and marketing fruit which have claimed our attention.

January Meeting.

Under "Points Gathered in Handling Apple Crop of 1907," J. W. Prickett said that he proposes hereafter to have enough crates to take all culls from the sorting tables direct to bins or piles, preferably under cover, to save one handling, and so as to have all together for the inspection of prospective buyers. Other members have also found this plan very satisfactory. A number of members emphasized the importance of purchasing barrels early and hauling them home so as to avoid the vexatious and expensive delay at packing time which we have frequently experienced. If fruit is sold in the orchard, buyers are always glad to take the barrels.

The experience of members in regard to several pickings from the same trees, varies in results. The general opinion is that small and low colored fruit gained in size and color when left on the trees a week or ten days longer.

Messrs. Eldon and Chester Tyson, who were sent to the annual meeting of the New Jersey State Horticultural Association as delegates from our State Horticultural Association, made a lengthy and interesting report of their trip. They mentioned specially the royal entertainment they received at the hands of the New Jersey people, and that they were impressed by the great freedom and wide scope of the discussion. They also gave an instructive account of their sojourn among the fruit dealers and cold storage men of Philadelphia, giving their side of the barreling, packing, facing and barrel nailing questions.

In reply to W. W. Boyer's question "What apple trees to plant," it was suggested that for the home orchard a succession of good varieties would include Yellow Transparent, Early Ripe, Bachelor Blush, Summer Rambo, Wealthy, Smokehouse, Baldwin, Grimes Golden, Rome Beauty, Stayman and York Imperial. For a commercial orchard plant a good number of York Imperial. If you already have a liberal supply of that variety, then plant Stayman Winesap, Jonathan, Grimes, and Rome Beauty, but *always enough of a kind* to make a carload when in fair bearing.

In reply to question "Is it safe at this time of year to cut back to a definite bud?" one member said he had often disregarded common counsel by pruning when the wood is frozen and has seen no ill results.

February Meeting.

J. W. Prickett reviewed the first and last days' sessions of our recent convention, which led to a discussion of the relative merits of bags and baskets in apple picking. Mr. Prickett would hesitate in following Geo. Powell's suggestion to plant dwarf apple trees as not founded on experience. He called attention to the importance of the crop reports issued quarterly by the New York Association, and the general advantage of co-operative work.

Mr. A. I. Weidner gave an interesting report of the Lancaster Meeting of the Pennsylvania Horticultural Association. Our County Association again carried off the Sweepstakes Certificate of Merit for the largest and finest display of apples, and our President, R. M. Eldon, won the certificate for the best individual exhibit.

March Meeting.

R. M. Eldon expressed the belief that it will pay well to plant locust on vacant hillsides, it being a most desirable tree and a rapid grower, often attaining a diameter of a foot in fifteen years. He purchased seed at 25 cents a pound, which he will plant. He could buy trees at from $1.00 to $2.00 per m, for twelve to eighteen inch trees. (On account of the danger of importing the locust borer, the planting of the seed seems the safer plan.)

In discussion of the "Labor Question," it was shown that New York has sufficient *native* help, while New Jersey, being near "Castle Garden," employs many Italians. It is thought that we can follow the New York plan for some years.

John A. McDermad discussing the question, "Should we have a Legislative Committee?" gave good reasons in the affirmative, and C. L. Longsdorf, John A. McDermad, and W. H. Black were assigned that work.

April Meeting.

W. H. Black read a paper on "Fungous Growth from a Technical Standpoint," in which he designated Fungi as of two classes, those of external growth, and those of internal growth. The former, the much smaller class, because of their accessibility, are more readily and successfully treated, while the internal fungi, because the Mycelium, or root system, penetrates the tissue and spreads beneath the surface, must be treated while still on the outside. The necessity of rendering leaf, bough and fruit immune to fungous attacks by spraying *before* the floating spores can reach them was strongly emphasized.

Under call for reports on fruit buds and winter orchard experience, it was stated that all kinds of fruit buds are in good condition. Some damage was done by rabbits to unprotected trees.

June Meeting.

The Secretary read a letter from Secretary Critchfield in which he expresses satisfaction with our spraying reports. Blanks will be furnished at once that members may report their individual experience for the current year.

Attention was called to the action taken by other states looking toward more stringent packing and package laws, and the Legislative Committee was requested to secure information and report.

C. A. Wolfe said that all fruits and potatoes are benefitted by spraying for fungous diseases, bordeaux being the standard material. He recommended 5-5-50 for apples and potatoes and a weaker solution for stone fruits. J. H. Peters has applied 2-4-50 to peach with good results and no damage, while applications of 3-4-50 and 4-4-50 had damaged fruit and foliage.

A large number of members reported on "The Fruit Outlook," showing the following average condition compared with a full crop:

Summer apples 67 per cent., Winter apples 16 per cent., peaches 75 per cent., pears 88 per cent., plums 100 per cent., cherries 88 per cent.

Several members report damage by scale to sweet cherries.

Attention was called to the rotting of the bark of apple trees just below the surface of the ground. The symptoms seem to be those of the collar rot.

The Ida cherry was reported very satisfactory.

July Meeting.

The Legislative Committee made a lengthy report on the package and packing laws of a number of states and Canada and directed our attention to the lack of uniformity. The Association declined, with thanks, the invitation to exhibit at the Spokane Apple Show on account of the distance and this being our "off year."

H. M. Keller, reporting on "Cover Crops," thinks red clover leads. A. I. Weidner prefers crimson clover. His experiments showed a yield, root and branch, of 45 tons of green and of ten tons of dry product per acre. Other members find crimson clover difficult to cover with disk or plow and not suitable among peach when it is desired to depend on harrow for the spring cultivating. C. L. Longsdorf made a special plea for crimson clover and objects to fall plowing of orchards, as a cover crop is essential to prevent leaching and loss of potash.

A recent interview by a member with the Chief Forester of the Pennsylvania Railroad, confirms the report that the Locust Borer is giving the road much trouble in its extensive planting of the locust.

August Meeting.

Further reports on packing laws in other states were read.

Mr. McKay attacked the plan of the American Apple Growers Congress which suggests a 10 per cent. margin of imperfection on No. 1 fruit, and 20 per cent. on No. 2 fruit, believing that a margin of that kind would be used as an excuse for poor packing.

R. M. Eldon believes "there is no profit in peaches without thinning. No more should be left than the tree will mature without impairing its future usefulness." Said that "fifty seven-year-old trees, is a good day's work for one man. Thinning is a matter of judgment and the boss should be on the job *all the time.*" The fruit he is now picking does not run over six or eight per cent. of imperfect specimens.

The Corresponding Secretary was instructed to assure State College of our willingness to co-operate in their effort to secure a legislative appropriation for the purpose of erecting a suitable building for the use of the Horticultural Department of the College.

September Meeting.

Under general discussion of "Small Fruits," cut straw seemed to be the favorite mulch for strawberries. The heading back of raspberry canes in June seems to be a general practice, and the shortening of bearing grape vines a little later is advocated.

In reply to a request for information, J. W. Prickett says he uses Bordeaux, 6-6-50 for apple leaf blight.

Chas. Osborne said his best market for cull apples is in the form of cider and vinegar. He has a local market for all the cider he can make.

A very large, round, showy seedling peach from the Connecticut orchard of J. H. Hale was exhibited and when cut and sampled was found to be a perfect free stone and with delicious flavor. Mr. Hale has 1,000 trees of this unnamed variety ready to market now.

October Meeting.

A communication from H. W. Collingwood, Editor of the Rural New Yorker, led to a discussion of the stock food and manurial values of apple pomace. The general opinion seems to be that it has little value in either case.

W. H. Black made a strong plea for honest packing and selling methods as being good business as well as good morals.

The Association agreed to donate the fruit we exhibit at Harrisburg to Prof. Watts for class use.

"The Handling and Use of Hen Manure," was the topic referred to J. H. Peters. He removes it frequently and broadcasts it in the orchards, being careful not to let it touch the trunks. When he applied it around the trunks of peach trees to keep out borers, a number of trees were killed and others injured.

To prevent wilting, Robert Eldon heads up Grimes Golden and York Stripe in paper lined barrels and they come out fresh and plump.

W. S. Adams reports that he planted 500 plum trees as fillers in a four acre apple orchard. Although grafted on plum roots, about 20 per cent succumbed to diseases incident to peach trees. The trees sprayed with "Pyrox" were free of rot, and yielded about two and a half bushels to the tree. Red June and Wickson were the best sellers. He found it best to ship to a number of dealers as four or five carriers is about the daily limit of each dealer.

The Secretary read a copy of the laws of the State of Washington for the control of the Commission business, with the view of arousing interest in a similar law in Pennsylvania. No action was taken.

November Meeting.

"Pruning Peach Trees" was discussed by R. M. Eldon. He headed his last planting at the end of the first and again at the end of the second year, cutting off about half the year's growth. It made a thick compact head. He questions the value of the system and cited several large profitable orchards which are tall, apparently not having been trimmed.

Fall planting of apple was strongly advocated by many members.

December Meeting.

Frank Garrettson plants strawberries in the spring as early as possible, sets plants with line and dibble, rows about 28 inches and plants 24 inches apart, applies about 1,000 pounds 2-8-10 fertilizer per acre in June and cultivates continually till late fall—sets two runners on each side of parent plant—mulches with strawy manure. Prefers variety called Dornan, which has a perfect blossom. After crop has been harvested mows tops with machine and removes with horse rake, plows spaces and harrows both ways with spring-tooth harrow. This removes some plants but there are plenty left. Destroys bed after second crop which usually is the best.

Attention was directed to growing demand for good fruit in Europe which America should supply, and that crown gall is now less seriously regarded than formerly.

We shall be glad to receive into membership with us, anyone interested in fruit, either as grower, handler or consumer, and for the information of any who may feel like joining the Association I will read article three of the constitution:

Section 1. Candidates for membership may be elected by a majority vote of the members present, and upon the payment of

$1.00 into the treasury shall be entitled to membership until the next annual meeting.

Section 2. Any member may renew his membership by the payment of annual dues, but upon failure to pay dues within three months after annual meeting, shall require re-election.

Section 3. No member shall receive the benefit of commissions or of co-operative buying by the Association, to an amount greater than $1.00 for the term of one year after election to membership.

Any member of the Association will be glad to present your name.

PROFITABLE PEACH GROWING.

JOSEPH BARTON, MARLTON, N. J.

Mr. President, Ladies and Gentlemen:

I want to say in the beginning, it is a pleasure for Mr. Roberts and myself to be here, but I give you fair warning that we expect to take back as much as we can get and in listening to the reading of your monthly minutes, I feel that you are more thoroughly alive to your work than we are. We have been growing peaches ten years, but in discussing the question here, we are somewhat at a disadvantage, you and I, because your problems are not our problems. I feel that we differ in three essential particulars. First, in the soil conditions; secondly, in the climatic conditions; and thirdly, in our market opportunities. The low sandy soils of Jersey present different problems than your hillsides. With us much depends upon our air drainage. Of course, your hills regulate that for you; and our market conditions, because we are nearer to them than you are, gives us the advantage in that respect. Your conditions are not our conditions and, therefore, as I said before, we are at a disadvantage which I will bear in mind all the time as I go along. I am just giving you our personal experience in growing a little fruit. First, in the setting of the orchard, we always pay more attention to our air drainage than any other one thing, soil conditions being equal. If we can get a gentle slope, we consider it a strong advantage for a piece of ground. In the matter of distance of setting on good soil, we feel that 20x20 is as close as we dare put them. Our deep, sandy soil naturally does not grow as large a tree as some other soils. We get down as low as 15x20 ft. in some instances, but usually 18x20 ft. is about right with us. I have always stood for a strong big tree. I have had that disputed many times, but we certainly have had our best results with a large strong tree. We always plant trees in fall or early winter and we believe very thoroughly in fall or winter setting. We want the open, spreading top tree.

Mr. Peters. How do you prune those trees?

Mr. Barton. When we set a tree we will cut it down to a foot to a foot and a half from the ground. They will throw out three or four sets of limbs and at the end of the first year when we come to trim them, we cut out some of the branches and so you

see we have four or five good large branches and the tree is open right from the start.

Mr. Peters. Do they generally sprout out about where you would like to have them?

Mr. Barton. Our experience is that they start pretty close to the ground, after the tree is set and headed back that way. In the first two or three years of the life of that tree, I think there is nothing more important than thorough cultivation. We think that thorough cultivation pushes the tree and I don't think you can push a peach tree too hard for the first two and one-half years. Now the crops that we grow in those trees are potatoes, sweet-potatoes, melons and cantaloupes. The frequent cultivation of the truck crops results in a good growth of the young orchard. The second year, it is just about the same proposition and, after the second year, you cannot grow most crops because the tree is so large that you want a single row crop; and, after the third year, the cultivation depends on the size of the tree. We have an orchard five or six years old where there is a great quantity of humus, making the orchard very rank and we are going to cut out cultivation altogether till late in May. Last year we had a magnificent set of fruit although we lost quite a lot of it. So as I say the cultivation depends largely on the existing conditions. If the orchard is slack in growth you want to cultivate it early and keep it going as long as you can.

In trimming, as I said, the two main points that we think we are after are air and sunshine. Therefore, we start low to get the tree down to the ground and accomplish this by cutting out the head, then when the tree becomes full of fruit, the sun will come right down through and ripen it up. The second year, we cut out everything that runs toward the center; the third year, we do practically the same, and after that the trimming will depend on whether the tree has got too thick on you. Last year, to prevent loss by frost, we left a lot of wood, but we got through without frost and this year puts us up against cleaning out the wood that we left last year.

When you get a low spreading tree, it makes it easy to pick, easy to spray and easy to trim. I have picked as high as 500 baskets to the acre and never had a ladder in the orchard. You can't do that with high trees. Of course, in farming under these trees, you must have low machines, with extension heads, etc., with which to do it. You can't do it with the old-fashioned method of plowing with one horse.

When we come to the enemies of the peach, there are many; a lot of them, I need say nothing about. The yellows: you probably all know the indications. The only thing that we think of doing is to tear it out as soon as we see it. Don't drag it through the orchard or take any chances whatever. Dig it out immediately and burn it on the stump.

More trouble to us than the yellows, is the "little peach." It is worse than the yellows in that it is quicker. It will put a tree out of commission a year sooner than the yellows will. The peach is not only small but the seed is correspondingly small. The leaves are stunted and also if you take the leaves between the eye and the sun there is a spotted condition. We do the same with that as with the yellows and in wet seasons we have most trouble to hold it down. It gets a little ahead of us. Scientific men see no reason why it should. We feel that it is our greatest menace, and if you haven't got it you want to be on the lookout.

We dig out the borers in the fall. If you get them out anytime before the 20th of May you are all right. We don't use any wash on trunks. We used to whitewash them but never saw that it had any effect at all. We take the dirt away to prevent the ravages of the mice. They seem to have a regular home in there, and do us a lot of damage.

We have no trouble in holding the scale in check on the peach by spraying with the sulphur and lime. We feel this has a threefold function: takes care of the scale and leaf-curl and has proven a safe guard to a considerable extent against summer rot. Since we have taken that up, we have never been bothered with leaf-curl. As I said in the beginning, we have not done as much work on summer spraying for fungous troubles as you have through here. This fall I was over at Mr. Wertz' in the Cumberland Valley, and he had used sulphur and lime somewhat through the summer, also bordeaux mixture, but his results seemed indefinite.

W. E. Grove. How much lime and bordeaux for peach?

Mr. Barton. 2-10-50.

Mr. Peters. Is it possible that you get too much lime?

Mr. Barton. There is a point there. I don't think with 2-10-50 we would.

Mr. Peters. I used 2-4-50 with good results.

Mr. Barton. Our fertilizing is taken care of through the truck crops in the early life of the orchard. After an orchard begins to bear, we use a half-ton of muriate of potash and phosphoric acid per acre and that, in addition to the green mulch, gives us as rank an orchard as we can take care of. We have used crimson clover to the extent of getting in a very dangerous condition and this year we shall use no more than one-half the above application of fertilizer, unless it is a little nitrate of soda as a medicine where there is a sick-tree. After the fruit is thoroughly set in the spring, we would use about 100 pounds to the acre of nitrate of soda on an orchard which has cropped heavily the year before. But in a general way, I would caution against any heavy application of nitrate.

You do not make as great a growth up here in your hills as we do in our sandy soil and you can stand a little more bordeaux, a little more copper sulphate, than we can because your foliage is a little harder. We don't get as hard foliage and we expect to cut a little of that foliage out with the bordeaux, but we are glad to get rid of it for the sake of getting a little more air. Remember that our orchards are almost level. In many ways, we are up against a much harder proposition than you are on that one vital question. If we get a little air drainage, it is very slight. We cannot grow the later varieties, coming after the fall storms begin, so you will notice, as I name over a list, that we are growing early and midseason fruit. You will notice that we are holding to Greensboro. When Maryland and Delaware don't have a crop, which they seldom seem to have, our early, poor varieties bring good money. We got rid

of Greensboro at $1.00 a crate right there at home this year. Last year they brought something like $2.50, and if it isn't much good it has been a good proposition for us. Carman: there is a peach that is going to be a good one. Champion: on poor ground succeeds well, on good soil it rots badly. Don't farm it. Then there are the standard varieties, such as Crawford's Early, Elberta (which stands at the head of the list in our market), Crawford's Late, Old Mixon, Stump, etc.

We are right there, within an easy carting distance of Philadelphia, and easy shipping facilities for New York. Our fruit is on the market within a few hours from the time it leaves the orchard, therefore, we can handle some of the softer varieties.

In conclusion, I might say that the peach yields us the biggest returns of anything we grow. Last year we got $2,300.00 off of one block of four acres.

Mr. Miller. What is the life of the peach tree?

Mr. Barton. I cannot tell. We lost our first orchard, set out in '98, last year, but it went out on "little peach."

Mr. Miller. How about Salway?

Mr. Barton. We cannot do anything with it. Mr. Roberts has had experience with that. Did it do any good?

Mr. Roberts. The fungus is bad on it.

Mr. Prickett. Did you ever try painting the peach trees to keep out borers?

Mr. Barton. No, we did use a coat of whitewash containing some wood ashes, but we have stopped and see no difference since we stopped.

Member. To what extent do you thin your peaches?

Mr. Barton. We do most of our thinning with shears in the winter. We have less wood.

Mr. W. H. Black. What tools do you use for cultivating?

Mr. Barton. Clark disc orchard harrow. One that we can get right up to them when we want to go in close.

Mr. R. M. Eldon. Your land is sandy you say. You don't need anything to break up your soil. Can you destroy your cover crop in the spring?

Mr. Barton. Yes. We run this disc over two or three ways, two or three times.

FORESTRY AND ITS RELATION TO HORTICULTURE.

Hugh P. Baker, *U. S. Forest Service, in Charge Department of Forestry of the Penna. State College.*

Mr. President, Members of the Adams Co. Fruit Growers Association:

Only a few years ago forestry was practically a new word in this country. People knew that it had to do with trees, but even yet its actual meaning is not clear to all, although the interest taken by people of all classes in the protection of our forests and their perpetuation is surprising. One can hardly pick up a newspaper or a magazine to-day without finding numerous news and notes and often splendidly illustrated articles on the development of forestry in the different states and throughout the country.

Forestry of Ancient Origin.

Because the present forestry movement is of recent origin in this country does not argue that it is a new practice or profession. Japan has practiced forestry for the past twelve hundred years, and Germany and other countries of Europe have had well developed systems of forestry for the past one hundred years or more. Even in this country during our Colonial period those who made our laws and considered the future of our country kept the protection of our forests constantly in mind and many regulations were passed in the behalf of the forest. Exeter, which is now the State of New Hampshire, as early as 1640 made regulations as to the protection of forests and the planting of oak. William Penn, in 1682, ordained that "the grantee must keep one-sixth of his land in forest." As early as 1780 all of the thirteen colonies had forest fire laws. Before 1820 our government had appropriated considerable sums for the purchase of forest lands to provide for future supplies of ship-building timber, and even went so far as to begin the planting of live oak forests. It is somewhat surprising in view of the early efforts of our thirteen colonies and later of the United States, that our Congress during the past year could find no precedent for the purchase of lands in the Applachian and White Mountains to be reserved for the protection of the head waters of navigable streams. But all the early laws regarding the protection and perpetuation of forests soon became obsolete, because of the vastness of the forests and the tremendous struggle which our forefathers had in subduing the forests for agricultural purposes. The forests harbored the marauding Indian, and as the early settlers pushed west, they cleared the forests not only for the development of agriculture, but to protect their homes against wild animals and wilder Indians. In one sense the forest was an enemy to be overcome and the past two or three generations have actually thought in terms of forest destruction, with no ideas as to forest conservation. The tremendous commercial development of this country during the past 30 years has produced a type of business men with an unnatural and feverish desire for the accumulation of money, and to satisfy this desire our forests—the grandest and most extensive the world has ever seen—have disappeared like snow before a warm spring sun.

What Forestry Means.

By forestry we mean the business-like management of forests. The meaning of forestry varies somewhat in this country according to the section in which it is considered. Throughout the prairie section the people understand forestry as tree planting; in other sections it is understood to be the protection of forests from fire; and in still others we are glad to say that it is getting to be considered as the careful lumbering of our forests with the idea of insuring future forests on the same ground. During the early days of interest in forestry in this country the whole matter was looked at largely from

a sentimental standpoint, which might be illustrated by the first line of the poem "Woodman spare that tree." In some instances the sentiment was carried a little too far, and there are states which have laws preventing the cutting of timber on state lands. We are now, while not doing away with the sentiment, learning that if forestry cannot be considered as a business-like proposition it has no place in this country, and the forester of to-day may be described as a man with an axe on his shoulder who knows how and when to use it.

Why Forestry is Needed in this Country.

There is no one here who, if he has considered the matter of forestry at all, has not asked himself: why do we need forestry in this country? If each one of you could see the million upon million of acres of bare hillsides and ridges in this state and other states of the east and west which were formerly covered with splendid forests, you would need few arguments to convince you of the wisdom of practical forestry. The fact that we are tremendous consumers of all kinds of forest products should make us consider the future supply of these products and what future generations are to do when the virgin supply is gone. We use annually in this country 500 board feet of timber for every man, woman and child; in Europe less than 60 board feet are used. One or two examples of the consumption of timber may be of interest in emphasizing our need for forestry. In the something over 300,000 miles of railroad in this country there are used about 2,800 ties to the mile. This means that 800,000,000 ties are constantly in use, to be replaced every 5 to 10 years. The amount of wood used in ties each year is equivalent to 600,000 acres of forest, which would be about one-fourth of Pennsylvania, and we would be a rich state if one-fourth of Pennsylvania was forested heavily enough to produce all of the ties used in this country even for a period of five years. Another example which may be of interest is the way in which we are using fence posts in Pennsylvania. According to the last Census, Pennsylvania has 8,204,000 acres actually in agricultural crops, but there are about 18,000,000 acres out of the total area of the state, which is 28,790,400 acres, as improved or unimproved land within farms. The 18,000,000 acres in farms is equal to 28,125 square miles. Assuming that it requires 2,000 posts to fence a square mile, it requires 56,250,000 posts to fence our farms. At 10 cents each, which is a very low price, it costs this state $5,625,000 every eight to twelve years for fence posts alone. An average acre of timber of size suitable for posts will produce about 3,500 3 to 5 inch round posts. It would thus take 16,071 acres every eight to twelve years to produce the posts which we use in this state alone. The last census estimates that one billion fence posts are set in this country each year. If these posts were set 16 feet apart, they would make a fence 121 times about the greatest circumference of the earth. Such statistics could be given almost without end, showing that we are exceedingly prodigal in the use of our forests.

The tremendous consumption of forest products in this country has been necessary, perhaps, in our wonderful development. The trouble is that we are using up our timber resources three times as fast as they are being produced. After careful investigation the U. S. Forest Service states that we are on the verge of a timber famine, and that within forty years we will have used up all of our virgin forests. Isn't it time that our governors get together and people talk forestry? Surely our government and our industrial life will be tested as never before when we reach the end of our great natural resources.

Disappearance of Forests Due Largely to Waste.

The chief regret and shame to us as a nation and as states will be that we brought this timber famine upon us not so much by what we actually used, but by what we have wasted during the process of utilization, and have allowed to waste by forest fires. In 1907 the largest cut of any one species was the yellow pine of the south. Mr. Long, of the Long-Bell Lumber Co., estimated that in that year over 20 per cent. of the yellow pine trees were left in the woods at time of logging. The amount so left is equal annually to a good stand of timber on over 300,000 acres. As the logs come from the forest there is waste at the mill, in the planing mill and finally too much waste in the use of the lumber for construction and other purposes. Such waste is the rule rather than the exception, and similar figures could be given for species other than the yellow pine.

Fire the Greatest Enemy of Forests.

The most shameful thing is that the greatest waste which has been going on in our forests has been the result of ever re-occurring fires, and our people have been so busy taking care of their own little selves that they have been and are standing helplessly by and letting these fires continue. It was estimated that during the past fall months when fires were burning throughout the country that standing timber to the value of one million dollars was destroyed each day. During these "firey" months just past there was fortunately comparatively little loss of human life or destruction of personal property, but every now and then in this country we have such terrible fires as that which occurred at Hinkley, Minnesota, in the early 90s, when 500 lives were destroyed and over twenty-five million dollars worth of property went up in smoke. Not a fire occurred last fall which with reasonable expenditure of funds could not have been prevented. In Germany and other European countries to-day fire is one of the least of the enemies of the forest. There preventative measures have been made so eective that fire is actually not a serious problem. The U. S. Forest Service estimates that three to four million dollars properly expended in the forest regions of this country annually would make it impossible to have any very serious fires, and yet last fall a million dollars a day was being destroyed, and the probable total destruction for the fall months would be between eighty to one hundred million dollars. Last year on the national forests, which aggregate 168,000,000 acres in extent, the Forest Service at an expenditure of $30,000 to $40,000 kept all fires from 99 per cent of the total area, showing what we can do easily in any forest region of this country at a comparatively

small expense. The value of timber lost by fire in Pennsylvania last fall alone is such that if the state could have in money what was burned up, it is safe to say that all forest lands of the land could be protected from fire for a period of ten years, and the present area of the state reserves increased to a million and a half acres. The State Forestry Commission of Pennsylvania is doing a splendid work in establishing reserves and protecting them from fire, but they need more funds, and such an organization as yours should be of tremendous help in getting these funds.

The destruction of the standing timber by fire is not the only loss to the forest. The forester calls the seedlings and young trees in the forest his growing stock, and the value of this growing stock for the production of future forests is often nearly as great as the value of the merchantable timber in the forest. If a commercial nurseryman has the young trees in his nursery destroyed by fire resulting from the carelessness of some individual or corporation, there would be no trouble in his getting full damages in any court in the land, yet any man who seeks to get damages for the destruction of the growing stock in his forest is almost laughed at to-day. The time is coming rapidly, however, when the value of the growing stock will be fully appreciated and it will be no trouble in getting damages for the destruction of such property. Another loss from fire which is not ordinarily considered is the loss to the forest from the destruction of the humus which covers the forest floor. This humus, which is formed by the decay of leaves and debris, has a very large water capacity, and acts like a sponge in holding rain and snow water and giving it off gradually to springs and streams. When the humus is destroyed by fire the water rushes rapidly from our hillsides and we have freshets and floods and droughts, such as occurred last fall throughout this State. The humus has also a very great manurial value, and as the fertility of our agricultural soils is exhausted we will turn as the Europeans have to the humus of the forest as a fertilizer, and where not removed too extensively from the forest it may become an important source of organic material for the enrichment of agricultural land. Finally, not only is the humus destroyed by fire, but over large sections the soil itself is so burned that it will be years before sufficient soil can again accumulate to support forest growth. In the absence of the humus, melting snow and rainwater washes the soil from hillsides in vast quantities covering and destroying farm lands and filling our navigable streams and harbors. We believe in the improvement of our water ways, and yet if some of the vast amounts which have been expended in this country for waterway improvement could be spent at the head waters of the streams in protecting and maintaining the forest, very much less would have to be spent in dredging and deepening channels.

Future of Pennsylvania Forests.

Some of you may be asking, after what has been said, if anything is left in Pennsylvania with which to practice forestry. There is by all means, but the present condition of the mountains and hillsides of the state have been and is a standing shame before our people. Thousands and thousands of acres have been made barren wastes that a little money may be accumulated, and it is going to take more money than was received from the sale of the forest to so re-forest these wastes that we may prevent droughts and floods; make our navigable streams really navigable, and bring these waste lands back to a condition of profit with returns coming annually to the state. Much timber is still standing in the state, largely in the form of woodlots and isolated tracts, and it is probable that portable sawmills will operate for many years to come. Our climatic conditions are very favorable for excellent forest growth and with proper support our State Forestry Commission should be able as years go, to so re-forest the barren and non-agricultural lands that they will not only pay for their protection and care, but become a source of great revenue for the state.

In view of the statements made, which all of you know to be more than theories, there are people who still say that substitutes will be found for our timber and that all of this talk about forest protection and re-forestation is foolishness. We know that the use of steel and cement and other materials has increased tremendously in this country and will continue to increase, yet the mere fact that the use of these materials is increasing argues a great increase in the use of timber. With all the trials that have been made of substitutes, it is not clearly proven that cement or any metal will ever replace timber for railroad ties, pavements, fence posts, etc. In fact, a number of our railroads have made careful test of cement and steel ties and after these tests are erecting treating plants with the idea of using ties from rapid growing soft woods properly treated with creosote even though they require a tie-plate and screw-spike. Furthermore there is a constantly increasing use of wooden pavements in European countries, and many cities in this country are laying more wooden pavements than any other kind.

If our system of taxing the forest as a crop was as equitable as our system of taxing agricultural crops our lumbermen would be as anxious to conserve the timber as anyone. As our forests are now taxed, lumbermen are simply forced to cut the forests, or have them taxed out of existence. When the time comes that forests are taxed as other agricultural crops, that is when the crop is harvested, then our lumbermen and large corporations generally will turn to forestry as they are already convinced that it is a good business proposition.

The Forest a Renewable Resource.

Pennsylvania can and will make her eight to ten million acres of agricultural lands a very important factor in the progress of the state, and the value of these agricultural lands will increase more rapidly after our supplies of coal and metal are gone. The encouraging thing about forestry is that even though we have very largely exhausted our vast timber resources a forest is a renewable resource and can be made a constant source of income for all time to come. We must not forget that there are ten to fifteen million acres in Pennsylvania better suited to forest trees than to any other crop. These lands can be made to produce not only a large part of our needs in timber and conserve our waters, but as the virgin supply of

timber in other parts of the country disappear our forests can be made so profitable that they will go far towards relieving the people of our Commonwealth from taxation.

Reforestation and proper forest management will come slowly and the help of everyone is needed. The mere fact that this association has a Forestry Committee is a great help, and each of you can help in preserving our forests by giving your cordial support to our efficient State Forestry Reservation Commission, the forest schools of the state and the United States Forest Service. Not only feel that the movement should be supported, but act, and keep everlastingly at it. Let those who represent you in the legislature and congress know that we are in earnest and believe in the necessity of these things and the forests of our state will be protected and perpetuated and made a source of pride and of profit to our people.

COMMERCIAL CHESTNUT CULTURE.

Horace Roberts, Morristown, N. J.

Mr. Chairman, Ladies and Gentlemen:

I don't know which surprised me most, to find that you are interested in chestnut culture, or to learn that you had heard of my interest in that line. I have been raising nuts a good while. I started when a very young man. The business was new so I started in a small way, not putting any money in it at all. Such a thing as grafting chestnuts was more rare then. I went into the pine woods where there were seedling chestnuts, cut trees out of the way, put fence around a ten acre block and let the cattle come in to help us do our trimming. In this way, we worked at a minimum expense.

Now, I do not think that where you can raise apples or peaches or other nice fruits, it is worth while to plant chestnut trees. You can get more out of the fruits. But I had land that was not paying anything and a little care has turned this into a nice chestnut grove. It makes the farm more attractive and at the same time brings revenue. The commercial side, is the side you gave me to talk upon. But there is another and more valuable point from which to regard this topic. Chestnut trees are worth more around the farm as a home-maker than you would think. Conditions in the farmyard seem to suit them. For instance, the worst enemy of the chestnut with which we have to contend is the wevil and in the farmyard, the chickens pick up the wevil. Nut trees planted around the yard help to make it attractive. Nothing will make a child more attached to its home than to gather these chestnuts and earn a little pin money—a point which it is well for us to remember.

I have only practiced one form of grafting. The regular cleft graft, same as we use for apple. We cut our wood early in February, put it in the ice-house to hold it back, and wait until about the 20th of April, when we are done all other grafting, before we start on our chestnuts. Many die back, but we keep working away at them year after year till we get a stand. The chestnuts have always paid me from the start. I enjoyed the work and at once began to sell wood for grafting purposes and very soon began to derive revenue from the nuts.

Mr. Prickett. How high do you cut the sprouts to graft?

Mr. Roberts. About as high as my eyes.

Mr. Prickett. What is the average size sprouts should be for grafting?

Mr. Roberts. About as thick as two fingers. You can cut off almost any size in apple and the cut will heal over properly but it is not so with chestnuts. I am going to read to you the experience of some others who went into the business about the same time I did but with different results:

> "We have had experience with most all the vicissitudes to which the chestnut business is subject, such as fire, frost, hail, wind, drought, insect pests, faulty preparation for market, and disappointing commission merchants. Is it any wonder that the fabulous profits predicted eight or ten years ago have proven to be a myth? The writer does not want to discourage any one from engaging in chestnut culture, but fourteen years treasureship of a chestnut company, from which no dividends have as yet been paid, has prevented the writer from extending his holdings in chestnut culture stock until we get a better understanding of the business in all its details. We have Pandora's only blessing left us: 'We hope for better things.'"

There are several large plantations in my neighborhood owned by companies that do nothing but raise nuts. They keep men especially for that work, while I can care for mine and trim them at odd times with my own help. In this way what must be used to pay expenses with them becomes profit to me. I was able to buy a large grove adjoining me two years ago for a good deal less than the owner had spent on it but it has paid me very well.

We don't understand how to keep nuts nor how to cure them, but we will learn. In fact, we are learning. One little thing was learned this year with great satisfaction, and that is how to manage the worms. I found that treating the nuts with carbon-bi-sulphide did the work. As soon as gathered we put them into a barrel, set a saucer with four or five tablespoonsful of carbon-bi-sulphide on top the nuts and shut it up tight. After three or four hours, the barrel was opened and chestnuts dumped on to the packing house floor to air, and that was the end of the worms. They will be there just the same but what the buyers objected to was the live worms crawling over their stores. By treating and packing them at once the worms don't seem to develop and that simple little remedy that cost me less than two cents a bushel brought definite results. Instead of having to find a new customer each time as we did before, customers would come back and want more chestnuts, even at an advanced price. We are very much encouraged over the business. This year the revenue from my chestnuts would make a good rent for the farm and they grow at a minimum expense on land where I can't raise anything else. My neighbors who have gone into the business as a specialty have not succeeded so well. In entering the business of raising nuts, I would advise you to feel your way a little as I have done.

This last summer, I had a chance to see the new chestnut disease. Within ten miles of my home, one of my friends in the business lost 2,000 trees. How expensive it will be to combat this trouble I cannot say, but we will not let that discourage us. You may not have it down here. It is a fungous disease and it attacks the top of the trees and works downward. I understand, however, that it is not entirely new, but has been noticed in former years to some extent. It is the same disease they have had in Bronx Park, New York, which you have doubtless seen mentioned in the newspapers during the past summer.

Member. What variety of chestnuts do you use? The Japan?

Mr. Roberts. At first the new Japanese chestnuts were a novelty and the bigger they were the better they sold. Bitter nuts sold just as well as the other kind on account of the size, but people have learned better, and it is hard to sell the very large nuts. We now grow Cooper, Paragon, Numbo and Scott mostly.

Most of my grafting has been with suckers, but if you want to start nuts, I would recommend that you do it yourself rather than to buy the nursery trees that generally die. A nice way is to take the native sweet chestnut and start it in flower pots, and the English walnut in nail kegs. Nut trees have tap roots which make them difficult to transplant, but by putting them in pots or kegs you can control that root. Besides you can set your pots or kegs in the garden in some convenient place to watch and protect them the first year. Then set them in their permanent home. If you want to raise nuts, better take the American rather than the Japanese nuts. One troublesome disease is the red spider. For years we called it rust, but the rust is only the appearance caused by the red spider. The new fungus disease is not so severe on the Japanese nut, nor is the red spider.

Mr. Eldon. Are English walnuts hardy here?

Mr. Roberts. Yes, on northern slopes and north side of buildings. When we planted them in our fields, they generally died, but when planted the other way, shielded a little from the sun, they live and do well. There is no reason why a farmyard shouldn't have a reasonable supply of nuts, shellbarks, chestnuts, and walnuts. It makes a great difference to the attractiveness of the farm. My father was very much interested in these things and after he left the farm he never came out to see me without going to see how the grafts were getting along. It is worth a whole lot more than the mere dollars and cents you get out of it. Why not plant nut trees along your roadsides. They do better than fruit trees will in places like that. If some of your neighbors do get a few, it won't hurt them. I never heard of anyone dying from eating of my nuts.

Mr. Eldon. Do you graft the English walnuts on native black walnuts?

Mr. Roberts. That could be done. I have never done it, but have often seen trees so treated. After a person gets to grafting they get interested in doing a lot of such things. I have grafted chestnuts on chestnut oaks.

Chester Tyson. Did I understand you to prefer the Japanese chestnut seedlings upon which to graft?

Mr. Roberts. No, I prefer the American stock.

We are not masters of the business. We don't know how to keep our nuts. We must sell them at once, or they dry out too much. The Italians seem to know how to do it, and send them to this country by the ship loads, always in perfect condition.

Mr. Cox. Can't you get any information from them?

Mr. Roberts. We will, but somehow we seem to learn slowly. There seems to be no one in this country yet who can cure their nuts like the Italians. Chestnut culture is a very important industry in Italy, and the nuts form a staple article of food for the people as well as their domestic animals. As yet they are much beyond us in the business.

Mr. Cushman. How would a bath of silicate of soda answer, to close the pores and prevent evaporation?

Chester Tyson. Do they have varieties in Italy that it might be well for us to have?

Mr. Roberts. Possibly. I was talking to my Italian foreman the other day. There seems to be no reason why we shouldn't raise just as good nuts as they do because we can easily graft their kinds.

Mr. Gold Miller. Are the bitter kinds good to eat when grown in Japan?

Mr. Roberts. I don't know. The Japanese chestnuts are good when boiled, but I have one kind so bitter that the hogs pass them by. It has hurt the business very much that that kind of nuts should be raised. We are not pushing them, for anyone who bites into a chestnut of that kind will be satisfied if he doesn't eat another one for a year. We prefer the peach baskets to get them to market.

Mr. Eldon. Do you mean the half-bushel round baskets?

Mr. Roberts. Yes, a tight one will hold them all right and the buyers seem to prefer them that way. I am glad you are interested in the chestnut business. Anybody who takes that up has an interesting time.

Member. What do you do for the red spider?

Mr. Roberts. This is another trouble we have not yet mastered, and some years it is serious enough to curtail our crop more than half.

Member. In planting roadsides, do you transplant seedlings from the nail kegs where they are to remain permanently and allow them to become well established before grafting?

Mr. Roberts. By transplanting several times you could get a larger tree to live by the roadside. It is difficult to protect a little tree in certain exposed places. It does not matter when they are grafted.

Member. Are seeds placed in pots in fall or spring, and if the latter how are they kept over winter in moist condition so as to grow?

Mr. Roberts. Nature's way is to plant in the fall and she seems to know her business.

Member. Where do you procure the English walnuts suitable for seed and how are they treated?

Mr. Roberts. The only ones that ever gave me much satisfaction we planted in the fall in nail kegs. There are many productive trees in our town that would furnish suitable seed for planting.

UTILIZATION OF CULL APPLES.

Mr. E. W. Catchpole, North Rose, N. Y.

Mr. President, Ladies and Gentlemen:

I am very glad to be with you. I see lots of trees here, a great many more in fact than I had any idea of finding. You evidently have faith in your business for you are planting land which is much more valuable for grain and stock raising than ours in Western New York. You have the courage to plant orchards on this high priced land simply because there is a great future for them here, and I am very glad that such is the case. I hope that before leaving, I may be able to help you a little and give you some idea as to how to handle the crop to best advantage.

In considering the waste products of our orchards and the best way to transform them into a bank asset, our view point should always be at long range. A slight variation in market values of one or more of these manufactured products may change the results to the loss side of the ledger. The season just closed is an example of extreme market fluctuation. Owing to the short crops of early varieties, and their good quality, consumption apparently increased and the demand became active for apples at strong prices which absorbed a large per cent of the large crop of Greenings of Western New York, and then sought the bulk or barreled later varieties, prices for "bulk" apples finally reaching a point too high for either evaporators' or canners use.

This season has proven that green fruit values do not affect the market prices of evaporated, and have only a slight influence on canned goods, prices of both of these commodities being largely controlled by ruling prices of small fruits and the sun-dried products of the Pacific Coast.

Ignoring present conditions entirely, the building and equipping of an evaporator is a profitable investment, as a protection or form of insurance against the much dreaded wind storms and tornadoes. This plan is followed by many speculators, when buying the entire crops of large orchards on foreign territory, especially in regions subject to that much dreaded disease—bitter-rot.

Evaporators.

Whether in your case, it is best to build and equip a plant only large enough for your own individual orchards, or to co-operate with others and build a large capacity, is for you to consider, taking into consideration all local conditions, present and future. For a modest plant, a two-kiln plan with work room attached would suffice, but the question of power for this, should only be decided after taking into account ruling wages, as against a larger investment of capital in case of the power plant. One's available capital should be the ruling factor in selecting a type of building whether a cheap frame of 2x6 inch studding "drop siding" on outside and building paper on inside to make an air space or whether this space be filled with cement or still better of solid cement construction. This latter holds heat much better and is wind proof. All outfits of four or more machine capacity should have a complete power equipment so that no hand work is required (except trimming) from the time the apple is placed on the fork of the paring machine, until the thoroughly bleached and evenly sliced product is finally deposited on the kiln, under which a fire is already burning to reduce the moisture content to 27 per cent.

After removal from the kilns, the dried product should be shoveled at frequent intervals, in order that it may be thoroughly cured.

The skins and cores when dried are known in the commercial world as "apple waste" and are largely used in the manufacture of jams and jellies, and recently in a small way, in making vinegar. For the latter purpose one and a fourth cents per pound is the price limit which happens to be about present quotation.

Canning.

Canning is usually conducted on a large scale by those having large interests and usually an established market for their brands. These large concerns use asparagus, peas, beans and sweet corn as well as small fruits, and only use apples when they can be purchased at a price which will leave a profit, on the basis of the value of the manufactured product for present or future delivery. These concerns are operated by sharp, shrewd business men and run on a close margin of profit. In estimating the cost of canning apples the owners only take into consideration the daily operating expense, making no allowance for interest on the investment. From your view point as fruit growers, you have the raw material at hand, no freight charges, no commissions to pay, no loss and damage by shipment, all these to offset the interest on your investment, repairs, etc., so that your only disadvantage is that of selling the manufactured product. A better grade of apples, both as to size and quality is used for canning than for evaporation, not smaller than two and a fourth inches in diameter and not too many worm holes, since the cutting out of these makes too many small pieces, a large per cent. of quarters being desirable. In preparing apples for canning, machines are used only for paring, the whole fruits then being placed in a weak brine bath, to remove bruises and prevent discoloration by action of the air and afterward quartered and cored by hand, carefully inspected and put in cans holding about five pounds of the fruit (the product of one bushel filling six or seven cans). Hot syrup is added, cans sealed or capped and put in boiling water or steam bath for six or eight minutes according to ripeness and variety of fruit. This product, you will note, contains a little sweetness, a little of the apple and a large amount of water. It must be stored in a cool and well ventilated room, and unlike old wine, does not

improve with age. Compare this product, with the evaporated product, from which a large per cent. of the water has been driven out by heat, treated with sulphur fumes to prevent discoloration, a product which, with ordinary care, can be kept almost indefinitely. Always bear in mind the fact that one pound of evaporated apples represents the same amount of fruit as is contained in the can purchased at the corner store at twice the cost and it may be shipped to the end of the earth at a minimum freight rate.

The production of cider and apple vinegar has now reached a stage of scientific and technical care and accuracy unheard of in former years. The development of facilities has been in the direction of economy in utilizing the highest possible quantity of those elements of apple juice which produce that desirable acidity which renders apple vinegar unsurpassed in quality and wholesomeness. There is economy of time as well as materials, the approved modern methods requiring but a short time compared with that necessary to secure results through fermentation and acidification in barrels.

It may be of interest to orchardists to learn that manufacturers who understand the business reject apples affected in any way with black or bitter rot. Red rot is used for vinegar. Some people have held the view that partly decayed and, therefore, unsaleable apples can be used for vinegar. That is not true of black or bitter rot, as they make bitter vinegar. The change in the apple juice needful to produce vinegar has already taken place and the valuable elements have been wasted. Red rot and soft rot, however, can be used as the chemical action taking place is exactly in line with vinegar production.

The ordinary domestic process of vinegar production is well known. It consists in allowing apple cider to ferment and become acid in the original package or barrel through lapse of time. The time is long or short according to the temperature and accession of the growths that hasten acidification. Every farmer in former times had his own method, not economical, but fairly certain if he could wait. The product was inferior because of the usual low percentage of acidity through the escape of the valuable alcohol in the first process of fermentation.

Apple jelly can be made by boiling fresh, unfermented cider so it shall be reduced in volume from 5½ to 1 or 6 to 1. No sugar is necessary unless the cider is unusually sour. In boiling cider for the market there is need of constant care to prevent it from reaching the state of jelly. Apple jelly may be produced commercially on quite a large scale, with proper care in filtering cider from selected apples. If properly packed in glass or other jars of convenient size and covered with a thin film of paraffine or securely sealed, and kept in a cool place apple jelly forms a very desirable addition to the cuisine.

Apple butter is, when properly made and seasoned, a great delicacy. Methods of production vary. Perhaps the most common and desirable method is to cook peeled and quartered or sliced apples with boiled cider until a desirable consistency is attained. The pure butter without spices is excellent, if the apples and cider are of good flavor. As a rule some spices are used. If produced for immediate use and kept in a cool place there is no need of a preservative. When made commercially some innocuous preservative may be employed. Every housewife has her own method of producing apple butter. As a rule sugar is not required.

Much skill is required in the part of the "Processor" to be successful in making jelly and jams. A well known manufacturer recently remarked "I know the jelly and jam business from A to Z, but it cost me five thousand dollars to learn it."

Fortunately, it is possible to employ skilled men to take charge of a plant, men who have had the advantage of the expensive experience just mentioned.

You, as growers, should study your local conditions and market. Make a tour of inspection and see what the "other fellow" is doing. The best way to dispose of low grade or unmerchantable apples is by adopting the hand method of thinning, beginning immediately after the June drop has ceased, reducing all clusters to one fruit and individual specimens at least six inches apart.

The earlier and more systematic this plan is followed, the higher the quality, and the smaller the per cent. of low grade fruit and of more importance still, the greater certainty of securing annual crops.

Cultivation, pruning, spraying, fertilizing and cover crops, each and all should be carefully studied and followed, that the standard of quality be raised and maintained. The benefits of improved methods are three-fold: increased quantity, better quality, and larger annual crops.

Markets. Marketing and Grading.

Oftentimes the export market will take medium sized, well colored fruit at prices fully as high as are being paid here for the larger grade, and also afford a market for a still smaller size (1 to 2 inch) for the North of Europe Christmas trade.

Nothing pleases the children of North Europe so much as to get bright red apples on the Christmas tree. Color, not size is the measure of value.

By grading the crop into two or three lots of fairly uniform size, the commercial value can be materially increased. The grade known as "No. 2 Export," can usually be sent abroad profitably.

No. 2 Export consist of apples of No. 1 quality and No. 2 or slightly smaller size. All apples for German market should be free from worms in order to pass the rigid government inspection at port of entry. Color is largely the measure or unit of value in both English and European markets.

The mechanical graders are a great labor saver for this purpose and, with slight changes, will do this work as well and much faster than by ordinary methods.

F. B. Pease & Co., South Ave., Rochester, N. Y., use circular metal cups of varying sizes—in rows of five or six each and four or five rows, arranged on a table about 28 inches x 7 ft., supported by four legs. Fruit put in at end and gradually worked along by a series of rubber covered wooden "fingers," the small fruits passing through the circular rings and larger specimens passing entire length of table to box or barrel at end.

Another grader consists of a table similar to above in shape, and endless carrier or belt, made by joining many metal rings of same size, moves fruit the length of table but does not turn over the individual specimens and expose all sides to view as in case of former machine.

Fruit lacking in color and finish had best be shipped in bulk. The demand for this grade is gradually increasing and may indirectly be the means of increasing consumption of the better grade. By shipping in bulk, the grower saves cost of package and labor of packing, while the consumer gets more for his money and is able to see the quality thereof.

Carefully consider the situation in all its bearings—from a large cold storage plant costing thousands, to the home manufacturers of jams and jellies, with an outlay of only a few dollars—then decide where you will "get in the game."

In regard to the matter of export. I hardly know what to advise. You people are growing a variety which is especially adapted to this territory, one which when grown under these conditions will command a good price in the market. In western New York we have been through seasons of over-production and low prices. With us under these conditions we found that the only hope then was the export market. We feel reasonably sure that all European markets will pay us full prices for our fruit, and I think that those who keep in touch with this market will in a few years have a fairly well established trade. The export trade may be used by following one of three methods:

First, to export as an individual. Some of our larger railroads have their marine departments at the sea port and it is a part of their business to forward your shipments if you wish, looking after the matter of insurance and freight rates. In that case, you simply ship in your own name or consign to a European house. Another method is to use the so-called insurance broker, who, on receiving the goods, will look after the forwarding and, of course, he gets your insurance business. He will forward to any European market you direct. But, the more common method is to export through the New York representatives of the larger European markets. It costs no more to have them handle your goods and they will communicate with European houses and find you a good market and are supposed to know the exact conditions there. The same condition prevails over there as we have here. New York is in the market to-day and to-morrow it may be off. By keeping in touch with the markets, they are able to place your shipments in that particular market which bids fair to return the largest amount to the grower. There are several perfectly responsible, very reliable and conservative European houses and they seldom fail to bring back a satisfactory return from your shipment. It is necessary to use great care when picking and when each basket is emptied so as not to bruise the fruit and the barrel should be filled fuller than you would fill it for domestic markets. The matter of thoroughly shaking barrels when filling, I think, is the great secret of export packing. It is necessary that this care should be used for this reason; the English markets are very much displeased with barrels that arrive there not full. It makes a difference of about 25 cents a barrel, and that shows the necessity of growing fruit which has a good carrying quality. We have found no fruit which has a carrying quality equal to the well known Ben Davis. Along this line, I would emphasize the matter of fertilizing, thorough cultivation and spraying in order to grow the very best quality of fruit. It has been found in my own experience advisable to modify our former plan of annual cultivation somewhat. We find that we grow finer fruit by allowing a cover crop to remain one year. We prefer Mammoth clover for this purpose. By this method we are able to grow a firmer fruit, of better color and of better size.

Mr. Black. Would it be best to line barrels so as to take up slack caused by shrinkage of fruit.

Mr. Catchpole. With certain varieties, yes; still ordinarily I think the trouble is more a matter of transportation than it is of shrinkage.

Chester Tyson. Do you find any difficulty with the feeding roots coming too high.

Mr. Catchpole. We have had no serious trouble and see no bad results.

E. C. Tyson. What do you think of the feasibility of having a local storage house?

Mr. Catchpole. In case of export, I think that it would be advisable. In any case it is all right to have a central packing house. With the very large trees, such as we have, trees running twenty-five to thirty feet high, it isn't necessary to move the packing table very often in the orchard and for the cold storage, possibly we can get them in better shape than by using a packing house. Personally, I am very much in favor of the packing house. You get a more uniform grade because you are mxing up the product of many trees before it goes over the sorting table.

Member. What package do you use in taking apples direct from trees to packing house?

Mr. Catchpole. Slat bushel crates.

Member. Do not the slat edges bruise the fruit?

Mr. Catchpole. We never noticed the cutting of the edges. The only trouble we have is in filling crates too full.

Member. How far apart are the slats?

Mr. Catchpole. About an inch to an inch an a quarter.

Member. Are slat edges sharp or rounded.

Mr. Catchpole. Sharp.

E. C. Tyson. We have noticed quite a little cutting where fruit comes into contact with edge of slats. It has been a question in my mind whether it would not be well to have a solid box.

Mr. Catchpole. It is very objectionable in many ways. Too heavy, to expensive unless it were built of light wood like orange boxes. Possibly your varieties are more tender than ours. It makes material difference how these crates are filled. We never allow a man to fill a crate on the ground itself. Place one crate on top of another and fill it.

We understand you people here are using baskets entirely on high grade fruit. We use the blouse picking garment. It consists of large loose garment, cut long, "gathered" and held at waist of wearer by a strap, and then by having one crate on top of the other

the apples are only dropped the height of the crate itself. We use a crate a little larger than the regular bushel so it holds a bushel scant full and then we do not allow our men to fill them more than even so that upper crates do not touch any apples on the lower.

Member. Would you recommend plowing orchard in the fall?

Mr. Catchpole. I would not.

Member. Suppose there was not time in the spring?

Mr. Catchpole. I certainly would plow it now rather than not plow it at all by all means.

In regard to orchard cultivation. You who have been reared on your grain farms are inclined to feel that the ordinary farm operations must be done first and if there is any time left the orchard is cared for. That will not do. You should put your farm operations second and attend to the orchard first. It is going to require a great effort on your part. First take from your equipment that which the orchard needs and attend to the farm work next. It is a hard proposition but with a little care it can be overcome. The first spray before bloom always comes at the time when the spring crops should be planted, but the orchard should be sprayed. What are you going to do? Attend to the orchard by all means. There is more possibility of profits from it than from many times the acreage in farm crops.

Member. You do not allow the orchard to lie in sod more than one year?

Mr. Catchpole. Not under most conditions. If you have hill land subject to erosion it is altogether different, but the better plan is, don't plant those high hills. They are too expensive orchards. There is plenty of level land about here.

Chester Tyson. We like to go on our hills for the good fruit.

Mr. Catchpole. You doubtless have level land on top of the hills. I would avoid the steep slopes.

Member. Is vinegar making proving a profitable industry?

Mr. Catchpole. Over in our state we have a law which was supposed to be a grand good thing for the grower of apples, but it has proved to be entirely in the interest of the commercial vinegar makers. They have a way of getting a whole lot of acetic acid out of a small quantity of fruit. They waste nothing. The local groceryman can buy vinegar as cheap from the manufacturer as from the local grower. If he buys from the grower, there is always an inspector along right away and he is almost certain to find something wrong with the vinegar as the farmer does not have facilities to guarantee the analysis down to fine points as the large manufacturer does, and as this law requires. The result is that the local dealer is fined and will not buy any more vinegar from the local grower. The only way we can get into the game is to erect a vinegar plant and employ one who has had experience. He will come and make the vinegar for you, but he won't tell you how. That is his trade secret. It is the same thing that is true with the canning industry. There is no trouble at all to get a processor who is capable of taking care of a canning plant. If you want a certain product furnish him with the raw material and the help and machinery and he will make it for you.

Member. What is the commercial price of vinegar to-day?

Mr. Catchpole. About fifteen cents a gallon retail and about ten or eleven cents wholesale.

Member. What percentage of loss is there in conversion of cider into vinegar?

Mr. Catchpole. None.

Member. What tools do you find good for general cultivation?

Mr. Catchpole. The spring tooth harrow is used very largely with us. The peach grower will use the double action cut-away. Those having stones and thistles will use the "'Planet, Jr." No. 41 orchard cultivator. We use the single action cutaway sometimes, but very largely use the spring tooth harrow. I think some of you will find as your orchards grow older that it is advisable not to plow as deep as you are now plowing. It is advisable to plow shallow near the tree itself and for that purpose the Canadian plows are best. The American manufacturers have produced a variety of styles of plows for this purpose but they are crude in their make-up and too weak in the beam. They have two, three and four horse plows, but the best tool we have found for the orchard work is made over in Canada by a Canadian firm. They are very strong and have extra strength in the beam and do the work properly, so that one can attach to it three, four or five feet of chain or rope and drive your team straight, leaving a straight furrow without the danger of striking the tree. We generally use three horses and plow about five inches deep. The depth is regulated by wheel.

Mr. Prickett. What is the price of one of these plows?

Mr. Catchpole. They cost about the same as the ordinary sulky plow.

Member. Isn't the wheel in the way of the tree.

Mr. Catchpole. The furrow wheel is adjustable and can be brought in so that it will not interfere with the tree.

Member. Will it work with a long hitch on hillsides?

Mr. Catchpole. It is inclined to kick out behind.

Member. How do you make the plow run straight when team is hitched to side.

Mr. Catchpole. This plow naturally runs straight on soil free from stones.

Mr. Cox. I would like to ask Mr. Catchpole where those plows are made.

Mr. Catchpole. Cockshutt Plow Company, Brandtford, Canada.

Member. Does an apple tree need more roots when not in cultivation?

Mr. Catchpole. I cannot say.

Chester Tyson. I would like to ask Mr. Catchpole what form of wagon is found most practical in hauling to central packing house?

Mr. Catchpole. There is a wagon which was formerly made in New York by the Thomas Wagon Company, now located at Lititz, Pa., on the principle of the old Champion. They make both the single turn and a double turn in which the hind wheel follows the track of the front wheels. We find it a very desirable wagon for orchard use where one wishes to use the ordinary width platform.

This wagon has a steel gear. The wagon bed is only one inch above the center of the axle. We use a naked platform without sides, so that we can haul barrels or crates stacked two or three high. This wagon is made with or without springs. They made it with springs as part of the gear itself or with an adjustable spring. Something like a bolster spring.

Member. Do you mean it can be equipped with springs with the platform so close to the axle.

Mr. Catchpole. No, that is the ordinary type of wagon. The adjustable spring would raise the platform five inches higher.

APPLES.

MR. U. T. COX, PROCTORVILLE, O., *President Ohio State Horticultural Association.*

Mr. President, Ladies and Gentlemen:

I am very glad to be with you. In the southern part of Ohio where I came from, it is very hilly. We have some very nice bottom land along the Ohio River, but when you get away from the bottoms it is very steep. In some places it is as steep as a house roof. We have good markets and not many farmers in that country produce fruit, consequently, the growers get pretty good money out of them. We people living out on the hills find that we are up against it in some respects. Our land is not worth more than a dollar an acre compared with yours. Your land will produce fully twice as much. We find our hills are no good for anything but fruit, but we can grow fine fruit. I was born there and consequently stayed, and I believe I prefer to remain, but if I were going to move away, I believe I would come east.

To get apples, we must have orchards. The old orchards down there that were planted about thirty or forty years ago are nearly all dead. They don't live long with us. They bear themselves to death and die while they are in their prime. In fact, you can't find an orchard that is over thirty or thirty-five years old. They come into bearing early and we push them hard. When an orchard gets to be twenty-five years old out there on those hills, it is like an old horse that you work to death, or a man who has worked himself to death. Whether it is better to grow trees that way is to be seen. We get the apple trees down there to bear when they are five to six years old. Rome Beauty and Ben Davis begin to bear well from eight to ten, and you can get enough before that to pay for the picking and yet the soil is naturally so poor you can't raise a disturbance unless you plant a saloon there. Some of the large orchardists out in the west have several hundred, some a thousand, and some five thousand acres, but they can't care for them properly. I believe that the man who has no more than he can care for properly will grow the best apples. Very few of them have more than forty acres, and I believe very few depend on hired labor altogether, but use the labor they have in their own family. They grow better fruit, simply because they can do the work on time. We had a fine bloom on the trees last spring, the weather was good and we began to spray. Suddenly the weather changed and we had to quit. Some varieties that bloomed sooner were all right. We had some good apples, but the apples that bloomed late had the apple scab. We cleaned up the crop but most of them were scabby, and all inferior, some of it due to drouth, so that I believe the man who has the small acreage will make the best success. There are lots of places in this country as well as that, that could be profitably put to fruit. There are lots of places that the soil gets washed away and if that was put to fruit under the soil-mulch method, instead of wheat, I believe in a few years they could make a good fortune out of it, if they care for it properly. You cannot do it in growing wheat or grain of any kind. Because we are on those hills, which we cannot cultivate, we had to do something else. We would work the soil and a big rain was very likely to wash the soil away with it. It took all the fertility out of the soil and we could not replace it without great cost. We saw that we had to keep that land in grass. We mow the grass and leave it on the ground and haul out manure and straw and any other coarse material we can get. Look at the forest. You find the water going from it perfectly clear. It is not taking the fertility and the soil out with it. They stay right there. The leaves form a mulch and that forms fertility when it decays. That is what the forest needs and what we want for fruit trees. I believe that fruit trees as well as forest trees take up great quantities of water. I found some figures the other day, telling how much water a tree will take from the ground. Some one made a test and it was found that a tree took up 250 gallons of water per day. First it has to produce the leaves and then the apples. Of course, water is going out through each one of those leaves every day, so you see it take an enormous amount of water and you must keep that water in the soil in the form of soil moisture, and we find our mulch helps do that for us. I don't believe we need the amount of fertility in the soil that you need for a grain crop and I don't believe apple trees will pay as well for a feeding of plant food in the form of commercial fertilizer as wheat, grass, corn and other things of that kind. On the other hand, they do not require as much water as the fruit trees do. At one time the entire surface of the earth was barren. After a time, a few forms of plant life began to grow. This in turn decayed, and the land became better as years went by, till we had quite a good lot of vegetation on the earth. That land got better year by year simply because there was plenty of humus in the soil. I don't see why the land should not get better year after year, but in many cases it is getting poorer every year, because the people are taking out everything there is in it. You cannot have a sufficient amount of moisture in the ground and neglect the humus and that humus must come from decaying vegetation of some kind, and unless you have it, you don't get enough moisture and it is too expensive to buy enough, but we are doing what I think is about as good. We are using the sod mulch system. We keep our hillsides in grass. We mow this grass about the last of May or first of June and leave it on the ground. We generally mow it again through August or September, leaving both of those lots of grass

on the ground to form a mulch. We don't plow it up at any time, because I saw the land washing away everytime we would plow. I believe I stated a while ago that all the manure we make is carted into the orchard. We don't put manure around all the trees, because we don't have enough. We try to go to some of the poorest places or over some poor spot where we cannot get grass to grow. I don't believe in having barren soil.

You can't make fruit growers out of men who do not love the work. They generally make a failure of the work unless they love the business. If he don't know anything about the business he had better keep to live stock or grain growing for such men are going to make a failure out of it. Then after growing the fruit, they have to learn to make a success of disposing of it. I will talk of that a little later.

There are lots of apples eaten and the cores thrown away so that we find seedlings coming up out of the ground; in some respects a great deal better than three-fourths of the varieties grown by the nurserymen in the country. The people want some of these new varieties and they can get them very cheaply. I believe that we have several varieties down there, two or three, that are worth the attention of people to make a trial of them. There are lots of apples that do well in one place but don't do well in another. There are lots of apples that look nice but that are not good. There are lots of apples that look poor but are excellent. People must be educated and know what to appreciate in an apple. You may go on the market but be deceived by appearances. When a person learns to appreciate a certain apple he will ask for it every time. For instance, you buy a Grimes Golden once and find how good it tastes, you want to buy more of them. You can sell these apples after they are known at higher prices than Ben Davis, and yet Grimes Golden won't hold its good color under certain conditions as well as Ben Davis. They look bad after they have been carried around for a few days and bruises will show on them. Some people, not familiar with varieties, seeing a Ben Davis and a Grimes Golden, would pick out the Ben Davis every time because it looks better. For that reason, a red apple takes better on the market than a yellow one. I believe that some of the best apples that have ever been grown in this country are just simply seedlings and the people don't know the parentage of them, and that only a comparatively few apples have been introduced, the parentage of which is known. The time is coming, however, when more attention will be paid to this matter than at present. Luther Burbank is bringing out great things but he is not working on the apple as much as other fruits.

My father used to set out his trees down there when he commenced in 1860, east and west. What I have planted of late years, have been set with the curvature of the hills, so we can drive through an orchard better and they were set out by guess. I believe I showed a picture of two of our young orchards set out that way and the distance apart to set them will depend on the variety. My trees are about twenty-five feet apart. I couldn't advise you to grow trees that close, but such as Yellow Transparent and Wagner we plant about twenty feet apart. Such small trees will never grow together. A little further apart will, of course, give you more room to cultivate, but in sod; if you are going to let the ground stay bare, then by all means have the trees planted so they shade the ground. If you have the trees set close together they will take out extra moisture. The old orchards down there are trimmed too high. I have seen some you could drive horses up against the trunks. I don't believe in setting trees that have the first limb started three or four feet from the ground. I want the limbs to start out not more than two or three feet from the ground. I don't care if it is only a foot. Such trees will begin to bear younger than if the limbs are up higher. One reason why I prefer to start limbs down there, you don't get the blossoms and the fruit on young wood on apple trees. The older limbs form fruit buds a year or two sooner than new limbs higher up. I don't prune my trees as much as some people for the simple reason that I don't believe it pays me. If I could do it myself, I would do it, but I don't want a man to prune in my orchard who knows nothing about it. I don't do much pruning, especially after the trees get to a good age. I believe you will have a better crop of apples than if your tree is pruned out very thin, the frost won't injure the buds as quickly. I have known my trees to have a good crop of apples while my neighbors would have none because we had plenty of limbs and they did not freeze out. It is true that you may have too many apples on these trees when you have so many limbs, but the next best thing is to thin the apples. As the tree grows older you will get those limbs out, or they separate.

Mr. Prickett. Are they not in the way at picking time?

Mr. Cox. You don't want to get up in the tree, but get up on a ladder to pick. You don't want them so thin that you can climb anywhere. I know my practice don't suit a whole lot of people, but I find by experience that the other people don't do any better. You don't have to follow my advice. What you want to do is to go up in your own head and think out your own proposition and apply the principles that are best adapted to your conditions. I said the trees begin to bear earlier. It is true. You can also spray your trees lots better than if it is a way up and you can thin your fruit lots better and can pick them lots easier and cheaper and are not nearly so apt to have them blown off in a wind. I don't know how true it is, but will give it for what it is worth. Mr. Vergon of Deleware, Ohio, says that he has no borers in his trees with such low heads, as the eggs do not hatch in the shade.

Spraying.

If you bring these trees up to bearing age, you cannot grow very good apples without spraying. You *must* spray now. If you are going to spray, you want to know what to spray for. If you have San Jose Scale in your orchard you don't want to go in there and spray with a fungicide—arsenate of lead, or something of that kind. We used to have a little San Jose Scale in our orchard. Got it about 1889 on peach trees from New Jersey. The peach trees were set in amongst the apple orchard, and we found San Jose Scale on the apples several years later. Those trees came from Lovett and we suppose that is where we got the scale. Well, we began spraying those trees with crude petroleum and have been

doing it continuously ever since, using lime-sulphur of late years, and for two years I haven't seen a mark of scale on the fruit in my orchard. Now, I am not certain that there is anything better than lime-sulphur. I have boiled my own lime-sulphur by fire. There are brands of prepared lime-sulphur. I haven't used any of them. We must not only spray a little, but understand the business and spray thoroughly. I am satisfied that there is not one grower in ten who sprays thoroughly. I don't know whether you do any better spraying in Pennsylvania than we do over in Ohio, but over there I can find localities where they don't spray at all. In the spring, we spray before the bloom, with bordeaux, for apple scab, because we believe that we cannot keep those fruit stems clean any other way. If we don't spray just before the bloom, the chances are that the apples will be covered with scab. There has been many a good apple crop saved by spraying just before the bloom. If one has the scale and sprays with lime-sulphur before the bloom, that will be sufficient fungicide to take the place of bordeaux mixture. In fact lime-sulphur is coming to be a good fungicide when applied on the foliage if you know how to make it. I might as well tell a few things. Mr. Scott, of the Department of Agriculture, made an experiment a few years ago with self-boiled lime-sulphur (you cannot spray with lime-sulphur boiled with fire without injuring the foliage), and I think he has used arsenate of lead with it, with good results, also. Some say they can't be used together. I don't know. I believe in the west they had no burning of foliage and no russeting of the fruit from lime-sulphur self-boiled.

Now as soon as the bloom drops off, there is a little miller called the codling moth, and the time has come when every grower must spray for this little rascal. When we have June drop, the wormy apples fall off. For the codling moth we use about one and a half to two and a half pounds of arsenate of lead to fifty gallons of water. Don't wait until all the bloom drops. I begin to spray as soon as the bloom begins to drop off and then go back again and spray in about a week or ten days. At the last of June we make a late spraying and the last one the last of July or the first of August. That makes five sprayings in all and then we get very good results. We usually have very few wormy apples. Two years ago we never looked over the fruit when we were packing, because wormy apples were so scarce they didn't show.

Now, what kind of sprayer to use? I would not like to advise any particular kind of sprayer. There is more in the man than there is in the sprayer. You will get about forty pounds pressure with the ordinary hand pump. You cannot do a good job of spraying with that pressure. I would want not less than 100 pounds pressure, that will give you pressure to go clear through the trees and make a fine mist and that is what you want. I am using the Friend nozzle the last year or two and I like that better than any I have ever used. There are several on the market that are said to be as good as that one.

Mr. Roberts. Do you use the same nozzle for winter work?

Mr. Cox. I have always done my winter work with lime-sulphur. If you use oil, you might require a finer nozzle. Did you ever use a Friend nozzle?

Mr. Roberts. I use it in summer time for bordeaux, but want a finer nozzle in winter time.

Mr. Cox. If you are putting on oil, you might possibly require a finer nozzle than that. I know that to spray with oil, you want a finer spray than for bordeaux mixture and with high pressure it will be finer. When spraying you should have a good supply of water on hand. I have a reservoir right on the top of a hill which gives us a good supply of water and it is then piped down to our mixing shed and we have the water run down the hill by its own gravity. Now, if a person has to dip the water up from a spring or stream it makes very hard work. You ought to have the water so it will run just as soon as you turn it on. A person who has a large orchard should by all means have the water provided. I believe that if you would lay some tile out through a field on a little higher ground, when it rains you would get a good supply and could drain it into a reservoir or cistern. Anyway a person that has a large orchard needs a large water supply and must have it provided. I have known times that you couldn't get water out of a spring when you needed it. The most of this work must be done at the right time if you want to do it at all. All of you know that as the trees grow up in the spring and you make one application and the new foliage comes out you require more sprayings on those trees to keep the new leaves covered with this fungicide, so that is one reason that you need to spray to keep these all covered up, and you can't have apples growing on trees as they should grow unless you have good foliage. Some varieties are very susceptible to this leaf disease, and there are other varieties that will have better foliage but the trees that are susceptible must be sprayed often. It is not only that way during the summer but it is that way during the fall. Did you ever think why those apples all fall off. We used to have them do that way in Ohio and I expect they did over here. Those apples hang until late in the season since we have sprayed the trees and get a good color. A person who has a large acreage of orchard need not expect to dabble in politics or set on the fence, and grow good fruit. You need the boss right there and he might just as well carry a rod. Your men don't know what you are spraying for. They don't know what you are spraying with. You ought to tell them what you are doing and explain to them the reason. They ought to be more than mere machines. I know as a general thing we have a poor class of help along that line, but there is hope for improvement.

Thinning out is probably the best way to get rid of the culls. You will probably grow more apples the next year if you get these culls cleaned out. I think that apples should be thinned down to one in a place, although it depends on the variety to some extent.

Member. Do you take those apples out of the orchard?

Mr. Cox. Some people advocate gathering them up, but we never do.

Mr. Tyson. Do you have any varieties that grow in pairs?

Mr. Cox. Yes, there are a good many varieties of that kind, and they should be thinned to one in a place. Those kinds that grow in clusters sometimes are entirely too thick. If you leave them that way the trees will break down. The best way is not to pull on the apple straight down, and then you will not pull off the whole bunch. The only way to do it effectively is to take both hands. Lots of people take hold of it and give it a jerk, and pull the next year's fruit bud off with it. An apple to be picked to keep good should have the stem left on. Now it doesn't cost very much to thin a fair sized tree, and I am satisfied the apples will be a great deal better for it, and it will leave the tree in a much better condition to bear the next year. That may seem a little strange, but there are lots of people who don't do this. They let their trees over-bear one year and the next year they have to recuperate because they worked too hard the year before. You want to thin your apples a good distance apart.

Chester Tyson. How far?

Mr. Cox. It depends on the variety. I don't know how far, but I believe they ought to be thinned down to one at a place, and if that isn't enough have them so that they will not touch one another.

Chester Tyson. Do you have any varieties that grow together?

Mr. Cox. Yes, a great many varieties of that kind, Rome Beauty grow two or three in a bunch. You can throw them down cheaper than you can carry them down. If you pick them you have all those culls to pick out. I believe you will save in labor right there, and will have a good deal more pride in your work. We make our own barrels on the farm and have them on hand when the crop is ripe. I believe every grower, if he don't make his own barrels on the farm, should have the barrels made early in the season, so that he has them ready when the time comes, and won't have to pay out extra money for those packages when he must have them. I believe a person ought to have all the packages that he thinks he is liable to use at all, so that if you should have a hundred or two barrels of fruit more than expected you won't have to lose time getting more barrels. We have been making two pickings in our orchard for many years. That may seem strange to some people, but I think it is the correct way, especially with summer apples. I wouldn't think of gathering a crop without picking two or three times. Those apples don't ripen at the same time. An apple will grow as long as it hangs on the tree as a general thing, and while it is growing it will take on a better color. People pay for color when they go to buy an apple. The leaves generally fall after we have a frost. I don't think the apples quit growing until the wood ripens or the stems loosen in the apples. Some people used to think that it was the hot sun that made the color on the fruit. You cannot have good color on your fruit if you have hot days and hot nights. About the middle of August we happened to have an awfully hot dry spell, and consequently we did not get the color on the apples that we usually have just because it was so dry. I don't know whether it was the same over here. It was so dry that I can say there is not a single green field of wheat in Southern Ohio. That may seem strange to you, but it is a fact. I never saw wheat showing green at all until I crossed the Potomac River. We had a few little showers every month but it did hardly any good at all. I believe it was two years ago we had fifty-seven inches of rain. While the usual rainfall is about three and a half inches per month, we have had only about five inches of rain since the middle of August, so that we have had very little rainfall the past season. We are trying to grow a good many apples down there that will ripen through the summer and fall clear up to the winter time. We have a wagon on the market nearly all summer and all fall. It pays to sell apples in baskets and grade them up nicely. We try to grade these early apples. We found that if we would put all of them together that they want to pay just about what one of these cull baskets is worth. Consequently, the best way is to put in nice apples and have them just as nice as you can get them. For the past two or three years, we have sold a great many of these apples at $2.00 a bushel. Of course, they sold cheaper than that sometimes. Some years they don't sell near that high. We cannot blame a person then for setting out a few early varieties on his farm. I am setting out more Jonathan and Grimes Golden of late years than anything else as we have plenty of Rome Beauty. I don't believe I would like to plant an orchard of mixed up varieties very much. For instance, set out blocks one row of one kind, one row of another kind, and so on. I believe in setting out a full block of a kind, or not less than four rows of a kind. It is said by some people that you get much better fertilization by having these varieties mixed in that way and still I believe it is better to have more than one row of a variety if you care to do that. I would make it four rows anyway of one variety. The highest point on my farm is 350 feet higher than the lowest point and not over one-fourth mile apart. There will be a slope and then there will be a place nearly level again. That's the way the hills are situated. On those banks a good many of those apples will roll down to a level place and it doesn't hurt the apples very seriously on the grass. If there were a good many rocks, it would be different. I never saw a rockier place in my life than I did coming over here. We picked the rocks up out of our orchard very readily.

In going to those local markets a person must learn to be a salesman. It takes a man to learn the business and get acquainted and let people know that you would like to do business with them, etc. Now, it takes a man to be trained up. One man can go in there and he will get twice as much out of his fruit as another man, and I believe in training up the boys as they grow. Let them go in there and learn it. I took up the business somewhat myself for a good many years and I believe that if it is not too egotistical to say it, I can do better than any man on my wagon. The man that is honest has no trouble in getting plenty of trade and the man who is honest in buying is honest with the man who is selling. They are willing to pay you whatever you get for the rest of your fruit. We have quite a good many grocers and fruit stands and have a good trade among them all. We have a telephone running out to the farm and they can call me up any time and give orders. When you have got enough stuff you can go nearly every day. An occurrence happened down there last summer. A man took some potatoes to town. He had them in a bushel crate and sold them to a Jew. The Jew looked at them and found some small ones among them. He said, "I want good potatoes. Take those small ones out." The farmer picked the little potatoes out and still there was a bushel of large potatoes. The Jew said, "pour the little potatoes back and I will take them," but the farmer said, "These are mine. There is your bushel," and kept the small potatoes. The buyer is willing to pay you for good potatoes and if you have any culls, sell them as culls and get that much extra. We generally pack about three grades of them and then have some culls besides. This winter we have a good many cull apples. We pick out nice uniform apples first in a basket to face the barrel with. In fact we would rather not have the extra large ones along with some not so large. If you have some big ones there and pack a few little ones with them, they will be noticed at once. The first grade is two and a half inches in diameter and up, and fairly good color. So have that barrel marked "Fancy." You want to have on it the name of the variety and the name and address of the grower. I use three colors of ink for my stamps. The best is marked "Fancy Rome Beauty, grown by U. T. Cox, Proctorville, Ohio." Fancy, will indicate that that's my best grade, and it is stamped on there in blue. The next grade is stamped in red. We call them "Choice Rome Beauty apples, grown by U. T. Cox, Proctorville, Ohio." If you can't read the writing you can tell by the color what grade of apples you have in the barrel, they are perfectly free from scab. They are nice. We have another grade, smaller than that, sometimes. Some drop that are not wormy. We pick them up and take them into our local market and sell them right there. Sell them as drop apples and some of you would be surprised to know what we get out of them. Last year we got $2.25 for drop apples without the barrel. In addition to that there are some scabby ones and we put them out in a different grade and just call them Rome Beauty. They are marked in black. There will be some one coming along presently who will want to buy some of these apples for home use, or a little cider, or I don't know what. I believe it is a detriment to ship them to a city market. I believe it is a detriment to the trade to have any of them in there. The Rural New Yorker had a picture of something like that. We are ruining the trade of this country by doing so. If it says good apples *on the head* of the barrel, there should be good apples *in* the barrel.

It is said by some foresters that we ought to have a considerable part of this country in forests. Why shouldn't the apple tree or some kind of fruit tree take the place of the forest trees to a great extent? We can do a great deal to extend our apple markets to foreign countries. The western growers are getting big prices but they cannot grow any better apples in quality or color than we can. If we had those same men transported over here in this country with practically the method they are using out there, I believe we would have as good apples as they have. I believe there is something else needed. Not every man can pack apples. I believe we need an association to pack the fruit and have the name of the association and their guarantee on the barrel or box. Then the buyers would not need to spend days and weeks in buying those apples. They would just simply come to the manager of the association and say how much will you take for your apples this year the way you are putting them up? It would be cheaper for the buyer to have them packed in this way than if he had to go and hunt them up, so I am looking for the time that the people get educated to grow, grade and pack these apples. I don't know if you people have done anything in that way. We are making preparations down in Southern Ohio at present. They sometimes return as high as $75.00 an acre clear profit on that worthless land. I think you are making a success under your conditions so you certainly should study your conditions and apply the best methods.

Prof. Stewart. Do you raise orchard grass?

Mr. Cox. We generally sow clover and orchard grass together. I believe a little mulch applied oftener would be more effective than a whole lot.

ORCHARD FERTILIZATION.

PROF. JNO. P. STEWART, *Asst. Professor of Experimental Horticulture, Pennsylvania State College.*

In fruit production, there are at least four factors that are essential in securing maximum profits. Assuming that location and varieties are proper, they are soil management, fertilization, pruning and spraying. Each must be right. No one of them can be singled out and made to carry the load of others left undone. Any one or part of one neglected may become the crop-limiter of that orchard and the extra care devoted to the others is lost. The truth of this principle is emphatically shown in figures which we have recently collected in a study of costs and profits in fruit growing. These figures show that in the case of the apple net profits have actually increased with expenditures up to more than $300 per acre for producing and marketing the crop. Thus in fruit growing as elsewhere one gets returns exactly in proportion to what he intelligently puts into it. To increase this intelligence, we look into one of the most complex of these production-factors, orchard fertilization.

In the country as a whole, orchard fertilization is not being neglected. The last census shows that the size of the orchard-fertilization bill is about $2,000,000 per year. Fruit farms expended 30 cents per acre for fertilizers as compared with 4 cent on hay and grain farms, and 2 cents per acre on stock farms. Whether this expenditure is being wisely made or whether it is sufficient is the question. At the present time, we have no exact system of orchard fertilization and little accurate data upon which one may be based.

The systems of fertilization now in operation or recommended are based on four things: (1) analyses of trees and their crops; (2) general experience and observation; (3) orchard surveys; and (4) experimental studies. Each has its strong and its weak points. For example, analyses show that an acre of bearing apple trees takes up about 55 lbs. of potash (K_2O) per year. But the fact that they have this potash does not prove either that they must have it or that its addition to the soil would secure any material response. Indeed, the same analyses show the annual possession by the trees of 57 lbs. of lime per acre, and yet lime is not generally considered important in orchard fertilization.

There are similar weaknesses, with the other sources of evidence. General experience and observation fail because of their lack of checks and their local application. Orchard surveys furnish the wide application and are very valuable on this account, but they can not completely isolate any one factor, and they are confined to current practice. Experimental studies are confined to comparatively few trees and soils, hence, must be more or less local. They also require long periods of time. But in spite of defects, each of these sources of evidence furnishes something and the final solution of the problem will depend upon them all.

In this discussion, we are concerned with the experimental evidence. The apple is not an easy crop to deal with experimentally. The difficulty of getting uniformity in soil and varieties over the large areas required, the perennial nature of the plant with its resulting food-storage for early spring growth, the continuous cropping without chance for rotation, and the sensitive and fickle bearing habit are a few of the difficulties that face the investigator. They make it necessary to forget some of the methods found applicable to other crops, and they require that the whole problem be studied from its foundation.

In view of these difficulties, there is a very fair amount of experimental evidence already at hand. Three valuable, long-time experiments have been made. The first of these has been in operation at the Woburn Experimental Fruit Farm in England, since 1894. Up to the close of the 14th season, there had been almost total absence of effect of manure of any kind. In a more recent test on poorer, sandy soil, they report that manures and especially stable manure, are having a very beneficial action.* The absence of effect in the longer experiment was explained by "the fact that trees draw their nourishment from a very large area, and from a very considerable depth, * * * * * * * * and, hence, are very little affected by surface dressings."* This experiment is of value in showing that some orchards are limited by something other than manures and fertilizers. It is also interesting in the fact that while the experiment as a whole shows no results from manures, yet it is reported that certain July applications of nitrate of soda produced distinct effects. The applications of nitrogen in the regular experiment were made in February. While this experiment undoubtedly has the values indicated, yet its full application to our conditions is somewhat inadvisable because of the marked difference in English conditions, and the fact that the experiment is being conducted on dwarf trees.

The second, long-time experiment is the one made at the Geneva Station, New York, and reported in 1907 by Professor Hedrick. This gives the results of twelve years of annual applications of potash and phosphate, at the rates of 169 lbs. K_2O, and 129 lbs. P_2O_5 per acre. The trees were 43 to 55 years old and the soil is a medium heavy clay. The results as a whole were considered negative, since the annual increase in yield of all varieties on the treated plots barely paid the cost of the fertilizers and their application.

* Letter of Spencer U. Pickering, September, 1907.

The results in detail are shown in Table No. 1. The first three lines of the table are taken from Professor Hedrick's report, page 225. The last three lines we have calculated from them, since the trees were set 48 to the acre.

Table 1.

New York Results. Potash and Phosphate Applications. 12 *yrs.*

	Baldwin		Fall Pippin		Roxbury		R. I. Greening		Northern Spy	
Annual Averages (Bu.)	Treated	Not Treated	Treated	Not Treated	Treated	Not Treated	Treated	Not Treated	Treated	Not Treated
Yield per tree, . . .	8 78	8.50	7.23	6.18	11.16	8.51	8 38	8.72	7.90	5.35
Yield per acre, . . .	421.4	408.	347.	296.6	535.7	408.5	402.2	418.6	379.2	256 8
Benefit,. . . .	13.4		50.4		127.2		-16.32		122 4	
Per Cent. Benefit, . .	3.1 per cent.		17 per cent.		31.5 per cent.		-3.9 per cent.		42 per cent.	

In our judgment, one of the most striking things shown in this table is the *difference in response* to fertilizer made by the different varieties. The Baldwin and R. I. Greening were practically unresponsive, while the Spy and Roxbury show an *annual average benefit* of nearly 125 bushels per acre. It did not pay to add fertilizer to the Baldwin and Greening trees, while even at the low price of $1 a barrel the Spy and Roxbury returned a *net profit* of nearly 180 per cent. on the cost of the fertilizer. This apparently indicates that the value of a fertilizer may sometimes depend upon the variety fertilized. But it should also be remembered that only phosphates and potash were applied in this experiment, and it is stated elsewhere in the report * that "leguminous cover crops plowed under in the orchard have usually produced beneficial effects the same on the next season," and that "it needs nitrogen, or humus, or the physical condition to be obtained by plowing under organic matter." In other words, nitrogen or humus is apparently the crop-limiter in this orchard and until this need is met, little or no advantage can be gained by applications of other forms of plant food. Hence, we conclude that instead of being negative, the least that can be said of this experiment is that it shows *partial results* from the application of certain fertilizers.

The third experiment is in Massachusetts, a preliminary report of which has been kindly furnished us by Director Brooks.† This experiment has been running at the Massachusetts Station during the last 30 years. The trees were planted one year after the experiment was started and the plots contain three trees each of Baldwin, R. I. Greening, Roxbury and Gravenstein. The soil is a "moderately heavy, gravelly loam, with a moderately compact (clay) subsoil," and is reported to have been "highly exhausted, chiefly by the production of hay, before the experiment started." The treatments and results we have arranged as shown in Table 2.

* Page 231, Bulletin No 289, N. Y., Geneva Station.

† Letter from Director Brooks, November 30, 1908.

Table 2.

Massachusetts Experiment on Apples, 1889-1909.

(Treatments and Yields per A., to date.)

Plot	1	2	3	4	5
Annual Treatment, ...	Manure, 10 Tons-Acre	Wood Ashes, 1 Ton	Check	Bone and K C l 600 and 209 lbs.	Bone and Low Grade K 2SO4 600 and 400 lbs.
Present Average Girth, ...	37.75 "	31.94- "	37 "	30.554 "	35 42 "
Ratios of Girth,..	140-	118.4	100	113	131.5
Total yields lbs..	17288.5	10150	3354	10958 5	15971.75
Ratios of yields .	515	301	100	327	476
Quality, ...	5	1	4	3	2

Here we have some very positive results from the application of fertilizers. In growth, the trees of the treated plots show an increase of 13 to 40 per cent. over the checks, and in yields, they show benefits of 201 to 415 per cent. The quality of the fruit is also improved in all plots except that receiving the stable manure, in which it is poorest. Manure, although most efficient in securing growth and yield, fails so completely on quality that it takes relatively low rank in final value. The most valuable returns clearly have come fro mplot five, where ground bone and low-grade sulphate were used. This plot also shows a surprising gain over plot four, which differs only in the use of the muriate instead of low-grade sulphate of potash. Whether this superiority is due to the magnesia in the sulphate or to a harmful effect of the chlorine accumulating from the muriate, or to a soil difference can not now be stated. It is being further studied by the Massachusetts Station.

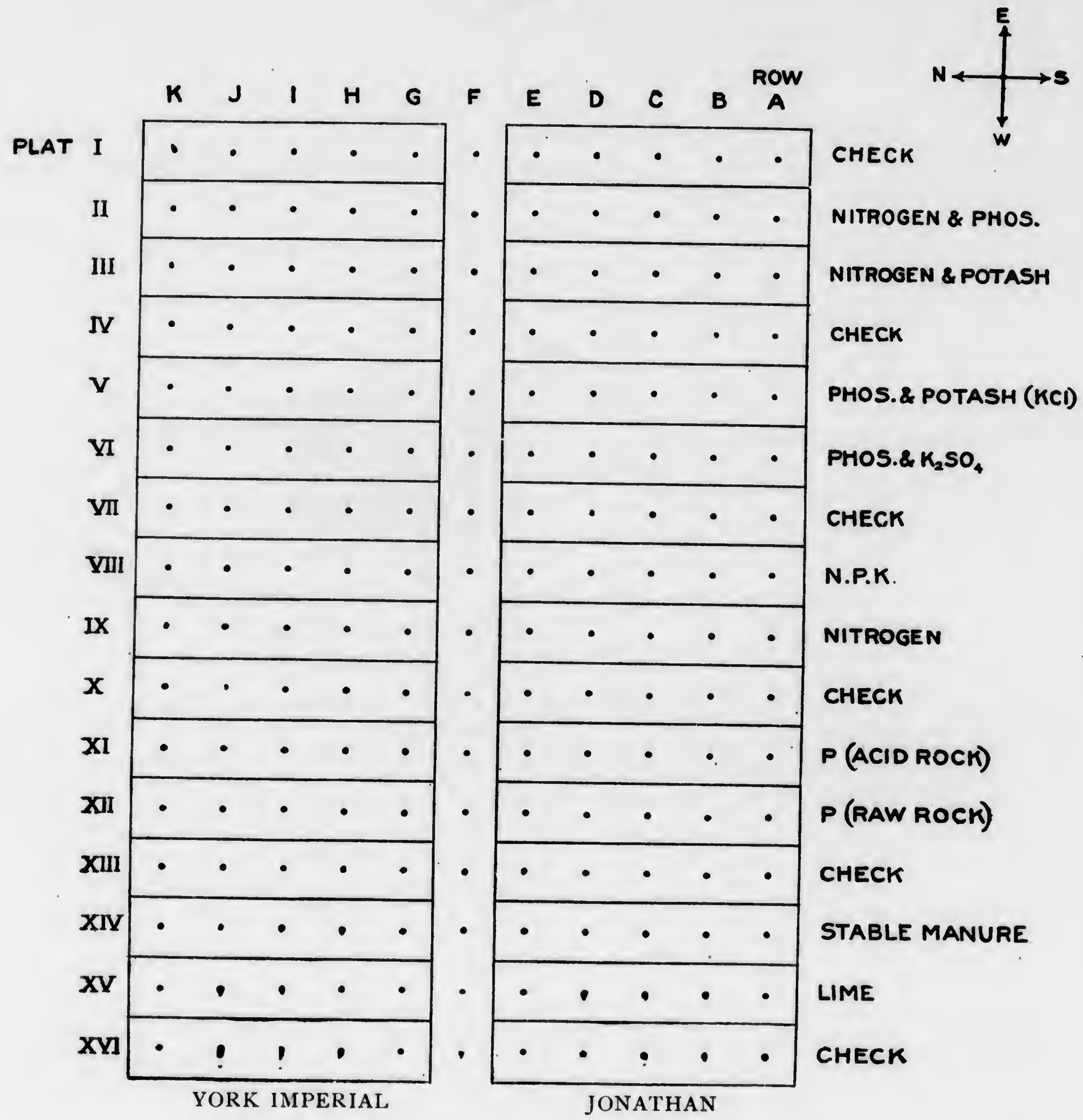
Thus we have before us the results from three experiments in orchard fertilization, running for 14, 12, and 20 years respectively. One shows no results, another partial results, and the third shows very beneficial results. Altogether, they show for a certainty that plant food is a crop limiter, but not in all orchards.

To obtain additional evidence, the series of experiments now in operation in this state were started, as you know, by the Pennsylvania Experiment Station in April, 1907. The series is without the merit of age as yet, but we trust that it has some of extent and plan. An idea of the extent can be obtained from the fact that the records of the past season required the handling of 82 tons of fruit from 2,268 trees. These trees covered nearly 50 acres, and involved ten soil types and twelve varieties. Young orchards to the amount of 42 acres in addition were set during the season.

Before examining the records in detail, we shall outline briefly the work as a whole. The problem placed before us was to determine and study the causes that affect yield and quality in apples. We based our work upon the general proposition that the growth and development of any plant vary with the limiting factor. The possible environmental limiting factors for all plants are moisture, food, heat, light, carbon dioxid and oxygen. Some of these factors are beyond the control of man and, hence, it was decided to study first the influence of those that are more or less within his control.

We, therefore, are now studying (1) the influence of plant food as affected by fertilizers; (2) the influence of moisture as affected by soil management; (3) the influence of cover crops; and (4) the influence of heredity as shown by propagation from best individuals, and by variety.

Figure 1.



Influence of Fertilizers.

This experiment is located with D. M. Wertz, Franklin Co. Others with Tyson Bros., Adams Co., S. M. Brown, Bedford Co., and at State College.

The plan of our fertilizer experiment is shown in Figure 1. The fertilizers are applied annually at the rates per acre of 50 lbs. nitrogen (N), 100 lbs. phosphoric acid (P_2O_5), 150 lbs. potash (K_2O), 1,000 lbs. of lime, and 12 tons of stable manure. The results from three orchards ranging from 9 to 19 years of age are shown in table No. 3.

Table 3.

Fertilizer Results, Three Experiments Combined, 1908.

INFLUENCE ON YIELDS. TOTAL YIELDS, LBS.

	1			4	5	6	7	8	9	10	11	12	13	14	15	16
	X	N P	N K	X	P K	PK 2-SO4	X	N P K	N	X	Acid Phos.	Raw Phos.	X	Manure	Lime	X
	3337	5117	4244	1416	2135	1109	931	2286	2034	1467	707	475	882	1370	643	80
Per cent Benefit.		90	58		70	1.5		98 7	55.5		-45.2	-55.8		59.7	-22 9	

INFLUENCE ON COLOR. PER CENT. COLORED.

	69.2	50.8	56.2	58.5	66.4	55.2	47.9	35	37.6	60	58 9	69 3	53.7	49 2	63 6	75.9
Per cent Benefit		-14.8	-5.9		11.4	3 8		-16.9	-18.4		1	13.5		-11.7	-4.6	

INFLUENCE ON SIZE. AV. WT. IN OZS.

4.42	5.03	5.29	5.01	5.22	5.45	5.22	4.97	5.51	5.05	5.65	4.87	5.18	5.18	5.18	5.49

Too variable to determine benefit on size.

Influence of Fertilizer Elements. Per Cent. Benefit. 2d Year.

By comparison of the results from the different combinations shown in table No. 3, it is possible to obtain figures showing the influence during the past season of the individual fertilizer elements. Their effect upon yield and color is shown in table No. 4.

Table 4.

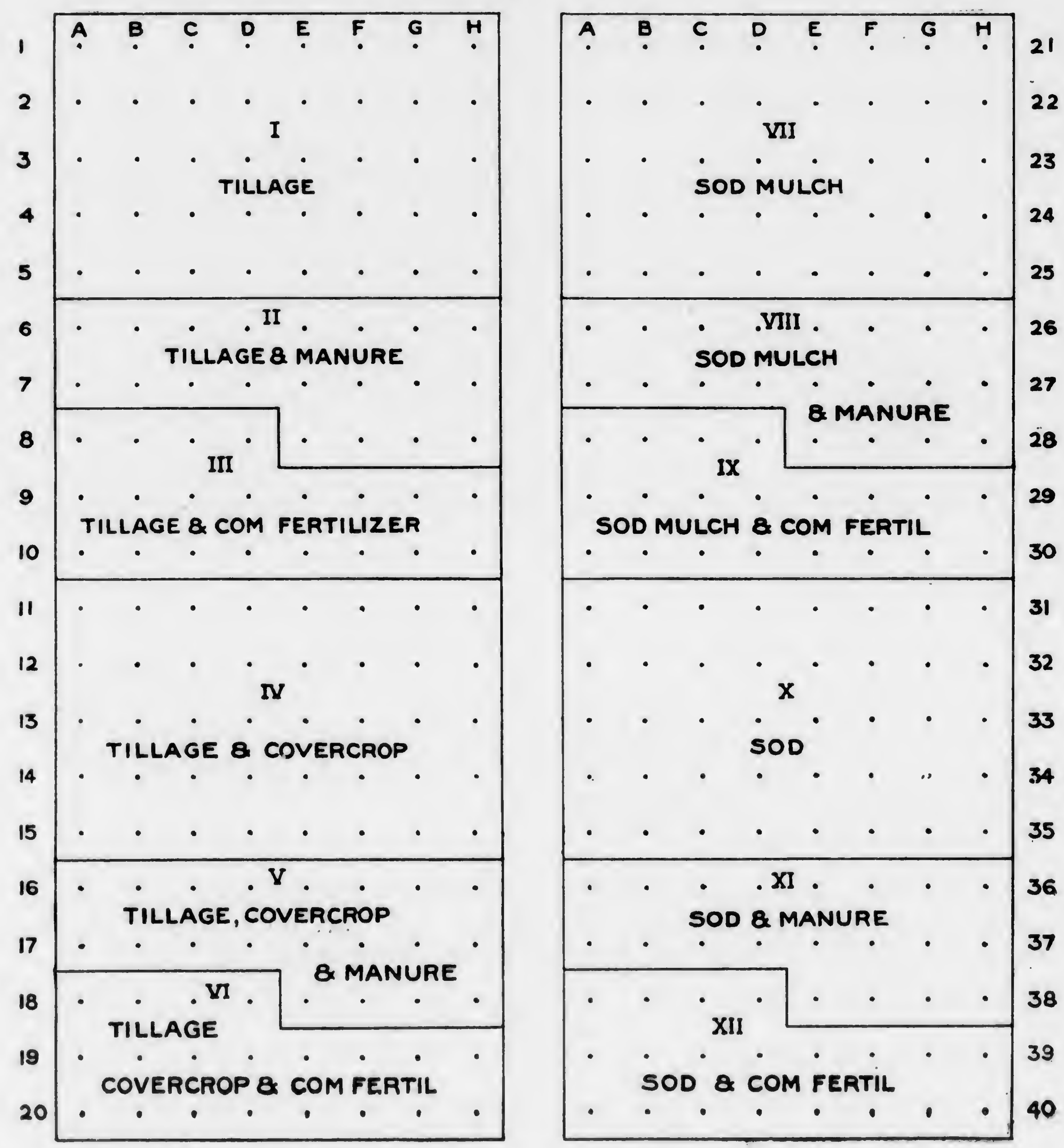
Element.	Yield.	Color.
Nitrogen, ...	47.25 per cent.	—17.87 per cent.
Phosphate (P_2O_5), ...	5.8 per cent.	1.56 per cent.
Potash (K_2O), ...	19.00 per cent.	10.15 per cent.
Manure, ...	59.7 per cent.	—11.7 per cent.
Lime, ...	—22.9 per cent.	— 4.6 per cent.

This table shows that both nitrogen and stable manure have materially increased the yield and decreased the color of the fruit. It also shows phosphates to have had but little influence on either yield or color. This seems to be largely because this element failed so completely on the plot where it was applied alone. Where it was used in combination, phosphoric acid showed some distinctly beneficial results. Potash has shown moderately beneficial results on both yield and color, and lime has apparently decreased both. It is hardly believable that lime actually has the harmful effect indicated here, and it will be interesting to see whether or not the indication is maintained in later developments. It is probably one of the transient conditions, which make necessary the long periods required in orchard experiments.

The strong influence of nitrogen both on fruit and foliage is one of the striking features in these experiments to date. This is particularly true in the Bedford County experiment, on a thin, exhausted, stony clay. Its effect in relation to the time of application here we believe also to be significant. The first application was made in the form of nitrate of soda as a top-dressing on July 8, 1907. Not only was the effect of the nitrogen plainly evident before the close of August and during the remainder of the season, but the trees of these nitrogen plots came out again into leaf much greener the following spring and showed as marked differences in late May of 1908, before the second application as they had shown in the preceding autumn. This undoubtedly has a bearing on the time for applying *soluble, transient fertilizers* to such perennial plants as apple trees.

Coupled with the Woburn experience, it indicates (though it has not proved) the advisability of delaying such applications until the season's growth is well advanced, but not completed; in other words, until the plant's supply of stored food is about exhausted and available food becomes a limiting factor.

Figure 2.



Influence of Soil Management and Manures.

The experiment figured here is located in Bedford County, with J. R. Sleek. Others with J. H. Ledy, and with John A. Nicodemus, Franklin County, and with F. H. Fassett, Wyoming County.

Figure No. 2 shows the plan of our soil management experiment. Soil management is so closely related to the use of fertilizers that it has seemed inadvisable to completely separate them. This experiment, in addition to comparing the different systems of management, tests the value of commercial and stable manures in connection with each. The stable manure is applied annually at the rate of 12 T. per acre and the commercial fertilizers at the rate of 30 lbs. of nitrogen (N), 60 lbs. of phosphoric acid (P_2O_5), and 100 lbs. of potash (K_2O). On the sod-mulch plot, all grass is left in the orchard and an additional mulch of straw at the rate of three tons per acre is applied annually.

Table 5.

Influence of Soil Management on Yield, 1907, 1908.

Young Orchards	Clean Tillage	Tillage and Cover Crop	Sod Mulch	Sod
Yields 1907, ...	4037 lbs.	3359 lbs.	4425 lbs.	4481 lbs.
Yields 1908, ...	13651	16112	18692	15473
Totals 2 years, ...	17688	19471	23117	19954
Ratios, ...	100	110	130	113
Ratios, ...		100	118,5	
Mature Orchard				
Yields 2 years, . . .		35318	25266	
Ratios, ...		140-	100	

Table No. 5 shows the yields obtained from the different systems of soil management during the last two years. Results for both years are given here because the current year's crop can be more directly influenced by cultural methods than by fertilizers. The results given here, and those in the later tables on young orchards, have been obtained by combining the yields from three orchards of six to fifteen years of age. The mature orchard is thirty-five years old.

As shown in the table, the young orchards have yielded better under the sod-mulch and sod treatments, while the mature orchard is best with tillage and cover crop. Sod-mulch in young orchards shows 30 per cent. better yields than clean tillage and 18½ better than the cover crop method, while in the mature orchard the cover-crop is 40 per cent. better than the sod-mulch. If these differences are maintained by later results, they would indicate that the mulch treatment is of value in developing and establishing the bearing habit in orchards which have reached bearing size and age. Also after this habit is established, the present results clearly indicate that tillage is to be preferred.

Table 6.

Influence of Manures on Yields, 1908.

Young Orchards	Unfertilized	Manure	Com. Fertilizers
Yields, lbs.	23669	41532	34316
Ratios,	100	176	145
Ratios,		111	100
Mature Orchard			
Yields, 2 years,	34635	26540	22881
Ratios,	151	116	100

Table No. 6 shows the yields obtained under different methods of manuring in their second year. The orchards are the same as described under table No. 5. The young orchards have responded to the treatments while the old orchard apparently has not. Both commercial and stable manures show distinct benefit in yields in the young orchards, with the latter somewhat in the lead in orchards of both ages.

Table 7.

Influence of Manures on Color, 1908.

Young Orchard	Unfertilized	Manure	Com. Fertilizer
Average per cent of color,	59.89	48.34	44.5
Ratios,	100	81 5	78.5
Mature Orchard			
Average per cent of color,	88.3	84.7	86.45
Ratios,	100	96-	98-

Table No. 7 shows the results obtained during the past year on the influence of complete fertilizers and stable manures upon color. Both manures have decreased it. The decrease averaged about 3 per cent. in the old orchard and 20 per cent. in the young.

This decrease in color is probably simply due to delayed maturity, the effect being greatest in the young orchards because their general response to fertilizer has been greater. Had picking been delayed a few days on the manured plots, it is quite likely that the differences in color would have vanished.

Table 8.

Influence of Soil Systems on Size, 1908.

Young Orchards	Tillage	Tillage and Cover Crop	Sod Mulch	Sod
Average Wt. iu ozs.	5.9-	6.03-	6.02	5 79
Ratios of systems	102-	104	104-	100
Mature Orchard				
Average Wt. in ozs.,		5.47-	5.02-	
Ratios of systems,		1.09	100	

Table 9.

Influence of Manures on Size, 1908.

Young Orchards	Unfertilized	Manure	Com. Fertilizcr
Average Wt. in ozs.,	7.30-	7.79	8.26-
Ratios,	100	105.3	115.8
Mature Orehard			
Average Wt. in ozs.,	4.61	5.65	5.47
Ratios,	100	122.5	118.5

Tables No. 8 and No. 9 shows results of the past season in regard to the effect of soil systems and manures on the average size of apples.

Both manures and tillage-with-a-cover-crop have increased the size of the fruit. This is desirable in old orchards, but rarely so in young as the fruit in the latter is already likely to be overgrown.

In the prosecution of the work as a whole, some interesting data have been gathered upon things a little aside from the main lines which we may briefly mention here. The most important of these are on the extent and depth of root-growth, the influence of soil systems on moisture, and their influence on the sticking qualities of certain varieties. As to results, suffice it to say that apple roots extend much farther laterally than is generally supposed, reaching sometimes more than three times as far as the spread of the branches. Soil systems during the past season varied greatly in ability to conserve moisture. On a moderately porous soil in Wyoming County, tillage held the moisture much better than a three-ton-per-acre, sod-mulch system and was vastly superior to sod even when closely cropped and the grass left on the ground. On the tillage plots, under these conditions, the sticking qualities of Baldwin apples were greater by 52 per cent. than on the sod-mulch plots. Northern Spies, however, under identical conditions, showed no material differences in sticking qualities.

To summarize the present status of orchard fertilization we would say that:

(1) Plant food is a crop-limiter in some orchards and in others it is not. Hence, it is a question whether the orchardist should apply manures in quantity until he has evidence that they are needed in his soil.

(2) There is generally little use of applying fertilizers without at the same time giving proper attention to the other factors of fruit production, viz: soil management, spraying, pruning, and general orchard care.

(3) After the other factors are right, if the trees are deficient in growth, foliage, or fruit, it is probable that an application of fertilizers will produce beneficial results.

(4) The indications are that nitrogen has more value as an orchard fertilizer than is generally accorded it, though it should be used judiciously on account of its effect on color. It can be used most freely on the earlier soils or in localities with rather long

growing seasons. It is probable that failure to secure results on apples from the application of potash and phosphates may be often due to a deficient nitrogen supply, which thus becomes the limiting factor for that orchard. If applied in the nitrate form, the time of application must be right.

(5) The greatest actual improvement in value of fruit has been secured on plots receiving phosphoric acid and potash in the form of low-grade sulphate. The exact cause of this is not yet known.

(6) Where plant-food is needed, we can not now improve upon the general recommendation of stable manure or leguminous cover-crops alternated with a fertilizer carrying about 30 lbs, of nitrogen, 60 lbs. of phosphoric acid, and 100 lbs. of potash per acre.

(7) To accompany this system of fertilization, the indications are that the proper soil management for most situations is tillage with a leguminous cover crop while the orchard is young, followed by a mixed lemuminous sod or sod-mulch when bearing age and size is reached. After the bearing habit is established, a return to tillage every second or third year should be made, increasing the frequency of tillage with the age of the orchard and the demands of the fruit.

PROPOSED NATIONAL LEGISLATION FOR UNIFORM PACKAGES, ETC.

Mr. U. T. Cox.

Mr. Chairman and Fellow Fruit Growers:

I don't know why you called on me to open this discussion. I am sorry that Mr. Rothwell cannot be here and I am sorry that I cannot fill Mr. Rothwell's shoes, but I can't begin to talk with him. I have studied a little bit on this bill in regard to regulating inter-state and foreign shipments of apples and I have come to the conclusion that we should have some such a law as this, but there are some few points in it that are objectionable to some of the growers. One of the points is, that the box that they specify in that bill must have certain dimensions. Now some varieties of apples you could pack in that to a greater advantage than others. I don't see why you couldn't make a box a different shape if you wish to. I don't see why you should make the box just the same for all varieties. Another objection that I would have to it, you cannot erase the marks from a box without having a penalty attached to it. That may be right and it may be wrong. If you have a box and pack apples in that box, that are not according to the grade that is marked on it and you wish to erase those marks, you cannot do so without being subject to a fine. This law, as I understand it, carries a penalty of 25 cents to a dollar for each package. I think we should be allowed to pack them in any shape provided we mark on the package just what is contained therein. The people of other countries are getting distrustful of the American people because they buy so many apples that are not true to the face. These people buy choice Baldwin or any other variety and expect a high grade fruit, but when they open the box, they find that it is very inferior cull stuff. And some people also put in the fruit buds and the leaves off the trees, simply to fill up, but, of course, that is an exception. But, anyway, we should not have anything there but what the box specifies. Now, if a person wants to put up apples, he ought to have the privilege of selling those apples somewhere. It is all right I believe that we put certain restrictions on apple packing. I would like to see Congress pass that bill or another one with similar regulations. It is under the direction of the Department of Agriculture and if a person does not pack his apples honestly and market them honestly he should be fined. That practice is ruining our trade in this country. We lost a great deal last year and our foreign trade is lost. I say, lost, simply because we sent out so many apples that were not honestly packed. Canada has some such a law as this and they can ship apples to foreign markets, and they can get more money for them than for the apples that come from the United States. The people are subject to a fine if they don't put these apples up honestly, and that's what we ought to do. If people are not honest, they ought to be made honest, in this case any way. Not only the growers, but I am here to say, that the buyer is just as dishonest in his dealings. He will buy another man's apples and he will face the barrels with the fine grade and fill the rest of the barrel with culls that he bought from some other man, and market them all as the honest man's fruit. I understand that there has been several objections made to this bill that I haven't mentioned, and I think a few of those things ought to be changed to allow certain things. I believe this law will be a great benefit to the growers so that no man can brand a package and have inferior stock in it. Possibly there is some one else here who is better posted on this than I am. I thank you.

E. C. Tyson. I do not feel qualified to express an opinion upon this important subject. It is a matter, however, which seems to me to be of great importance to fruit growers and one which has claimed quite a little of our attention for some time. In order to familiarize ourselves with the situation, as it now exists throughout the United States, we have had quite a little correspondence with other Horticultural Associations. We discover that there are five different dimensions for a heaped bushel in the United States, which becomes confusing in the matter of inter-state shipments. We regard this point of sufficient importance to justify consideration by the Porter Bill, looking toward the establishment of a legal bushel for apples and other produce of like character. We believe, however, that the matter is not mentioned in the Porter Bill as it stands at present. Our correspondence also developed the fact that there are numerous conflicting dimensions for apple boxes and also a wide interest in the passage of a suitable law of this kind.

Our western correspondents all strenuously object to the adoption of an arbitrary length, width and height for an apple box as provided by the Porter Bill, and in view of the conflict which is sure to arise over any attempt to thus prescribe a definite dimension, it is our opinion that it would be better to confine the proposed standard to a statement of cubical contents both for the bushel and the box as well as the barrel.

It is our opinion that 2,440 cu. in. most nearly represents what is likely to prove satisfactory as the cubical content for a legal bushel, our conclusions being based on the average of many replies to inquiries as to what would be a proper amount of heaping for a bushel of apples, namely a three-inch cone on a Winchester bushel.

It is likewise our opinion that 2,440 cu. in., which is practically the same as the Colorado box, also represents the proper size for a legal box with the additional advantage, as experiment proves, that three boxes of apples of that size just nicely fill a standard New York barrel.

The Porter Bill in its present form establishes three grades of apples on a basis of cross-section diameter, which shall be applicable to all varieties of apples, irrespective of their characteristic size. It seems to us that the Canadian method of grading combined with that practiced in the far west would be a better basis of packing. That this method is satisfactory in Canada is borne out by a recent letter from Mr. Alexander McNiel, Chief of the Fruit Division of the Canadian Department of Agriculture in which he says: "The various Provincial Fruit Growers' Associations of the Dominion have all placed their satisfaction on record by resolutions heartily endorsing the Inspection and Sale Act."

It seems to us, however, that the Porter Bill fails to consider the most important point of all, that of requiring that the packer place his name and address upon every package. A regulation of that kind would certainly of itself prevent a vast amount of fraudulent packing.

As Mr. Cox said, it is time for us to be getting busy. The fraudulent packing of apples has already resulted in immeasurable loss both at home and on the foreign markets. Canadian fruit, backed up by the government guarantee, is beating us right along on the Continental markets. We have already suffered severe loss on this account so that prompt and vigorous action is essential. New York growers are alive to the almost suicidal folly perpetrated there last year and are actively back of any legislation which will correct the abuse. It seems to me very important that the National Legislature enacts suitable laws governing the interstate, territorial and foreign shipment of apples making it unlawful to use short packages, or to ship closed packages of apples without marking each one with name and address of the packer and a correct statement of the contents. It is our belief that such a law should contain the following features:

1st. Establishment of capacity of a legal bushel for apples expressed in terms of cubic inches.

2d. Establishment of capacity of a legal "box" as being identical with that of a legal bushel with privilege to use a smaller box by marking it with the fractional part of a legal box which it contains, or with the number of fruits which it contains.

3d. Establishment of capacity of a legal barrel in terms of cubic inches, adopting that of the Standard New York apple barrel as nearly as practicable.

4th. Establishing a suitable number of grades of fruit one of which must be used on every closed packages packed for inter-state, territorial or foreign shipment.

5th. Requiring that every closed package containing apples for interstate, territorial or foreign shipment bear the name and address of packer and the name of variety contained therein in addition to grade marks. And that all fancy and 1st grade fruit also bear the name "American" when intended for export.

6th. Providing suitable penalties for violation.

I would like to hear from Mr. Catchpole.

Mr. Catchpole. I would like to have Prof. Wilson's views.

Prof. Wilson. I shall have to plead ignorance. I know there is such a thing as the Porter Bill but I don't know enough about the details of the subject to discuss it intelligently.

Mr. Catchpole. Your secretary has covered this matter in a very intelligent way and has gone into it in detail. A little history of this: We, in the Empire State, have been feeling our way in this question of regulation since the society was first organized. Last winter during some of these meetings, we realized the great necessity of doing something along this line, and we intend to take this matter up at the next meeting. The trade is lost to us. It means as much to you people here as it does to us. What are we going to do about it? Some of us who have had experience in these things favored the Canadian Law. International jealousies interfered. Just that one word, "Canadian" was like a red flag to many of our people. It was impossible to do anything in our meetings as there was too much opposition and it seemed best to do something in a quiet way and finally they agreed to compromise and I think it drifted along until about the first of June. The present bill is weak. It is awfully weak. I am very glad that your society has taken this matter up and believe you have an outline of something here which is very much better. Some of our people objected to inspection. That is, they thought that a careful grower with an established trade under an established brand should be permitted to market his fruit in that way. A majority of our growers, however, found it would be a benefit to the trade to have a suitable law. But the proposed law does not put it strong enough. As the matter now stands, the one who would purchase a carload of apples in the east has to take his chances. Our English friends are able to deal in Canadian fruits as our people here deal in cereals. There is a very large fruit firm in England. For two years the head of the concern was with us. Now he is able to buy carloads of Canadian apples, to buy ten carloads if he wishes. He knows what he is buying. He has the guarantee of the Canadian Government back of him. The method of packing which prevails here is getting worse and worse every year. As friend Cox said, the dealers are the worst sinners. They certainly are. They throw the blame on the growers. The local dealers buy a few of the good crops along with the bad and it is all sold. They take enough of the good to fix up both ends. If there is trouble at the other end, they compromise. There seems to be no limit to the low grades of fruit that is being put in the apple barrels. Another disadvantage to this old method of packing fruits is that the grades are growing lower and lower. I regret that to-day in Western New York they are packing a cider apple and sending out carloads of this low grade fruit which goes on the market. You people of this territory are growing fine fruits. You should pack them well and be protected in a good market.

Without taking more of your valuable time, I would suggest that before you people adjourn here in this annual session that you appoint a committe to attend our New York meeting and look into this matter of legislation and give us encouragement and we hope before the winter is over to pass a bill. We would be very glad to have a representative from this association meet with us in some of our big meetings up there. I hope that you can see your way clear to make such a trip.

Chester Tyson. I would like to ask Mr. Catchpole whether it is the general feeling of the people that the Porter Bill can pass?

Mr. Catchpole. I think there are great doubts in regard to the Porter Bill for some reason which it would not be proper to state here.

E. C. Tyson. I have the same information. I am informed from several sources that on account of Mr. Porter's political enemies, it is very doubtful if anything can be done and Mr. Porter was defeated for re-election, and I presume goes home the 4th of March.

Mr. Robert M. Eldon. I think the growers ought to become good politicians. I think that we don't take enough interest, no matter what the subject and I think we are especially slack in the fruit interests. The man who represents us, no matter where he goes, should be a man who is fully alive to the fruit interests of this county. I have yet to learn whether they have ever said anything favorable to the industry or whether they have ever been approached by fruit growers or individuals to claim their help. I don't think we take enough interest in it. They are just as able as those fellows who get what they want. Now I am not criticising anyone in particular, or anybody who represents Adams County. The good people who want good laws can get them if they go after them. There is cause for the distrust of the American people. It seems to me that the legislature ought to be honest. Those that are not honest ought to have something direct applied to them. President Roosevelt says that you cannot get anything by wishing for it but you have to go after it. If the people who attend to these local elections of ours are not people to associate with, let us go and boost it up.

E. C. Tyson. I would like to say in regard to your question that Congressman Lafean assures me that he is very much interested in the fruit industry of this country and in fact, said that he was willing to be responsible for any suitable bill that was presented.

Mr. U. T. Cox. How about personal letters? I think a personal letter will have more influence than representatives from any organization. I cannot say what will be done with the vote from our Congressional district, but I know our Congressman, and also I know the Congressman in West Virginia and both of them personal friends. I think that has more to do with it than anything else.

Prof. Stewart. I think that both of these suggestions are good, the legislator as well as the postage stamp, and one of them does not interfere with the other. It is an easy matter to do both and I think there is probably no one thing any more important to the fruit growers everywhere and particularly here in Adams County, than just this matter of an honest fruit package throughout and if Adams County can grow such fine fruit as we see here they ought to be protected in it. They will be putting out a first class article. They don't want somebody else to buy these apples and use them for facers and destroy the reputation that Adams County may make. Now that is just looking at it from the Adams County standpoint, and we cannot have it said of the fruit business that it is dishonest and that such things are practiced regularly upon the consumer of apples as have been reported in the Rural New Yorker recently. Readers of that paper asked the editor where they could get a barrel of Baldwin apples, honestly put up and he told them. Now I may say, that apples, if we can really make them honest, the consumption of apples is increasing and the price of apples is the only one of our fruits so far as I have been able to make a study of it, whose average price is increasing. I recently got the quotations from the Rural New Yorker, taking the matter monthly since 1880, and examined the average price of fruits to determine whether the price of fruits was going up or down and it is going down in every class of fruit that I studied except the apple which is going up. The average ten year price in the eighties was about $2.53 per barrel, in the nineties the ten year price on the New York market was something like $2.60. This was the average price for the Baldwin apple and the Baldwin apple was not selling at the highest price. In this last year apples were selling at $3.27. It simply means that the apple consumption is increasing even under present conditions of inferior and faulty pack. The price of apples will increase. If we can protect the consumer, it will increase more rapidly.

E. C. Tyson. Prof. Stewart said that the Rural New Yorker was asked where a certain man could get a barrel of perfect apples. I just want to say for your encouragement that in answer to this, the Rural New Yorker replied that if he would send his order to any member of the Fruit Growers Association of Adams County, he would get straight goods. This is very encouraging, but it also places upon us a great responsibility. We have it in our hands to make or mar our reputation and if we fall down it is our own fault.

Mr. McKay. I had the pleasure of attending the Bedford County Fruit Growers Association a few weeks ago and while there, I met a Congressman and I was wondering if a Congressman ever attended this Fruit Growers Association. I don't remember of ever seeing one on the program. It may be that you have no Congressman here but they have at Bedford. I was pleased to see there the Congressman, and by the way, I had the pleasure of meeting him and went out to his fruit farm, and, just to show you—the last election he was elected by a big majority. I found out that he is interested in everything that the fruit growers are interested in, and he takes a personal pleasure in helping them along. He goes to their meetings and so I think that it is partly your own fault that you don't get acquainted with the Congressman. President Roosevelt was the first president that ever recognized the farmer and in reference to packages I want to say that New York State last year did put up apples in bad shape. The prospect was that apples would be high and they put up all kinds of apples. That is what kept the price down last year. I think that there is a general improvement in packages and the general impression now among men is that they must put up a good package, an honest package, if they want to get a good price. I don't handle many apples but I must say that the packages are much better than they have been. There is one thing that has attracted my attention. Of course, the forests have been cut off and in spite of the Government's efforts to keep them up, wood is getting higher every day, and I was wondering if you cannot get up a package out of straw board and I think the time is coming that you will probably want a little different package. In this connection, I wish to say that the package is growing small, even out in the west. I notice the package here is smaller than it was last year. Now about the prices. Washington apples sold in open market for as high as $3.000 a box, probably they wholesaled at $2.00 a box. A Pennsylvania gentleman received $2.50 a box last year for his aples. I don't believe that there was one apple that wasn't perfect. His customers were pleased and this year wanted more but he did not have any this year. The apple market is improving. The package is improving, and I think if you get your Congressman and show him what you are doing, when you want anything he can get it for you.

GENERAL ORCHARD MANAGEMENT.

PROF. CHARLES S. WILSON, ITHACA, N. Y., *Dept. of Horticulture, Cornell University.*

Mr. President, Members of the Fruit Growers Association of Adams County and Friends:

I want to say that it is a great pleasure for me to come down from the State of New York to visit and see the organization which you have here. For the last three years I have been connected more or less with a county association in New York State, The Ontario County Fruit Growers Association. I took an active part in the organization of that association three years ago. Our annual meeting was held about two weeks ago, and at that meeting I had the pleasure of looking over the faces of about two hundred of the interested fruit growers of the county. Our labors had been great, but the pleasure and the gratification of looking over the faces of those real growers was something that made us feel duly paid. Now, here you have a similar county organization. You have one, however, which is better than ours. You have more members. Perhaps in the organization of this meeting you have also felt that sometimes the work was strenuous but it certainly must be a great

gratification to those who have been actively engaged in the work here to look over the faces of members this morning. I want to congratulate you on the success of this meeting. Moreover, I want to say that the Fruit Growers Association of Adams County is known not only in Adams County, not only in the State of Pennsylvania but far beyond Pennsylvania. This reputation is going to bring you greater returns. If any of you are not members, join a Fruit Growers Association. Get in the ranks and help the fruit growers. Here you can do a great deal more good than is possible to imagine.

Prof. Craig was to address you this morning. You are disappointed that he cannot come. I am disappointed too in one way, and yet, personally, I am glad that it is my privilege to be here in his place.

I have a few apples, nothing of any real value, but something that may interest you, simply a few that I could get in the little time I had to prepare. We have an annual exhibition up at Cornell and at that exhibition we get different varieties from our own State and also from all parts of the country. I have a few of the typical fruits from different sections of the United States. As I started from home I put these in my suit case. I have a Ben Davis apple here from three different states. Here is one grown in Adams County. Here is a Ben Davis grown in the State of Utah. It is a little different in form, not quite so highly colored and I suppose there is some little difference in quality. Here is a Ben Davis from Arizona, away up in the mountains and you would not recognize it as the Ben Davis variety. Here is a Ben Davis grown in the arid and irrigated part of Arizona. You hear a great deal about western apples that are grown out in the States of Washington and Oregon. There seemed to be some doubt about the real existence of the State of Washington. I am going one step farther than the last speaker and say that there is a State of Washington, and I can show you fruit from the State of Washington.

We hear a great deal of the western grown fruit. Oregon apples are advertised widely. Wherever we get a specimen it is a great big specimen. Now, Oregon can grow some varieties of apples and grow fine ones, beating us here. On the other hand, we can beat them in some other varieties. I want to show you one or two. Here is a Rome Beauty of New York. There is a Rome Beauty from the State of Washington and here is one from Oregon. There are the three and the eastern apple I have is better than the western apples. I have another variety here which shows what I am trying to make clear. It is a New York Northern Spy. We can grow Northern Spies well in New York. Here is a Northern Spy from Oregon. We can beat Oregon growing Northern Spy. There is a Newtown Pippin from Oregon. Here is a Newtown Pippin from New York. After all, we need not be so much ashamed of our fruit as some of them try to make us. There is the Arkansas Black. I brought that down as a matter of interest. What I have said is aside from what I was really going to present but I thought you might be interested to bite into some of these apples and sample the quality. Let me say this. They grow some varieties better than we can. Each section of the country has varieties which are adapted to its own soil and condition. A great deal of the western apple boom is real estate boom. They are trying to sell us land in the west. Don't go west. Stay right here in Adams County.

The subject which I am going to present is a new line of work which was taken up at Cornell a few years ago and which from a practical standpoint has proved one of the most valuable lines of work that the college has ever taken up. It really is a study of the orchards of the state with the results in yields and incomes which they are getting at the present time. We are studying the practical fruit grower and his orchard and what I am going to present is really the results of our study with a view of comparing the results so that you can adopt them to your own conditions. I think this would be a good piece of work for your association to take up. Ontario County, New York, started its orchard surveys a few years ago, and the college helped them and now Ontario County has its own orchard surveys. I think it would be a nice piece of work for the association here to take up and perhaps the college would be willing to go ahead with it. What we do is to have one of our graduate students who is a practical fruit grower go into the orchard and make a study of it. We take the county as a unit. This student goes right to the fruit grower and studies that orchard himself, the tillage, has it been cultivated? Then he goes to the fruit grower and gets the yields, the price per bushel, etc. He makes a detailed study of every orchard and it takes sometimes two or three summers to finish up a county. For example, let us consider the matter of tilled and sod orchards.

Tilled and Sod Orchards.

(5-year average per acre.)

	All Orchards				Well Cared for Only	
	Niagara County		Orleans County		Orleans County	
	Bushels	Net Returns	Bushels	Net Returns	Bushels	Net Returns
Tilled 10 years or more, . .	280	$120	327	$182	337	$189
Tilled 5 years or more, . . .	254	100	274	138	276	148
Tilled at least 3 years, . . .	239	97	225	113	234	121
Sod at least 3 years, ...	209	67	222	107	242	118
Sod 5 years or more, . . .	197	76	204	108	258	134
Sod 10 years or more, . . .	194	75	176	87	232	117

Now all of the orchards in the counties which they sprayed can be found under one or the other of these heads. The experiment covers a period of ten years. You will notice that the orchards under tillage for the longest term of years take the lead in both yield and profit. Here is one of our comparison tables showing average results for 4 years under different distances of planting:

Distance Apart and Yield in Bushels.

(4 years average.)

Not over 30 x 30 ft., ... 186 bu.
31 x 31 to 35 x 35 ft., ... 222 bu.
36 x 36 to 40 x 40 ft., ... 229 bu.

Now, you may doubt somewhat the accuracy of our figures here. Let me explain. The figures we get are from the fruit

growers on their yields and income. We believe we know about the accuracy of the figures. More than half of the fruit growers go right to their books where the figures are in black and white and give us the figures. The rest of them are able to give us a rather varied estimate. Perhaps it may not be accurate but even then we are getting an accurate result. It is really based on the law of average and when we have enough orchards we are getting accurate results. Let me just tell you how that law of average can be illustrated and this is rather interesting too. One of the men at Cornell wanted to impress upon the minds of the students the importance of the law of averages. When he came into the meeting he asked them to guess on the length of a certain line. In that meeting there were foreigners from all countries and people from all parts of our country and when he averaged up thirty guesses his result was .723 inches and the most accurate measurement he could make was .721. In the first place, we are dealing with hundreds and hundreds and the greater the number the greater will be the accuracy of our figures as far as the results are concerned. When one county gives the same results as another county and so on it seems to make our figures more accurate. Let us see what they are doing in tillage. There are four factors connected with the good care of an orchard: tillage, spraying, pruning and fertilizing. Every one of them is important. You cannot afford to neglect any one without affecting the results. I will only consider tillage and spraying. I don't want you to think, however, that the other two factors which I am not going to present to you are of less importance.

You will say that those differences are not due to the factor of tillage alone. I really don't think they are, because the man who tills well will also spray well, prune well, and fertilize more. We have another table including just well cared for orchards. This chart includes only the orchards which are well pruned, which are well fertilized, well sprayed and which differ only in the method of tillage.

Let us stop just a minute to look at them. In Orleans County the orchards which are tilled ten years or more are giving 86 per cent. better yield than the sod orchards. You often hear the fruit grower express the opinion that an apple grown on sod is better colored. You hear buyers say that they prefer apples grown on sod. Let us see exactly what the buyers for the last five years have done in spite of what their opinion may be. The average price per bushel for the tilled apples is 48 cents, for the sod 43 cents, a difference of 5 cents. In spite of the fact that the buyers say that they prefer the apples on sod, they really have been paying fifteen or twenty cents more per barrel for those under tillage.

Don't think from what I said or from what the figures show that I would advise that every orchard ought to be tilled. There are conditions where tillage would not be advisable. Again the land might be so steep that you cannot till it, or the nature of the sod might be such that tillage might not be best. I will say this, however, that four-fifths of the orchards now in sod would give better net returns were they tilled. Here is table showing results from pasturing different kinds of animals in orchards:

Method of Sod Treatment.

(3 years average per acre.)

Pastured With	Niagara	Orleans	Wayne	Ontario
Hogs, ...	138 bushels	312 bushels	271 bushels	180 bushels
Sheep,..	129	308	216	177
Cattle,..	117	153	159	115
Not Pastured. . . .	141	217	185	156

Let us see the results of the table. In the first place it shows that cattle are worse than nothing. Don't put cattle in the orchard. The reason for that is evident. They will browse on the lower branches, break the bark. Better let them out on the roadside and have a quarrel with your neighbor than to pasture them in the orchard. Sheep in most cases give better results than not pastured at all and the reasons here are evident. Sheep keep the grass eaten close to the ground and hence prevent the loss of moisture. The manure dropped in the orchard, adds considerably to the fertility. The hog is giving the best results in our state. He is better than machinery and I think the results for that are evident. The same as in the case of sheep, the manure dropped adds fertility. Again the hogs running in the orchard pick up the windfalls and destroy worms. I don't think we realize the real value of hogs in the orchard as destroyers of insects. Take the rings out of their noses and let them root. They will do no harm. What parts of the orchard do they root? They root under the trees that have borne the fruit that year. The part that bears one year probably may not bear the next. Now you may say that the hogs destroy the roots. As a matter of fact they don't. Two or three hogs to an acre makes a good method of tillage.

Now, let us look at the previous table. If there is a method of sod treatment which equals tillage the growers have not found it. In other words, the best of the yields of sod do not come up to the best of the yields of tillage. As a matter of fact in the counties which we have studied only one orchard out of five of the sod gave yields equal to the average of the tilled orchard. Now, an orchard, to be successful, must not equal the average. It must be above the average. If there is a method of sod management equal to tillage, the growers have not found it in our state. Now, those figures on tillage, sod management are striking but they are exactly what our growers are getting. They are exactly the results, comparative results in dollars and cents in yields under these different methods of treatment for the last five years. We have not been tilling well enough. It is all right to have these fine, big, well-flavored apples to pick, but before you pick a beautiful apple, you must grow it. Now we must improve our method of growing apples. We must till better in New York. Just take those figures home and look them over.

Chester Tyson. How do you explain the fact that the well-cared-for orchard in Orleans County does not show a greater premium over the ordinarily cared for?

Mr. Fox. Why does the orchard in sod five years or more show better results than what has been tilled three years or more in the tilled orchard?

Prof. Wilson. I don't know. I have a few ideas of my own on tillage and cultivation and sod. Both of these methods can be carried to the extreme. If I had an orchard of my own, I shouldn't keep it in sod every year nor till it every year. I should combine tillage and sod. I should till about three years, putting some cover crop on each year. Leave it in sod the remaining two. There is such a thing as tilling the orchard to death.

Mr. Wertz. In pasturing hogs, how late in the season would you allow them in the orchard?

Prof. Wilson. Leave them there until the apples are large enough so that when they drop they can be sold, or are of some value.

If you have been plowing and can plow without breaking the roots, plow it up in the spring, cultivate until after the first of July. Don't cultivate after July. The sod orchard matures its wood sooner.

Now for the matter of spraying. You will remember it is one of the four important factors. Here are the results we got from spraying:

Sprayed and Unsprayed Orchards.

	All Orchards				Well Cared For			
	Niagara		Orleans		Niagara		Orleans	
	Bushels	Income	Bushels	Income	Bushels	Income	Bushels	Income
Unsprayed, ...	261	$ 45	245	$ 92	266	$ 95	328	$103
Sprayed once, . . .	364	93	307	116	353	146	346	139
Sprayed twice, . . .	509	101	343	127	422	147	374	143
Sprayed three times,	577	171	322	139	440	201	414	184
Sprayed four times,.	390	183	569	211	285	226	569	211

This spraying means, first time just before the buds open, second just after the petals have fallen, third ten days later. That is what we mean by once, twice, three times. We usually don't spray more than three times.

Don't forget those other two factors, pruning and fertilizing. They are just exactly as important as spraying and cultivation. Prof. Stewart told you about fertilizers yesterday. That is just as important as any of these factors. You must prune also. You cannot expect to get the best results by neglecting any one. After you go home, next spring till perhaps just a little better, spray just a little better, fertilize a little more thoroughly and prune a little better. See if you cannot get better results.

Mr. Cox. Are any of the sprayings for second brood of codling moth?

Prof. Wilson. The sprayings for the second brood of codling moth have been successful when the spray was applied just at the right time, but if you got a little too early or a little too late woe be unto you.

Mr. Cox. Do you use bordeaux mixture or not?

Prof. Wilson. The only thing that it will be of value for would be the apple spot.

Member. What fertilizer do you use for orchard fertilization?

Prof. Wilson. We are recommending a combination of barnyard manure and commercial fertilizer. We recommend the application of barnyard manure one year and commercial fertilizer the next. Prof. Stewart is working at the commercial fertilizer. Don't apply nitrate in commercial fertilizer when you are using barnyard manure. You better do a certain amount of experimenting first.

Mr. Prickett. What time of year is the best time to prune?

Prof. Wilson. You struck a pretty serious problem. I was talking to Prof. Hedrick the other day and he says that pruning is one of the important problems of New York. As a general principal most of the growers are leaving their trees too thick. They ought to prune them a little thinner so that the sun can get down. I don't think it is best to have an open top. Have a round symetrical head and leave it a little thinner. Whenever you get a branch, cut it close to the fork. Never leave a stump in a bearing orchard to decay. It is just like filling a tooth. You can prevent those decays if you only cut properly. The ideal time to prune is just before the buds start in the spring. Anytime after the leaves fall in the autumn and before they open in the spring.

Member. What is your objection to an open top?

Prof. Wilson. It is liable to spread. All your weight is on the sides. Moreover, there is a whole lot of space there in the center that might be bearing wood.

Prof. Stewart. With reference to what Prof. Wilson just stated, that it is desirable not to let the foliage get too thick in the center, I am inclined to think that you will have to do more pruning than usual. Your center pruning, spraying and picking will be more economically done from the step ladder type and of course those things are in favor of the open center tree. You can get more light with less pruning and you can keep the tree lower and consequently pick the fruit and spray the tree better. If you choose the open center type, the thing to do is to not save too many branches. I am inclined to think that three branches properly chosen would make an ideal top for a tree. Those branches should be distributed so as to occupy the space properly. If you start your tree right in the first spring you set it out, you can get enough branches that will come out in all directions and you have a good opportunity to select. Those three branches should by no means come out any closer together than a foot if you can get it thus, varying of course with the growth of a tree.

Mr. D. M. Wertz. Would it be very risky in trimming at this time of year?

Prof. Wilson. Any time while they are dormant. There might be a little drying out on the wood surface between now and spring. Always paint a large wound, say of three inches in diameter.

Mr. Wertz. Would you paint them right away.

Prof. Wilson. I should paint them as soon as I could. Probably as good a paint as any is white lead and I would color it with a little lamp black.

Mr. Cox. You spoke a while ago about the farther apart the trees are, the better the returns.

Prof. Wilson. There is a limit to that. I went as far as forty feet. I don't know where the limit is.

Prof. Stewart. Don't you suppose they vary with the variety? There are trees that demand more space than some of the trees we have here.

WHAT CROPS CAN BE PROFITABLY GROWN IN A YOUNG ORCHARD PENDING ITS MATURITY.

Horace Roberts, Moorestown, N. J.

Mr. Chairman, Ladies and Gentlemen:

First, it is my pleasant privilege to extend to you the greetings of the New Jersey Horticultural Society and to invite you again to send delegates to our meeting at Trenton on the sixth and seventh of January.

My subject is, "Crops in a Young Orchard." As soon as I was of age, I started to make a fruit farm of my home. Father told me there was a starve-to-death period between the time a tree was planted and the time that I could market fruit and insisted that instead of cutting off my revenue by planting our regular fields with fruit that I should clear more forest land and start my orchards on the new land, which I did. The first year after the timber was cut we would plow the land, plant our orchard and then raise a crop of watermelons among the young trees and stumps. That is an ideal condition for a crop of watermelons and they usually did well and brought me about $100.00 per acre for the crop. The next year, we would plant this same piece in sweet potatoes and have a freshly cleared piece for more watermelons. Here again is the ideal condition for a crop of sweet potatoes and they would pay me about as well as the watermelons had done the year before. I kept on clearing land and raising truck crops between the trees and stumps till my peaches and cherries began to bear and I was able to buy land ready cleared.

To make a success of a fruit business, pluck, energy and enthusiasm are essential and any crop raised among the trees must not damage those trees in the least nor interfere with their proper care nor culture. On our soil thorough culture seems necessary especially on young trees, and if we can raise truck crops at a profit and at the same time help the orchard it is a good business proposition. We believe that the ripening of grain crops, excepting corn in a very young orchard, is detrimental and we also object to hay and grass crops. Oats and rye do very well for winter cover crops but clover is better and we plow them all in green.

Now I have done a good deal of this kind of work, planting orchards and at the same time make the truck crops pay the way and in some cases the crops planted between the trees have paid for the farm before the trees themselves came into bearing. The first crop we plant is peas. They grow easily and are a soil improver instead of being an exhaustive crop. These are gone in time to plant another crop on the same ground such as cantaloupes, tomatoes, watermelons, beans, cabbage or squashes. Then at the last farming of these second crops we aim to sow crimson clover, making two crops and a cover crop beside on most of our land. Such crops as potatoes or sweet potatoes take so much of the season that we simply get the one crop and the cover crop. In some soils, this system doubtless would cause too much growth of the tree and we have to modify this system a little for our peaches but for aples we do not hesitate to recommend it.

It does not cost much more to care for an orchard with a crop in it than for a bare orchard and we generally do it better. However, the time soon comes when we come to the parting of the ways and the question is, shall it be fruit or truck? Peas and beans can be raised longer than most crops in an orchard without disadvantage for the reason that we do not cease to cultivate them. Crops like cantaloupes, tomatoes and melons have a period when they take all the land and must be let alone to mature their fruit, but peas and beans have no such period and we farm them every time we pick them till we are ready to cut them in. Small fruits too can be raised in young orchards with satisfaction, but special care must be given to the trees to prevent injury from borers. Strawberries, or in fact any of the berries, if planted directly next a tree affords an ideal protection for the borers. Currents and gooseberries are more easily managed for they can be planted in check rows and farmed both ways. Raspberries too can be raised that way but I never did it nor saw it done.

Our conditions are so different from yours that my remarks must needs be general. Our lands are cheap and we are only a few miles from Philadelphia, over good smooth level stone roads, so that we can get perishable fruits or vegetables in market quickly at a minimm expense. This far from market you might not be able to do just as I do but such crops as potatoes, cabbages, cantaloupes, tomatoes and the berries you could manage easily and your very distance from market would help you get together and stick together. Asparagus too is a crop that would suit your conditions and if you learn to raise it in its highest perfection you can raise other things from choice but it will not be from necessity. I have had good success planting apples and asparagus together, but with me, needing lots of feed and lots of culture.

Prof. Stewart. What variety of peas do you plant?

Mr. Roberts. We raise the shipping varieties. We want a good yielder that will give large green pods that will still look green and attractive after being on the market three or four days. Alaska, Gradus, Soxton, and Long Island Mammoth. With us, quality is entirely secondary to appearance, a hard dry pea that looks fresh will sell but a stale looking pod is not wanted in any market.

C. J. Tyson. Do you find it necessary to spray those crops?

Mr. Roberts. Most of them, but not the pea crop.

Mr. Tyson. How about beans?

Mr. Roberts. We generally spray at least once. Often more. We think it pays. We aim to have a succession of beans all through the season. They help keep our Italian gang busy and contented. This last year I raised 15,000 baskets of them. Beans are almost always ready to pick, the young ones sell best. The Italians want work every day. They tell us they have all winter to rest up. They work willingly from daylight till dark, Sunday and all if we are pushed.

Dr. Mayer. From what part of Italy do your men come?

Mr. Roberts. We only engage one man and he gets the rest. He will get the whole gang from his own part of Italy if possible.

Mr. Mayer. Where do you house them?

Mr. Roberts. We have houses built on purpose. They are not at all fastidious. They are stronger morally than most of the foreigners we meet, and can live happily under conditions not possible with weaker races.

Mr. Tyson. Do your canteloupes ever blight?

Mr. Roberts. Yes, this is a serious trouble. We have often held it in check pretty well with bordeaux mixture applied early and often.

Chester Tyson. Do you raise cucumbers, also?

Mr. Roberts. No, cucumbers and canteloupes mix in blooming and spoil the quality of each other.

Mr. Wertz. Do you turn your canteloupe vines up so as to get the spray on the underside of the leaf?

Mr. Roberts. No, we use the Shangle power sprayer that sends a mist all through, over and under the vines pretty well.

Mr. Wertz. Do you consider corn a good crop to grow among your trees?

Mr. Roberts. Not the best, but it does not hurt young trees much. It takes the moisture in September at a time when the trees can stand it. The trouble with the other grains is, they take all the moisture in June or July, and that is a very serious disadvantage to the tree.

Mr. Eldon. Would you have any objection to sowing wheat in an apple orchard.

Mr. Roberts. It is all right as a cover crop, but I would not let it mature if I valued my orchard.

Mr. Eldon. Would it be an advantage to sow some kind of grain with grass seed.

Mr. Roberts. It is our custom to start grass alone. Where we want to grow grass, we don't sow grain with it any more. If you want big yields of hay, leave grain out entirely.

C. A. Griest. How far apart do you plant asparagus?

Mr. Roberts. The rows are about six feet apart and about two feet apart in a row. We try to keep the land busy with something or other between the rows the first year.

Mr. Griest. How soon after planting can you get returns from asparagus?

Mr. Roberts. One year.

Mr. Griest. What age plants do you put out?

Mr. Roberts. One year.

Member. How long do you plant potatoes in an apple orchard?

Mr. Roberts. I have one I planted for about five years.

Member. Do you mean five years in succession?

Mr. Roberts. No, I wouldn't put it in the same crop twice in succession.

Member. How much fertilizer do you put on?

Mr. Roberts. That is something, in our soil, which we have to be pretty generous with. Sometimes a half ton and sometimes a larger dose. I have often been able to buy fertilizer a little off color at a low price so I could afford to throw on a ton to the acre. I put the ammonia right in with the potatoes in the form of tankage, fish or King Crab.

Member. Then you use Phosphoric Acid from South Caroline Rock?

Mr. Roberts. Yes.

Member. Do you use sulphate or muriate?

Mr. Roberts. I prefer the muriate for potatoes. I cannot go entirely by my own results but I depend on these experiment men for those things. That's what they are for. We don't sell potatoes for quality. We get a larger yield from muriate. I think all the experiments will bear me out. Isn't that right Prof. Stewart?

Prof. Stewart. I cannot say from my own experience but I think the yield is about the same, but the muriate is profitable because it costs only one and a quarter cents a pound for the K_2O, and the difference in yield will probably not amount to anything.

BEES IN RELATION TO HORTICULTURE.

By Richard D. Barclay, Philadelphia, Pa.

Mr. Chairman, Ladies and Gentlemen:

Perhaps the connection between bee-keeping and fruit-growing may seem a little remote but on a little consideration, I think you will see that there is a very intimate relation between the interests of the bee-keeper and that of the fruit grower. You undoubtedly know that, in order to secure a proper setting of fruit it is necessary to secure the fertilization of the blossom by some means. Some varieties of fruit are self-fertile, or are capable of having the stigma of their blossoms fertilized by the pollen from the same blossom. Other varieties are entirely incapable of fertilization by their own pollen. This matter has never been fully studied out, but the leading fruit growers to-day recognize that they must make some effort to secure complete pollenation each year with some degree of certainty. In the smaller fruit plantations, perhaps nine years in ten, weather conditions are such as to permit this to be brought about by the wind which is the most usual agent. In damp springs when bad weather prevails the wind cannot blow the pollen from blossom to blossom, and without the aid of some outside agency to distribute pollen little fruit will be set. In large plantations where the wind has less opportunity, these conditions may occur more frequently. Any insect which has need for pollen or nectar from the fruit blossoms and which visits them will serve as their agent. However, at the time fruit is in bloom you well know insects are rather scarce. Flies, bumble bees and most other insects do not appear in great numbers until later in the season. The honey-bee is the only insect which is present in large enough numbers at the proper time of year to be of much service in pollenizing the blossoms. A large number of fruit growers are coming to realize that they must have some bees with in reach of their orchards to do their pollenation work. I myself have my bees on the property of a large orchardist outside of Philadelphia and I know of other or-

chardists who keep bees themselves simply for their value in connection with their fruit business.

Bees visit fruit blossoms for both insects and for pollen. The nectar is the raw material from which they make honey and the pollen they use in feeding their larvæ—and corresponds to the proteid or meat portion of our diet. For whichever material the bee visits the blossoms it unavoidably rubs against the anthers containing the pollen and some of this pollen is liable to stick to the hairs which cover the bee's body. When the bee visits the next blossom some of this pollen retained on its body hairs or upon its legs will most likely be rubbed off upon the sticky stigma of that blossom and bring about cross fertilization.

The matter of spraying is also important in connection with bees and pollenation experiments seem to show that the bees may be injured by spraying in blossoms with copper salts or arsenical poisons. Whether this, in practice proves an important direct damage or not, it is certainly true that bees visiting blossoms sprayed with such materials are likely to be killed, and often are in great numbers. Therefore, as the setting of fruit may depend greatly upon the presence of bees, subjecting them to the danger of being killed by sprays, will work injury to the fruit grower directly, irrespective of the value of bees destroyed. It is thus important for the fruit grower to bear the bees in mind when planning his spraying work. The blossoms should not be sprayed until the petals begin to fall.

Fortunately for the fruit grower and thanks to modern apparatus and the present knowledge of bee life, the keeping of bees is no longer as complicated or dangerous as was once the case. It is not necessary to be severely stung to keep bees and secure their products. Improved races of bees, of which the Italians are the most generally desirable, are very much more gentle and easily handled than the common black or German bee and its crosses. A veil or face protector of some kind is desirable generally, although not always necessary. I have worked all day in large bee yards protected only by light summer clothing and wearing low shoes, sleeves rolled up, and a large straw hat, without receiving a sting. Any veil used should be black in color, otherwise the light will be so reflected as to make it impossible to see through with ease. A broad brim hat is always an advantage because a bee always hesitates to fly beneath the brim.

More important than a veil and what can rarely be done without, is smoke. This is made by burning any suitable substance in an apparatus called a smoker, consisting of a fire pot and bellows attached from which smoke can be directed and blown where wanted. I find oily or fresh "waste" most satisfactory for smoker fuel. Smoke scares the bees. When scared, bees immediately fill themselves with honey, and for some reason, when they are filled with honey they are much less inclined to sting and can be handled more freely. Providing no individual bee is pinched, bees once scared and filled with honey may be freely handled and even picked up by handfuls. A colony of bees consists of a queen, a few hundred drones, perhaps and several thousand worker bees. The queen is a fully developed female, lays the eggs which produce all the other bees, and while she has a sting, uses it against a rival queen only. The drones are the males, and they do not have any sting. The workers are undeveloped females, which gather honey, secrete wax, build comb and rear the young. They are each provided with a sting. A queen can lay as many as 4,000 eggs in 24 hours, which is more than twice her weight. She can control the sex of her offspring, and lays two kinds of eggs, drone and worker eggs. Drone eggs are unfertilized—hence the drone has no male parent. The ability of the queen to produce vital unfertilized eggs is called "parthenogenouses."

Bees build two kinds of cells in the comb—drone cells and worker cells. Worker eggs are laid in worker cells and drone eggs in drone cells. As the bee keeper desires to prevent as much as possible the production of drones, he wishes to prevent the production of drone cells. Combs are built from wax which is secreted in scales from glands on the under side of the abdomen of the worker. The larvæ in the comb cells are fed from the mouths of workers with a material called "chyle" which is placed in the cells about them. Queens are reared in a specially constructed cell from worker eggs by a special process of feeding. In order to prevent the overproduction of drone cells and hence of drones the bee-keeper uses sheets of wax so marked by machines as to be like the mid-rib of a comb. These wax sheets are called "foundation." Only pure bees-wax is suitable for their use, hence its use is in no sense an adulteration even when used in market comb honey. The cell bases marked on this foundation are worker size. Hence drone comb is prevented, and it also causes the combs to be built straight and where the bee-keeper wishes them.

I prefer a tin frame dovetailed hive and have a model here. The chief essential for a hive is that it be readily accessible in every part, and can be contracted or enlarged to any desired size, and all parts interchangeable, not only in itself, but with other hives in the same apiary.

In producing comb honey an especially constructed "super" is used in order that the little honey boxes or sections may be left clean and the bees will build straight combs in them. Frames, called "section holders" and frames called "separators" are used to hold the section and between each row, respectively. For "extracted" or liquid honey, another hive body is used, or one of the same patern only not so deep. The honey is produced in large combs from which it is removed by a centrifugal machine called an "extractor," and the combs may be used repeatedly. Comb honey is less economical and requires more skill to produce than extracted, and is hence more expensive.

Honey is removed from the hive now by the use of what are known as bee escapes, a devise set in a board which goes between the hive and super which it is desired to remove. The bees pass through the escape but cannot return. Placed on a hive in the afternoon the super will generally be ready to remove and be entirely free of bees by the next morning.

Swarming is the most objectionable thing in the production of honey. Formerly, our success with bees depended upon the number of swarms hived. Now the bee-keeper wishes to prevent swarming as much as possible. To do this the first step is to clip the queen's wings to prevent her going away with a swarm of close issue, and this also serves in a measure in identifying the queen. We know also that bees build queen cells before they swarm and we can prevent the swarming by repeatedly removing these cells. However, when bees once determine to swarm they "sulk" until they have accomplished it. Hence, it is generally better to satisfy them when in that condition. The practice of "shook" or "shaken" swarming does the work. When a colony is found ready to swarm most of the bees and queen are shaken into a new hive containing only frames of foundation on the old stand. They go to work at once like a new swarm. The remaining bees and brood may be disposed of in different ways, depending upon whether increase is desired or not. By this practice swarming can be pretty generally controlled.

Honey is a very valuable food, being partially digested by the bee. It is used on the table as a syrup but unfortunately is too often considered a luxury. Honey readily absorbs moisture and for that reason is much used by large bakeries because by retaining moisture it makes stale cakes seem fresh. Only the cheaper grades of honey are used for this purpose.

Mr. Black. How about the bees damaging grapes?

Mr. Barclay. I don't believe the bees can damage grapes. Where the bee gets into trouble is that hornets or birds make a hole in the grape and the bee will go there to get honey. The bees mouth part is so arranged that there is no cutting to it. The wasp's mouth part on the other hand is like a saw blade. With grapes, you can puncture a few and you can leave some that are not punctured and the bees will starve to death in the presence of those sound grapes.

Dr. I. H. Mayer. In using the bee escape, where and how do you insert it?

Mr. Barclay. Between the part to be removed and the rest of the hive.

Member. What is the age of the working bee?

Mr. Barclay. It is ordinarily stated at about six weeks when they are working strenuously, but of course those that go into the winter live until the following spring.

The worst enemies of the bee are the foul brood and black brood. One or the other of these diseases are in some parts of the state and black brood have been very bad in New York State. These diseases of bees have been carefully studied by the Department in Washington and we have some pretty definite information on the matter. The treatment for both is, that of removing all the combs and starting the bees fresh without any contaminated honey in a new hive, and the use of the old combs for wax.

The bee moth is not a direct cause of any trouble for the bee-keeper, it is the result of other troubles or neglect. The colony becomes weak and is entered by these moth and the larvæ will begin to feed on the combs. They won't bother as long as the colony is strong. The Italian bee is perhaps the leading race of bees. They are much more gentle and more easily handled than the black bee. The black bee is hard to handle for the simple reason that when you lift a comb of black bees, they get scared right away, and run about, while with the Italian you can look a comb over, and hunt the queen, and they are not constantly running about and bothering you and getting in the road. They are much more vigorous in preventing the moth's entrance.

Prof. John P. Stewart. Is it a settled fact that spraying kills the bees?

Mr. Barclay. I said that I have had no personal experience. I have seen reports where bees have been found in great agony apparently from that cause, and they were analyzed and found that they contained copper and arsenic. I don't know of any case of very serious damage. I have occasionally seen where so and so lost so many bees but I have never actually come personally in contact with a case. It is possible to arrange our work so as to avoid spraying when the bees are working in the orchard and we might as well do it.

Distribution of Apple Trees in U. S.

The following is the percentage census of apple trees in the different states taking the United States as a whole at 100 per cent.:

Maine,	2.1	South Dakota,	.1
New Hampshire,	1.0	North Dakota,	..
Vermont,	.8	Nebraska,	1.9
Massachusetts,	.9	Kansas,	5.9
Rhode Island,	.1	Kentucky,	4.3
Connecticut,	.6	Tennessee,	3.4
New York,	7.5	Alabama,	.1
New Jersey,	.9	Mississippi,	.3
Pennsylvania,	5.8	Louisiana,	.1
Delaware,	.3	Texas,	.7
Maryland,	.9	Oklahoma,	1.4
Virginia,	4.1	Arkansas,	3.7
West Virginia,	2.7	Montana,	.3
North Carolina,	3.2	Wyoming,	..
South Carolina,	.3	Clorado,	1.0
Georgia,	1.2	New Mexico,	.2
Florida,	..	Arizona,	..
Ohio,	6.4	Utah,	.4
Indiana,	4.3	Nevada,	..
Illinois,	6.7	Idaho,	.5
Michigan,	5.4	Washington,	1.4
Wisconsin,	1.3	Oregon,	1.4
Minnesota,	.4	California,	1.4
Iowa,	3.4		
Missouri,	9.9		100.0

EVENING SESSIONS.

We have departed somewhat this year from our former custom in securing for the evening sessions speakers whose work would be instructive and entertaining to the greatest number of persons, not necessarily interested in the growing of fruit. The evidence of kindly feeling with which this change was received has been very gratifying to those in charge and indicates to them that their efforts have been in the right direction.

Wednesday Evening, the 16th.

Miss Grace E. Gilbert, Reader, Messanutten Academy, Woodstock, Va., who is a graduate of the National School of Oratory, Philadelphia, entertained the Association most acceptably. Her work covered a list of considerable length and widely differing themes. Miss Gilbert passed readily from the humorous to subjects pathetic and dramatic. Altogether a delightful evening.

Thursday Evening, the 17th.

Miss Ricke' Jacobsky, Irving College, Mechanicsburg, Pa., and a graduate of the Emerson College of Oratory, Boston, Mass., gave a very enjoyable recital. Her presentation of "Scene from L'Aiglon" being worthy of special mention.

Friday Evening, the 18th.

The Friday evening session was addressed by Dr. Francis H. Green, Professor of English, State Normal School, West Chester, subject, "Life's Musical Scale." Regarding the letters representing the musical scale as meaning, Cleanliness, Digestion, Education, Force, Gladness, Aspiration, Benevolence and Christian Character, he built up in prospective a harmonious Christian life. Numerous anecdotes emphasized the points which he desired to bring out especially strong. The lecture was most entertaining and instructive.

Music.

The musical part of the program of Wednesday and Thursday evenings was furnished by Messrs. Weigle, Clair, Smith and Stouffer, comprising the Pennsylvania College Quartet, and that for Friday evening by the Arendtsville Glee Club, all of which was very delightful.

Number of Trees per Acre

"Better Fruit" publishes the following table showing number of trees per acre at various distances apart when planted by different methods:

Distance Apart.	*Rectangular.*	*Hexagonal.*	*Quincunx.*
12x12,	303	348	523
15x15,	193	217	347
18x18,	134	142	247
20x20,	108	124	199
25x25,	70	81	126
30x30,	48	55	83
35x35,	36	41	45

REPORT OF FRUIT COMMITTEE.

HORACE ROBERTS, *Chairman.*

Your committee, after a careful examination of the fruit, unites in making the following report:

We find 144 plates of fruit entered by eighteen exhibitors.

This exhibit includes all the more profitable market varieties and also several choice dessert kinds. The whole exhibit is remarkable for its high color, general excellence and freedom from mark of insect and fungous trouble.

The yellow dent corn exhibited looks to be a most desirable variety well worth saving for seed.

The following growers were represented by the varieties set opposite their names:

W. H. Black—
3 plates York Imperial.

E. E. Rice—
2 plates York Imperial.
2 plates York Stripe.
1 plate Fallawater.

J. W. Prickett.
5 plates York Imperial.
4 plates Stayman Winesap.

C. E. Rice—
1 plate Summer Rambo.
2 plates York Imperial.
1 plate Ben Davis.
1 plate Rome Beauty.

W. W. Boyer—
1 plate Grimes Golden.
1 plate Winter Rambo.
1 plate King.

A. I. Weidner—
2 plates Grimes Golden.
1 plate Jonathan.

Robert Garrettson—
2 plates Smith's Cider.

R. M. Eldon—
2 plates Summer Rambo.
3 plates Smith's Cider.
4 plates Baldwin.
4 plates Grimes Golden.
3 plates York Imperial.
6 plates Ben Davis.
2 plates Dominee.

C. A. Griest—
14 plates York Imperial.
5 plates Grimes Golden.
5 plates Baldwin.
10 plates Winter Rambo.

E. N. Hoffman—
2 plates Smokehouse.
3 plates York Stripe.
2 plates Baldwin.

Rufus Lawver—
1 plate Summer Rambo.
2 plates York Stripe.
2 plates York Imperial.
2 plates Paragon.

H. E. Wolfe—
2 plates York Imperial.

H. M. Keller—
2 plates York Imperial.
1 plate Winter Bananna.

W. S. Adams—
1 plate Hubbardson Nonesuch.
1 plate Stayman Winesap.
1 plate Grimes Golden.
1 plate Smokehouse.
1 plate Winter Paradise.
1 plate Fallawater.
1 plate American Golden Russet.
4 plates Peck's Pleasant.
1 plate Ben Davis.

A. W. Griest—
2 plates Krauser.
2 plates Wagner.

C. J. Tyson—
2 plates Winter Rambo.
6 plates York Imperial.
3 plates Stayman.

E. P. Garrettson—
4 plates York Imperial.
2 plates York County Cheese.
3 plates Rome Beauty.

B. M. Stone—
1 plate Missing Link.

Such good fruit coming from such a large number of growers shows that the growing of the best quality of fruit is general in this community rather than the exception.

HORACE ROBERTS,
D. GOLD MILLER,
U. T. COX,
Committee.

REPORT OF COMMITTEE ON RESOLUTIONS.

CHESTER J. TYSON, *Chairman.*

The Committee on Resolutions made the following report, which was unanimously adopted:

First—

WHEREAS, The members of this convention have thoroughly enjoyed and greatly profited by the wise counsel and delightful sociability of the gentlemen who have come long distances at considerable personal inconvenience for our benefit and instruction; therefore,

Be it resolved, That we unanimously tender them our sincere thanks and wish them a safe return to their respective homes.

Second—

WHEREAS, Fruit growers have for years suffered more or less loss because of adulterated insecticides and fungicides, and,

WHEREAS, There is now before Congress a bill known as H. R. 21318, having for its purpose the standardizing of these materials and the prevention of fraud in their manufacture and sale; therefore,

Be it resolved, That we heartily endorse this bill and urge its speedy passage.

Third—

WHEREAS, We realize that the future of the fruit industry of our country demands greater care and more honest methods in grading and packing of fruit and marking of fruit packages and that a standard capacity for such package be adopted; therefore,

Be it resolved, That we fully approve the passage by Congress of a bill establishing the capacity of a legal bushel for apples, expressed in terms of cubic inches.

Establishing the capacity of a legal box as being identical with that of a legal bushel with privilege to use a smaller box by marking it "Short" or with the fractional part of a legal box which it contains or with the number of fruits which it contains.

Establishing the capacity of a legal barrel in terms of cubic inches, adopting that of the standard New York apple barrel as nearly as practicable.

Establishing a suitable number of grades of fruit, one of which must be used on every closed package packed for interstate, territorial or foreign shipment.

Requiring that every closed package for interstate, territorial or foreign shipment bear the name and address of packer and the name of variety contained therein, in addition to grade marks and that all "fancy" and first grade fruit shall also bear the name "American" when intended for export.

Providing suitable penalties for violation, designating the department which shall have control for its enforcement, and appropriating sufficient funds for its administration.

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Fifth Annual Convention

will be held

December 15, 16, 17, 1909

END OF YEAR