# PROCEEDINGS

*of the* THIRTY-FIFTH BIENNIAL MEETING *of the* : : : : : : : : :

# American Pomological Society

*Held in*

*BOSTON, MASSACHUSETTS*

*OCTOBER 30, 31; NOV. 1, 1917*

COMPILED AND EDITED BY THE SECRETARY
PUBLISHED BY THE SOCIETY
1918

THE
WEEKLY ADVERTISER.
ANNAPOLIS, MD.

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# AMERICAN POMOLOGICAL SOCIETY

Organized 1848

Incorporated 1887

## ACT OF INCORPORATION

### COMMONWEALTH OF MASSACHUSETTS, 1887

SECTION 1. Patrick Barry, of Rochester, New York; Charles W. Garfield, of Grand Rapids, Michigan; Benjamin G. Smith, of Cambridge, Massachusetts; J. J. Thomas, of Union Springs, New York; Prosper J. Berckmans, of Augusta, Georgia; Robert Manning, of Salem, Massachusetts, their associates, the Officers and Members of the Association known as the American Pomological Society, and their successors, are hereby made a corporation under the name of "American Pomological Society," for the purpose of promoting and encouraging the culture of fruit, with all the powers and privileges and subject to all the duties and liabilities set forth in the general laws which are now or may hereafter be in force applicable to such corporations.

SEC. 2. Said corporation may, for the purposes aforesaid, have and hold by purchase, grant, gift, or otherwise, real and personal property to an amount not exceeding one hundred thousand dollars.

SEC. 3. Said corporation may hold its annual meeting, or any special meeting in any place, state or county it may determine, provided that due notice shall be given to the members thereof of the time and place of said meeting.

SEC. 4. Any two of the corporators above named are hereby authorized to call the first meeting of said corporation in the month of September next ensuing, by due notice thereof to each member of said Association.

## BEQUEST FROM THE WILL OF THE LATE MARSHALL P. WILDER

"Eleventh. I give to the American Pomological Society one thousand dollars the income of which shall be, from time to time, offered in Wilder Medals for objects of special merit.

"Also, the further sum of four thousand dollars, for the general purposes of the Society."

# CONSTITUTION AND BY-LAWS.

## CONSTITUTION.

ARTICLE 1. The name of this Association shall be the AMERICAN POMOLOGICAL SOCIETY.

2. Its object shall be the advancement of the science of Pomology.

3. It shall consist of delegates appointed by Horticultural, Agricultural and kindred Societies in the United States, and British America, and of such other persons as take an interest in the welfare of the Association, and are desirous of promoting its aims. They shall pay two dollars for each session, and twenty-five dollars paid at one time shall constitute a life membership.*

4. The meetings shall be held biennially, at such time and place as may be designated by the Society; and special meetings may be convened at any time on the call of the President.

5. The officers shall consist of a President, a First Vice-President, one Vice-President from each State, Territory and Province, a Treasurer and a Secretary, who shall be elected by ballot or otherwise at each biennial meeting.

6. Libraries and educational institutions may become members upon payment of twenty-five dollars; such membership shall be limited to thirty years.

## BY-LAWS.

1. The President shall have a general superintendence of the affairs of the Society during its vacation; give due public notice of the time and place of meeting; preside at its deliberations; deliver an address on some subject relating to Pomology, at each biennial meeting; and appoint all committees unless otherwise directed.

2. In the case of death, sickness or inability of the President, his official duties shall devolve on the first Vice-President, or such one of the Vice-Presidents as the Society may elect by ballot or otherwise.

3. The Treasurer shall receive all moneys belonging to the Society, and pay over the same on the written orders of the President.

*New class of membership originating at 1917 meeting; see item 15.

4. There shall be a Finance Committee of three members appointed by the President at each biennial meeting.

5. The Secretary shall, with the assistance of a reporter appointed by him, keep a record of the transactions of the Society for publication.

6. There shall be an Executive Committee consisting of five members, together with the President and Vice-President, *ex-officio,* five of whom shall constitute a quorum, who shall manage the affairs of the Society during its vacation.

7. A Chairman of Fruit Committees, for each State, Territory and Province and a General Chairman over all, shall be appointed biennially. It shall be the duty of such Chairman to appoint four additional members of his committee, and with their aid and such information as he can procure, to forward to the General Chairman one month before each biennial meeting, State Pomological Reports, to be condensed by hi mfor publication.

8. A Standing Committee on New Fruits of American Origin, consisting of eleven members, shall be appointed by the President, immediately after his election. It shall be the duty of this Committee to report biennially on new fruits of American origin, and also to examine, and before the close of the session report on, all new seedling varieties that may be exhibited and to make an AD INTERIM report on those that were exhibited in an unripe condition at the meeting of the Society, but had subsequently attained a state of maturity; and on such other seedlings as may have been submitted to their inspection during the Society's vacation.

9. A Standing Committee on Foreign Fruits, consisting of eleven members, shall be appointed, whose duties shall be similar to those of the committee in By-Law Eight.

10. A Standing Committee on Tropical and Sub-Tropical Fruits, consisting of eleven members, shall be appointed, whose duties shall be similar to those of the committee in By-Law Eight.

11. A Standing Committee on Nomenclature, consisting of seven members, shall be appointed biennially.

12. Vacancies occurring in committees shall be filled by the chairman of each, and in case of his death or inability to serve, his place shall be supplied by the President of the Society.

13. The order of business for each meeting shall be arranged by the Executive Committee.

14. The Constitution or By-Laws may be altered or amended, at any regular biennial meeting, by a vote of two-thirds of the members present.

15. That there be hereby established a membership in this body to be known as Society Membership, which shall be open to state,

provincial and district organizations. The fee for such membership shall be, for a State or Provincial society, ten dollars, and for a district society five dollars, the biennium. This membership carries with it the right and duty to appoint delegates, one for each hundred members, or major fraction thereof, and one delegate-at-large, of the delegating body, to attend and participate in the meetings of this Society; and in addition to these delegates a State or Provincial society member shall nominate the State or Provincial vice-president, such nomination to be made and submitted in writing, properly attested by the president and secretary of the delegating body, to the Secretary of this organization ten days prior to the date of the biennial meeting next preceding the period for which such nominee is designated to serve. A State or Provincial society member shall be entitled to receive six copies of the proceedings of this Society; a district society member shall be entitled to receive three copies of the same publication.

Delegates from the above Society Members shall be entitled to all the privileges of other members of this Society; but in the case of the appointment of alternates, no alternate shall have a right to vote except in the absence of his principal, or in the event his principal elects to divide his privilege, thereby casting a one-half vote for principal and alternate.

## THE CODE OF NOMENCLATURE.

### Priority.

Rule 1. No two varieties of the same kind of fruit shall bear the same name. The name first published for a variety shall be the accepted and recognized name, except in cases where it has been applied in violation of this code.

A:—The term "kind" as herein used shall be understood to apply to those general classes of fruits which are grouped together in common usage without regard to their exact botanical relationship; as, apple, cherry, grape, peach, plum, raspberry, etc.

B:—The paramount right of the originator, discoverer, or introducer of a new variety to name it, within the limitations of this code, is recognized and emphasized.

C:—Where a variety name through long usage has become thoroughly established in American pomological literature for two or more varieties, it should not be displaced nor radically modified for either sort, except in cases where a well known synonym

can be advanced to the position of leading name. The several varieties bearing identical names should be distinguished by adding the name of the author who first described each sort, or by adding some other suitable distinguishing term that will insure their identify in catalogues or discussions.

D:—Existing American names of varieties which conflict with earlier published foreign names of the same, or other varieties, but which have become thoroughly established through long usage shall not be displaced.

**Form of Names**

Rule 2. The name of a variety of fruit shall consist of a single word, whenever possible, or compatible with the most efficient service to pomology. Under no circumstances shall more than two words be used. When the exigencies of a case make it appear expedient such words as early, late, white, red, and similar ones may be used as part of a name.

A:—No variety shall be named unless distinctly superior to existing varieties in some important characteristic nor until it has been determined to perpetuate it by bud propagation.

B:—In selecting names for varieties the following points should be emphasized: distinctiveness, simplicity, ease of pronunciation and spelling, indication of origin or parentage.

C:—The spelling and pronunciation of a varietal name derived from a personal or geographical name should be governed by the rules that control the spelling and pronunciation of the name from which it was derived.

D:—A variety imported from a foreign country should retain its foreign name subject only to such modification as is necessary to conform it to this code or to render it intelligible in English.

E:—The name of a person should not be applied to a variety during his life without his expressed consent. The name of a deceased horticulturist should not be so applied except through formal action by some competent horticultural body, preferably that with which he was most closely connected.

F:—The use of such general terms as seedling, hybrid, pippin, pearmain, buerre, rare-ripe, damson, etc., is not admissible.

G:—The use of a possessive noun as a name is not admissible.

H:—The use of a number either singly or attached to a word should be considered only as a temporary expedient while the variety is undergoing preliminary test.

I:—In applying the various provisions of this rule to an existing varietal name that has through long usage become firmly imbedded in American pomological literature no change shall be made which will involve loss of identity.

### CITATION

Rule 3. In the full and formal citation of a variety name, the name of the author who first published it shall also be given.

### PUBLICATION

Rule 4. Publication consists (1) in the distribution of a printed description of the variety named, giving the distinguishing characters of fruit, tree, etc., or (2) in the publication of a new name for a variety that is properly described elsewhere; such publication to be made in any book, bulletin, report, trade catalogue or periodical, providing the issue bears the date of its publication and is generally distributed among nurserymen, fruit growers, and horticulturists; or (3) in certain cases the general recognition of a name for a propagated variety in a community for a number of years shall constitute publication of that name.

A:—In determining the name of a variety to which two or more names have been given in the same publication, that which stands first shall have precedence.

### REVISION

Rule 5. No properly published variety name shall be changed for any reason except conflict with this code, nor shall another variety be substituted for that originally described thereunder.

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## of the
## AMERICAN POMOLOGICAL SOCIETY
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# FOREWORD.

## THE AMERICAN POMOLOGICAL SOCIETY.

"Its object shall be the advancement of the science of pomology," is the declaration of the constitution. It shall exist "for the purpose of promoting and encouraging the culture of fruit," states the act of incorporation under the laws of the Commonwealth of Massachusetts. In the call issued by Marshall P. Wilder nearly three-quarters of a century ago, delegates were requested from "all agricultural, horticultural, pomological and kindred societies in the United States and the Canadas," and the object of the association was declared to be "to promote pomology and the sciences upon which it depends"; and delegates were requested "to bring with them specimens of the fruits of their respective districts." The last retiring president, Professor Hutt, in 1917, declared that the Society "is the clearing house for advanced horticultural ideas, and the supreme court on varieties, nomenclature and pomological ethics."

These statements are broad enough to cover a continent. free enough for a democracy, interesting enough for every lover of fruits. Note that the word fruit is not defined; so is the society flexible, and able to adapt itself to the needs of each generation.

A long and honorable history is one of the safeguards of the Society. It was organized in 1848, seventy years ago. It has had a continuous history. No other similar society is so old. Its membership has carried many honorable names from the first. Its reports are important practical guides and indispensable historical records. Its word has always been authority. The Society has a proud record.

At first the purpose of the Society was distinct and clear in the public mind. Recently its place or mission has been confused on the part of the people; so many subjects and interests have needed attention that its energies were in danger of becoming diluted and obscured. Now, however, its field is defined again because other societies have been organized to cover certain industries. The recently established Congress of Horticulture will take care of the com-

mercial and legislative phases. The Society for Horticultural Science represents what may be called the professional aspects, those specially interesting to science men in the government and the institutions. The American Pomological Society may retain its original simple function to promote and encourage the production of fruit.

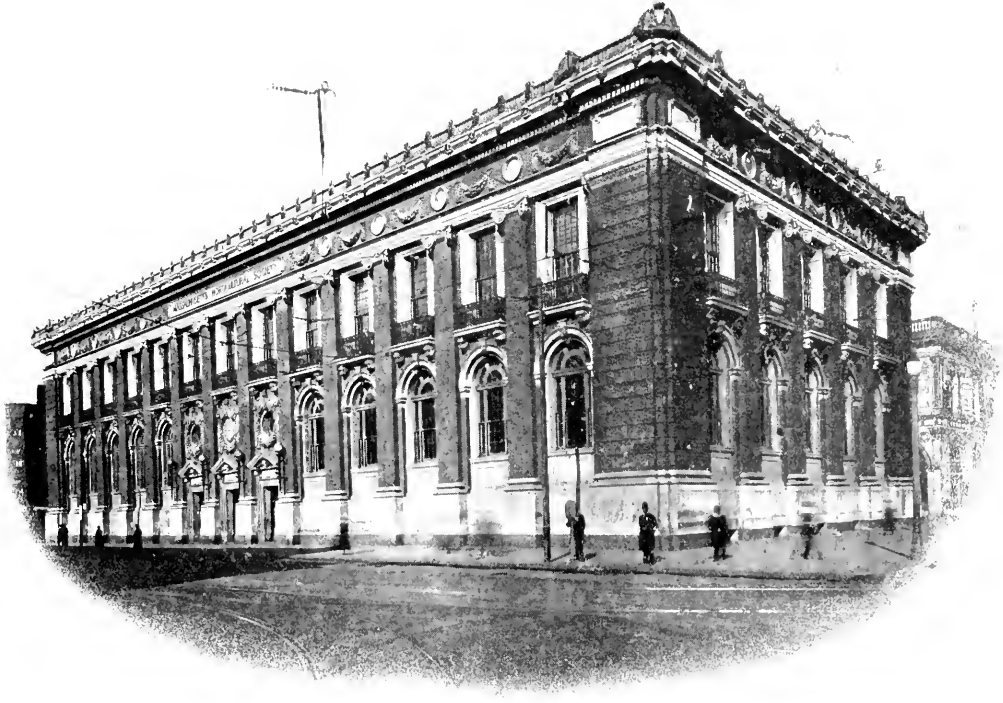
To the real amateur, to the lover of fruits, the American Pomological Society makes its appeal. To thousands of persons in all parts of the United States and Canada, in country and city and suburb, the Society comes with help and encouragement,—to the one who has but a small patch of berries, a little vineyard, a few trees of pleasant fruits or nuts, a little grove of oranges, specimen trees of persimmons or avocados, or of plants transferred experimently from the wild. To the naturalist who searches for fruits in wood and fields the Society also offers itself, and to investigators everywhere who bear enthusiasms for their work with fruits.

Equally does the Society welcome the commercial grower, however large his plantations; it will appeal to him primarily in his amateur or fruit-loving interests. Many of the enthusiastic amateurs are also large and forceful growers for profit.

All this means that the Society makes its primary appeal to the human interests attached to the growing of fruits. Its membership, therefore, should be many thousands rather than many hundreds. It retains for itself its original field of amateur fruit-growing and also of systematic pomology (with the fascinating subjects of varieties and nomenclature), as well as the scientific aspects that appeal to those who like fruits just because they are fruits. It needs the support of all investigators and teachers in the institutions.

Many plans are under way to make the old Society useful to all these people in the provinces and states It is hoped that a regular exchange of specimens and cions may be arranged with all the membership, being organized through the secretary's office so that proper iuspection may be safeguarded. There should also be a regular publication going to the membership. A wide and intimate correspondence should be developed. The experience of the entire country should be made available. All this requires a secretary giving his entire time to the work, and this depends on a large membership.

—L. H. BAILEY.



HOME OF MASSACHUSETTS HORTICULTURAL SOCIETY.
Meeting Place 1917 Session.

PROFESSOR W. N. HUTT.
President, 1915-1917.

## THE PRESIDENT'S ADDRESS.

W. N. HUTT, *North Carolina.*

When I began the preparation of this address my initial move, naturally, was to consult the published reports of the Society. I have had them for years as standard reference works on pomology, but when I began to study them systematically I found that they constitute practically a complete and unbroken history of the development of American Pomology so I have chosen this idea as the theme of my address.

The American Pomological Society had its birth in New York in 1848. It is, therefore, 69 years of age; getting along towards being an octogenarian. Like old people of similar age it has seen great changes and even crises in the progress and development of this American continent. Like most old people it has had its ups and downs, its strenuous labor, its periods of stress and its times of achievement. Unlike old people this Society never grows old or comes to senility for by the infusion of new blood from generation to generation it renews itself and becomes self-perpetuating. It has already seen the passing of practically three generations of horticulturists: grand, useful, noble men who have "done their bit" in the building up of the horticultural development of this great country. That they wrought well is evidenced by the fact that in a little over half a century they accomplished the greatest horticultural development that the world has ever seen. I speak advisedly when I say that the pomological production of this country exceeds in amount, value, variety and quality of product the fruits of any other nation on the globe. This Society enriched by the labors of these horticultural pioneers stands today as their best monument.

A friend of mine travelling in Scotland remarked to a Scottish friend that in Edinborough Sir Walter Scott had a grander monument than Robert Burns. The Scot replied, "Burns needs no monument, his works are his own best monument." So too, the grand men of the past who built up and sustained this Society find in its activities and achievements their best and most enduring monument.

When this Society began its activities the cultivation of fruit, in this country, for market, was limited to parts of a few of the older States lying contiguous to the larger cities of the North. The Pacific Coast was not then noted for its golden fruit but only for the gold to be dug from its mines, which, in order to get to, one had to travel by ox team and prairie wagon through the trackless deserts of the great arid West, or go by boat 2,000 miles south to Panama, travel on mule back across the Isthmus and then take a ship and go north again thousands of miles up the Pacific Coast.

The present vast fruit regions of the Central West now annually producing millions of bushels of fruit were then mostly virgin forests broken here and there with primitive farms. The Mississippi, Missouri and Ohio rivers then bore the entire traffic of this fertile region with primitive lumber roads feeling their uncertain way about the edges. The pomological resources of Florida, that present land of fruit and flowers, were then wholly unknown, its exports being mostly lumber and forest products. Michigan was then far on the frontier and marked the western boundary of pomological progress.

This great continent was then a vast extent of undeveloped horticultural possibilities. No one knew what kinds and varieties of fruits could be grown in any particular region. It was a gigantic experimental problem that could be solved only by actual orchard tests. All the pioneer fruit grower could do was to plant every kind, class and variety of fruit bearing tree and vine he could lay hands on and await the result. With the scarcity of nurseries at that time and the limited facilities for quick transportation this in itself constituted somewhat of a problem. But these pioneer pomologists were not of a type to be easily discouraged by minor difficulties.

In the light of present horticultural knowledge let us look at a few of the factors that enter into the question as to what a given variety of fruit will do in any particular locality. We must consider the problem from the standpoint of the environment of root, trunk, branches and buds.

The root of a plant is profoundly affected by the nature and physical condition of the soil and sub-soil in which it must live. The size, variety and chemical composition of the soil particles have a great deal to do with the comfort and resulting productiveness of a tree as well as the humus and plant food therein contained. Temperature plays an important part in the root environment of a plant as it does with its stem, branches and buds. The water-holding capacity of the soil and its location facilitating absorption and drainage must also be considered. In branch and bud environment come the variable factors of sunlight, temperature, atmospheric humidity and frequency and velocity of winds. Added to these we must consider the plant itself as a living organism with its likes and dislikes and its sensitiveness to various external conditions.

With a vast territory ranging from the North Temperate Zone to the Tropics, embracing upwards of three thousand distinct soil types and with altitudes from sea level to the cloud lines the question as to what varieties of fruit will do in different localities involves a huge problem of multitudious interlocking factors. These early pomologists did not theorize about the matter (as I am doing)

but set to work in a practical way to answer the question. This gigantic problem in experimental pomology was undertaken by this Society long before there were any National or State Departments of Agriculture or Experiment Stations, and carried on for over half a century by its voluntary workers without government aid or public patronage of any kind. Patrick Barry, of Rochester, well known to horticultural fame, was made chairman of the General Fruit Committee. For twenty-six years he carried on through the organization of this Society an extensive correspondence with its vice presidents in every State and Territory and prepared for each meeting a systematic report of the behavior of varieties in every section of the country. In those early days of American pomology they did not read papers on pomological subjects at the Society's meetings, for the all-absorbing question was what to plant in this great unknown land. They opened the business of the convention, continued it, and closed it with the discussion of varieties. It is interesting to note their thorough, systematic and painstaking methods. I quote the following from the report of 1871, page thirty-six:

The President then called on Mr. P. J. Berckmans, of Georgia, to open the discussion by proposing varieties suited to the South.

Mr. Berckmans accordingly named *Red Astrachan*, to which he would give ** for Georgia; and the response came alike from Virginia, Alabama, District of Columbia, Maryland, and all the South.

Mr. Flagg, of Illinois, stated the variety as unproductive since 1848, but he should be unwilling to discard it.

Earle (same State) would not.

Dr. Howsley, of Kansas, knew it to be a fine apple in Kentucky, and a success; but in Kansas it is late coming into bearing; yet by top-grafting on stocks adapted to the soil, the objection is removed.

Wier, of Lacon, Illinois, says with him it bears young; is a healthy tree; but not productive nor profitable.

Miller, of Iowa. Totally worthless in Central Iowa; discarded all over the State; never saw a ripe one.

Jewell, of Minnesota. Tree hardy, and more productive on timber than prairie lands.

Wier, of Illinois. Trees on prairie soil have not borne; tree hardy and grows well; hope that it will succeed as it grows older.

Paul, of Massachusetts. Grows well in Massachusetts and Eastern New York; hardy when young, and a good bearer on all soils and in all localities.

Linderman, of Michigan. On the sandy soils of Western Michigan it produces well and is a fair fruit; on the clay loams of the Central and Eastern portions of the State, it is not so productive, and scabs and cracks.

MASTERS, of Nebraska. Healthy and hardy tree, but not productive on the rich prairie soils; but on the thinnest lands and on the bluffs, in a few orchards have seen it producing well; should be cultivated only on thin and sandy soils; on prairie soils, its foliage turns yellow and then white; would not recommend it for general cultivation in Nebraska.

In this systematic way they went over the hundreds and hundreds of varieties of our different classes of fruits and checked up the accuracy of their results by cumulative data from meeting to meeting. Barry directed the work for over a quarter of a century when it was taken up by his son and later by Mr. George Y. Johnson, Colonel Watrous, Professor Taft and Professor Beach. This systematic record keeping and compilation of data of the hundreds of voluntary experimenters throughout the different States, Territories and Provinces constitute, I believe, the most colossal horticultural experimental project ever undertaken in the world. This monumental work required over half a century to complete and was done by voluntary service only, without Government aid or public patronage of any kind.

The resulting variety lists of all classes of fruits covering the tillable area of practically the whole American continent published from biennium to biennium in the reports of the Society constitute a mine of pomological wealth. They have been and will for all time be the basis of research work in American pomology.

## THE DEVELOPMENT OF COMMERCIAL ORCHARDING.

A notable feature in the evolution of American pomology has been the development of the commercial orchard. Its phenomenal growth and development in this country has been due to two primal causes, first freehold tenure of land and second the fostering care of this Society. "In the countries of the old world they have not had an institution of this character and the European farmer, being seldom other than a temporary tenant, has no incentive to improve permanently the land of another, or the quality of such products which may not benefit him in the near future. As a tenant he knows that in planting trees and making his landlord's land more productive he will likely be made to pay an increased rental. Pomological progress being therefore confined to a very small proportion of European freeholders as compared with our own has been necessarily slow.

A further development of American commercial fruit growing is seen in the building up of large specialized commercial fruit industries based on a single variety. The Bahia orange, the Concord grape, the Elberta peach, the Napoleon cherry and a few

*Commercially known as Navel.

other varieties have become so extensively grown and are so well known in the markets everywhere that their names have become practically household words. Each of these varieties throughout its climatic range has become almost universal and is practically a standard of excellence and shipping quality for that class of fruits. This does not preclude the fact that they may in future be superceded by even better varieties. The Roman Empire fell; the Wilson Albany strawberry has passed into history; the Concord grape may also loose its dominion and be left along the road as a milestone of pomological progress, but today these varieties are recognized as the standards of excellence and great commercial fruit industries representing millions of invested capital are built on them.

## Killing Varieties.

Commercial orcharding is a great eliminator of unfit varieties. The commercial grower always looking for something better eagerly seizes each new variety as it appears and tries it out in comparison with his Elberta or his Napoleon. If it does not measure up satisfactorily it is quickly discarded.

In the early days of American pomology before fruit growing became established on the commercial variety basis the wheels of progress were hampered by a host of varieties that had sprung up in different parts of the country that had not yet become subjected to the acid list of the commercial orchard. This Society did a notable work in assisting at their autopsy. In 1858 the Honorable Joseph Sebastian Cabot of Salem, Massachusetts, made a report whereby 625 varieties were rejected as unworthy of cultivation and dropped from the Society's list of fruits.

A great stimulus was given American pomology by the national legislation making possible the establishment of an Agricultural College in every State. This was followed years later by the act establishing agricultural experiment stations. The States were not slow to take advantage of these opportunities. Those most interested in fruit growing soon established chairs of horticulture. Michigan was, I believe, the first State to undertake the teaching of horticulture in its newly established College of Agriculture. Professor W. W. Tracy, now of the National Department of Agriculture, has the honor of being the first Professor of Horticulture in the United States.

The teaching of horticulture as a college subject naturally developed the science of pomology and soon turned out hosts of active well-trained young men who became leaders in pomological thought and endeavor. The experiment stations took up the investigational projects in pomology that this Society had carried so long

in a voluntary way and placed them in charge of trained pomologists who gave their whole time to their study. Experimental orchards and vineyards were set out and each State with its trained workers set about the further working out of its varietal and cultural problems that had been begun and carried on by this society through its State Vice Presidents and General Fruit Committee. In 1887 the Division of Pomology of the National Department of Agriculture was inaugurated under the direction of Secretary Morton. During the administration of Secretary Wilson its organization and scope were greatly extended until its trained experts were busily engaged in systematic pomological work throughout the whole country. These activities of State and National Governments naturally limited the field of the American Pomological Society, but the Society welcomed these new organizations and trained workers and was glad of their co-operation in the development of American pomology to which it had so long given its best endeavors.

In addition to its great work on varieties another notable achievement of the American Pomological Society is its Rules for Nomenclature. These were worked out a generation ago by those stalwart fathers of American pomology and so thorough and complete was their work that the rules stand today, with slight change, as letter perfect as our American Constitution. These rules of Nomenclature have been admired, copied and made use of by pomologists all over the world. It is to be deplored that they are so often ignored by modern commercialized horticulture which too often uses any fantastic or misleading name that will effect a sale. This Society would welcome a closer co-operation with Horticultural Societies and with Departments of Pomology of State and National Governments to secure a correct and honest naming of trees and fruits. If it is unlawful to misbrand any manufactured fruit product, should it not be unlawful to misbrand or misname the tree or fruit that produced it?

The following quotation from a paper in the Society's report of 1875 gives a clear presentation of the necessity of activity along this line:

"As an insight into what we have to do in the direction of a correct nomenclature, we herewith present a few facts in the way of a multitude of names for the same apple:

| | | | |
|---|---|---|---|
| 1. | The Ben Davis has..... | 17 | synonyms |
| 2. | " Buckingham has ..... | 24 | " |
| 3. | " Dyer, or Pomme Royal, has.. | 10 | " |
| 4. | " Early Harvest has..... | 11 | " |
| 5. | " Ramsdell's Sweet has..... | 7 | " |

| | | | |
|---|---|---|---|
| 6. | The Fallawater has ..... | 21 | synonyms |
| 7. | " Fall Orange has..... | 12 | " |
| 8. | " Fall Pippin has..... | 10 | " |
| 9. | " Fall Queen has..... | 6 | " |
| 10. | " Fourth of July has..... | 5 | " |
| 11. | " Green Cheese has..... | 10 | " |
| 12. | " Green Newton has..... | 7 | " |
| 13. | " Large Sweet Bough has..... | 6 | " |
| 14. | " Lowell has ..... | 8 | " |
| 15. | " McAfee's Nonesuch has..... | 23 | " |
| 16. | " Mangum has ..... | 12 | " |
| 17. | " Newton Spitzenberg has.... | 10 | " |
| 18. | " Nickajack has ..... | 36 | " |
| 19. | " Pittsburg Pippin has..... | 9 | " |
| 20. | " Primate has ..... | 12 | " |
| 21. | " Rambo has ..... | 10 | " |
| 22. | " Rawle's Genet has..... | 16 | " |
| 23. | " Red Winter Pearmain has.. | 14 | " |
| 24. | " Roxbury Russet has..... | 8 | " |
| 25. | " Summer Pippin has..... | 11 | " |
| 26. | " Twenty-Ounce has ..... | 9 | " |
| 27. | " Vandevere has ..... | 13 | " |
| 28. | " Yellow Bellflower has..... | 6 | " |
| 29. | " Ortley has ..... | 27 | " |
| | 29 varieties having..... | 370 | names |
| | Averaging 13 to each. | | |

Thus it will be seen at once, when but twenty-nine varieties are encumbered with three hundred and seventy different names, how difficult it must be to clear away all the spurious names and to substitute instead the original, the true and proper one.

## Discovering of Insecticides and Fungicides.

Numerous as are the factors that have contributed to the development of American pomology there is one simple discovery that must ever hold first place in the development, nay the salvation of our fruit interests; namely, the value of arsenic as an insecticide. As the original forests of the new world gave way to cultivated fields and as acre was added to acre in orchard and vineyard, insect depredators heretofore unnoticed began to take toll of the farmers' fruit. As the home orchard developed into the commercial fruit plantation these tiny pests finding their feeding ground enlarged increased accordingly and took increasing toll of the crop. Not

understanding the habits of insects and being unable to cope with them the early fruit growers did the only effective thing they knew, —moved away. Far Western Michigan soon became the Mecca of fruit growers for there were no codling moths nor curculios there. But these troublers, too, soon followed the western trail of civilization and the harassed fruit grower had to find a farther west, which he did in Iowa, Nebraska and Colorado. Michigan was overrun by these insect marauders even worse than were New England and New York. The growers' immunity in Nebraska and Colorado was short lived for the van of the advancing army was soon upon them and in devastating force. Westward they fled until there was no farther West and the Pacific Ocean stopped the retreat. The fruit industry of the Pacific Coast owes its present high development in no small degree to the pioneer fruit growers' attempt to out run their insect foes. In the reading of early works on fruit growing one is struck with the utter consternation with which early pomologists viewed the ever-increasing depredations of insect pests. Their attitude was that of Peppy's to the plague, "Lord help us for we cannot help ourselves."

With the discovery of the effectiveness of arsenic as an insecticide the marauders were put to flight and the fruit industry saved. Of scarcely less importance was the discovery of copper as a fungicide, for the losses from fungous diseases threatened to destroy the entire vineyard industry of the country. These fundamental discoveries and the later development of economic entomology and plant pathology have put fruit growing on a safe basis. True, we still have pear blight and crown gall and our unsolved problems in plant life as we have in human pathology, but these must sooner or later yield to the onward march of science.

As Virginia has been called the mother of Presidents, so may this Pomological Society be called the mother of societies. When the American Pomological Society was organized in 1848, but twelve States were represented. It set about encouraging fruit growing in every part of the country and had vice presidents in many territories before they had advanced to the dignity of States. Now practically every State in the Union has its horticultural or pomological society. It was in no small degree due to the activities of the American Pomological Society that the Division of Pomology of the National Government was founded and agricultural colleges and experiment stations established in every State. As the work of the agricultural colleges and experiment stations developed there grew up a force of scientifically trained men who, working in their institutions and also through the agency of this Society, have been of incalculable value to the fruit-growing interests of this continent. While still holding membership in this parent

Society these workers held a preliminary meeting in this city in connection with the meeting of the American Pomological Society of 1903 and organized the Society for Horticultural Science for the study of problems and methods of teaching and experimentation connected with horticultural work. Many of the members of the Society for Horticultural Science are with us today and are an effective element of our progremme.

Through all its long years of activity the American Pomological Society has not deviated from its original purpose as laid down in its constitution, namely, "the advancement of the Science of Pomology." In working to this end, it has incidentally exerted a powerful influence in the development of commercial fruit industries in the country, but from the character of its membership and nature of its organization it has never taken up the problems of transportation, grading, storage, and marketing, so essential to the successful commercial handling of fruit. It has, however, felt the need of a commercial horticultural body of national scope that would federate existing commercial horticultural organizations and take up all matters pertaining to the commercial handling of horticultural products. A special committee was appointed to report on this matter to the last biennial meeting of this Society held in San Francisco. The result was the inauguration of the National Congress of Horticulture, a report of which will be made to this meeting by Mr. Cranefield of Wisconsin, one of its charter members.

## The Financial Standing of the American Pomological Society.

There are many things in the world worse than financial stringency, but few that are more embarrassing. In reading up the long history of this Society its only troubles seem to have been financial ones. In the early days of the Society when it did a great deal of the horticultural work now being done by the National and State Departments of Agriculture, Agricultural Colleges and Experiment Stations, the members gave a great deal of time to the work of the Society entirely without pay and for the love of the work only. The Society has never had any paid officers except the Secretary, who receives the small sum of $100.00 per annum for carrying on the work from one meeting to another. The publication of its reports has always been a heavy burden on its limited membership. For years it has been compiling, publishing and distributing a report well worth five dollars each for a membership fee of but two dollars. To make up the deficit and always publish the report life memberships at $25.00 have been used. As the years go by this is placing an ever-increasing burden on the biennial memberships.

In 1873 and 1875 Henry T. Williams and W. T. Flagg, Secretaries of the Society, generously declined their salaries so that the reports for those years could be published. By a bequest in the will of the Honorable Marshall P. Wilder, first President of the Society, $4,000.00 was left to the Society for its running expenses and $1,000.00, the proceeds of which are to be used from time to time for giving Wilder medals for objects of special merit. This latter fund cannot be used for general expenses or for the publication of the report. The $4,000.00 bequest, which is invested in C., B. & Q. bonds, brings in enough to pay the Secretary's salary. The burden of publishing the report still remains. For this purpose the Society needs memberships but not as badly as everyone interested in horticulture needs this Society. In this cultured city of Boston, this horticulture-loving State of Massachusetts and in this wide-awake New England there are thousands of people who should be enjoying the privileges and benefits of the grand old Society. We do not require a great deal of money, but we need enough to publish the report and honorably discharge our financial obligations. It is our determination to keep ahead financially as well as pomologically. To do so we must adopt modern business methods. We have found it impossible by correspondence to keep up a large and active membership. We must get new members by personal appeal, the same as is done in the sale of merchandise or the solicitation of insurance. Let every member, therefore, constitute himself an active member of the Membership Committee to lead his friends into the fold. The Society's financial embarrassment will then automatically vanish and its valuable reports be assured to all its members.

I have endeavored to review the glorious past of this Society of American Pomology. What of the future of this mother of organizations which, like the Phœnix, never grows old but renews itself from generation to generation? It shall continue in the future as it has in the past, to be the leader of pomological thought and the stimulator of horticultural endeavor. As indicated by the programme which will follow, it is truly national in scope and stands for everything progressive and worth-while in horticulture. It is the clearing house for advanced pomological ideas and the supreme court on varieties, nomenclature and horticultural ethics. As the early pomological development of this country was stimulated and broadened by the exchange of ideas and the personal association with Wilder, Downing, Dr. Warder, Barry, Hovey, Saunders and the early leaders of pomology, so will the present and future of this science be stimulated by our meeting and counseling together.

With the glorious achievements of our past, the energetic advancement of our present, the possibilities for our future are boundless, let us

"Still achieving, still pursuing,
Learn to labor and to wait."

## APPLE BREEDING IN CANADA.

W. T. MACOUN, *Canada.*

Most of the varieties of apples in commerce in Canada today were originated outside of that country, although some of the best apples grown there are of Canadian origin, the McIntosh, which has such a world-wide reputation, being one of these.

The main reason why most of the varieties of apples planted in Canada originated in other countries is that the planting of apple trees, except in very small numbers, is much more recent than in the United States and other countries, and there have been fewer seedlings of merit come to light because of the much fewer trees grown, and it is a fact that, notwithstanding man's efforts to obtain better fruit by artificial breeding, nearly all the apples offered for sale by nurserymen have been originated by chance.

The writer believes that within the next fifty years there will be a much larger proportion of varieties of apples of Canadian origin sold by nurserymen.

Much work has been done by a few men in Canada in originating varieties of apples by cross-breeding and hybridization. To the late Chas. Arnold, Paris, Ont.; to the late P. C. Dempsey, Trenton, Ont., and to the late Francis Peabody Sharp, Upper Woodstock, N. B., is due great credit for work done at a time when few were interested in the scientific aspects of fruit growing. The Ontario apple, which was originated by Chas. Arnold by crossing the Northern Spy with the Wagener, is a worthy memorial to that gentleman, it being a good, and, in some sections, a profitable, commercial variety. The Trenton and Walter apples are two of Mr. Dempsey's crosses, and are among the best apples of their season. The Crimson (Beauty) apple, a handsome variety now grown to a considerable extent as a very early summer apple in New Brunswick and Nova Scotia particularly, was originated by Mr. Sharp, and the "New Brunswick" apple which, however, most pomologists cannot distinguish from the Oldenburg, is said to have been originated by him and has been largely planted in New Brunswick.

At the Ontario Agricultural College, Guelph, Ont., and at the Horticultural Experimental Station, Vineland, Ont., work in cross-breeding apples has been in progress for some years and, no doubt, some good varieties will be produced at these institutions.

Most of the work in breeding or originating new varieties of apples in Canada has, however, been done at the Central Experimental Farm, Ottawa, Ont. Of the varieties originated in the Horticultural Division, one hundred and fifteen have been named because they gave promise of being useful in some part or parts of Canada. The greater part of these were obtained by simply sowing

the seed of good varieties which had proved hardy at Ottawa, but a few have been the result of hand pollination where both parents are known, and every year new cross-bred varieties are fruiting.

In the year 1890, when the work was begun, an orchard was planted, comprising about 3,000 trees grown from seed imported from E. Goegginger, Riga, Russia. The seed from which these were grown was said to have been taken from apples grown north of Riga. These began to fruit in 1897, when about fifty trees bore. The number of trees was gradually reduced by winter-killing, by fire-blight, or were removed on account of weak growth and inferior quality. All but a few of those which fruited were as good as the named varieties of Russian apples. Nearly all of them were summer apples. A few only were considered sufficiently promising to propagate, among the best of them being Claire, Neville, Oscar, Percival, Roslin, and Rupert.

In 1898, the writer, believing that in an orchard at the Central Experimental Farm, Ottawa, containing between four hundred and five hundred named varieties of apples, all sorts of combinations of characters would be taking place by natural pollination and that the chances of obtaining some good seedlings by sowing seeds from some of these varieties would be very great, had seed saved of some of the best-flavoured apples then fruiting in the orchard, as well as some other varieties desirable on account of other characteristics. There were included in these the McIntosh, St. Lawrence, Fameuse, Wealthy, Shiawassee, Swayzie, Scott Winter, Salome, Lawver, Gano, Northern Spy, Winter St. Lawrence, and Bullock (American Golden Russet). The seedlings of these and others which were sown later have been planted out at different times, beginning in 1901, until about 2,000 trees were planted, this being all we had room for. The first tree to fruit from seed was a Wealthy seedling now called Crusoe, which fruited in 1903, two years after planting and five years from seed, and it may here be stated that the great majority of Wealthy seedlings were early bearers like the female parent.

The good results which it was hoped to obtain by planting seedlings from fruit from trees which must have received pollen from a great many varieties has been abundantly borne out by the actual results. During the past fourteen years, 1,211 of these seedling varieties have fruited, of which detailed descriptions have been made. Of these eighty-three and thirty-hundredths per cent were of marketable size (medium to large), and only three and ninety-five-hundredths per cent were small or crab-like. Of the 1,211 varieties, there have been three hundred and seventy-eight considered so promising that they are being propagated for further test and ninety-nine of the best have been named.

Some most interesting facts have been noted in regard to the way in which the seedlings resemble the female parent. If the parent is bright in colour most of the seedlings are bright in colour, but if dull in colour then the seedlings are dull in colour. If the parent is an apple of good quality then with few exceptions the seedlings are above medium to good in quality, and on the other hand if the parent is of inferior quality the seedlings are of medium quality also. If the parent is a long keeping apple then most of the seedlings are good keepers. Size has not been as constant as some other characteristics. Where there is a marked difference in size between the majority of the seedlings and the female parent it is in the direction of larger fruit in the seedlings. For instance, the fruit of the seedlings of Bullock (American Golden Russet), Swayzie, and Fameuse average larger than the parent. Where seed has been examined carefully it has been noted that as far as size of seed is concerned the seed of the majority of the seedlings resembles the female parent. The varieties which gave seedlings which had the most characteristics of the female parent are Wealthy, Gano, McIntosh, Northern Spy, and Langford (Beauty). Those least resembling the female parent are Swayzie and Fameuse. The seedlings of Fameuse have been the most disappointing of all, there being a large proportion of varieties of inferior quality. The largest proportion of promising seedlings are among McIntosh, Langford (Beauty), Northern Spy and Wealthy offspring.

As there are very few winter apples hardy enough for the colder parts of Canada where the apple is grown successfully and as there is room for better summer and autumn varieties all over Canada, these new varieties should prove of great value, and they are being propagated with a view to a more extended test of them. As this kind of apple breeding had given such good results, seed was saved in 1908 of some more of the best hardy winter apples grown at Ottawa, including Milwaukee, Bethel, Winter Rose, Baxter, Victory* (La Victorie), Stone and Forest.

## Characters of Seedling Apples Originated in the Horticultural Division.

Descriptions are taken of the seedling apples which are originated in the Horticultural Division, whether they are good, medium or poor. By doing this, it is possible to tell after a time what parent varieties are giving the largest proportion of promising varieties, and what the least. It gives valuable information for

*This form of the name was made in the Mss. in accordance with the secretary's interpretation of Rule 2, of the code. The author in proofreading raises the question of propriety of this action. It is evident the rule is not sufficiently explicit, especially in view of the statement in section d, same rule.—E. R. L.

future work in breeding apples, as showing what characters of the female parent are apparent or conspicuous in the seedlings. The descriptions of these seedlings were all made by the writer, hence the same relative values are more likely to be given to the characters of the different seedlings than if several persons having different standards had described them.

In the following table, certain characters of 1,211 seedlings of twelve varieties are given in such a form that they can be readily compared. These seedlings were raised from seed saved from apples which had fruited in 1898. The flowers were not hand pollenized and the male parents can only be suggested by the characters of the seedlings and the varieties which grew nearest to the tree from which the seed was taken. Of these we have a record. While the male parent is thus not known with certainty, a study of the following table will be found very interesting and, it is hoped, suggestive. The following characters of the seedlings of the twelve varieties are quite marked.

*Fameuse seedlings:* It is generally supposed that seedlings of Fameuse resemble the female parent in a marked degree. In this case the number of good Fameuse seedlings has been small, while a large proportion of the seedlings of McIntosh, which is a seedling of Fameuse, have been good.

*Gano seedlings:* A large proportion of the seedlings resemble the female parent in regularity of form, in colour, in absence of flavour, and in having large seeds. A large proportion of the seedlings are winter apples like the female parent.

*Bullock (American Golden Russet) seedlings:* It is interesting to note that of twenty-eight seedlings which have fruited none have russet skins. In seventy-eight and fifty-eight-hundredths per cent green or yellow predominates. A comparatively small proportion has been propagated and only one has been thought good enough to name.

*Langford (Beauty) seedlings:* A large proportion are handsome, fine-grained apples of the Fameuse type with a marked resemblance to the female parent or to Louise, a seedling of Fameuse.

*Lawver seedlings:* While twenty-nine per cent of the seedlings are late-keeping apples like the female parent, it is interesting to note that a large proportion have a season before December. Some of the Lawver seedlings show marked signs of Northern Spy blood, particularly in character of flesh and flavour. Both Lawver and Northern Spy are late-blossoming sorts and were not very far apart in the orchard in 1898.

*McIntosh seedlings:* The McIntosh is supposed to be a seedling of Fameuse and has many Fameuse characteristics. Its seedlings

have been much better than the Fameuse seedlings, nearly one-half the McIntosh seedlings being thought worthy of propagation, while less than a fourth of the Fameuse seedlings were propagated.

*Northern Spy seedlings:* Though at least partially self-sterile and thus doubtless pollenized by some other variety or varieties, there has been a marked resemblance to the Northern Spy in a large proportion of the seedlings in outward appearance, flesh, and flavour, and in being late-keeping apples.

*Salome seedlings:* The Salome has given some good seedlings, though the best are not from this variety. A large proportion of the seedlings bore a marked resemblance to Salome in outward appearance, flesh and flavour.

*Shiawassee seedlings:* The Shiawassee is a seedling of Fameuse. A large proportion of its seedlings had fine grained, tender flesh and were above medium to good in quality, but the percentage thought worthy of propagating was only a little larger than with the Fameuse seedlings.

*Swayzie seedlings:* Only a small proportion of the seedlings resemble the parent in outward appearance, though a large percentage bear a marked resemblance to Swayzie in flavour. The Swayzie is a small apple, but of the seedlings, over seventy-eight per cent were medium to large.

*Wealthy seedlings:* There is a general resemblance to Wealthy in a large proportion of the seedlings, particularly in colour and the regular outline of the fruit and character of flesh and flavour.

*Winter St. Lawrence seedlings:* The Winter St. Lawrence has given a large proportion of seedlings above medium to good in quality, but the proportion thought worthy of propagation is about the same as for Fameuse. There are a few late-keeping apples among them.

In describing the apples of which the characteristics are given in the following table, the standards adopted for size were as follows:

Small—Two and one-fourth inches in diameter, and below.

Below medium—Two and one-fourth to two and one-half inches in diameter.

Medium—Two and one-half to two and three-fourths inches in diameter.

Above Medium—Two and three-fourths to three inches in diameter.

Large—Three to three and one-half inches in diameter.

Very large—Above three and one-half inches in diameter.

The notes and figures under "Resemblance" do not apply to all the seedlings described. If a character of a female parent was conspicuous in the seedling it was noted but, no doubt, there were many slight resemblances which were not noted, hence the percentages after the various headings under Resemblance are merely suggestive, but all the other characters were recorded for all the seedlings.

## Characters of Seedling Apples Originated in the Horticultural Division.

| | Character of female parent. | Fameuse seedlings. | Character of female parent. | Gano seedlings. | Character of female parent. | Bullock (Am. Gold. Russet) seedlings. | Character of female parent. | Langford (Beauty) seedlings. | Character of female parent. | Lawver seedlings. | Character of female parent. | McIntosh seedlings. | Character of female parent. | Northern Spy seedlings. | Character of female parent. | Salome seedlings. | Character of female parent. | Shiawassee seedlings. | Character of female parent. | Swayzie seedlings. | Character of female parent. | Wealthy seedlings. | Character of female parent. | Winter St. Lawrence seedlings. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. Seedlings fruited | | 91 | | 83 | | 28 | | 140 | | 62 | | 120 | | 136 | | 108 | | 99 | | 130 | | 136 | | 78 |
| No. Seedlings propagated | | 21 | | 10 | | 4 | | 61 | | 15 | | 56 | | 63 | | 23 | | 26 | | 36 | | 44 | | 19 |
| No. Seedlings named | | 1 | | 1 | | 1 | | 16 | | 3 | | 19 | | 22 | | 9 | | 2 | | 7 | | 15 | | 6 |
| Size— | | p. ct. | | p. ct. | | p. ct. | | p. ct. | | p. ct. | | p. ct. | | p. ct. | | p. ct. | | p. ct. | | p. ct. | | p. ct. | | p. ct. |
| Small | | 6.59 | | 6.02 | | 0.00 | | 0.00 | | 6.45 | | 5.00 | | 2.21 | | 2.78 | | 3.03 | * | 5.39 | | 7.35 | | 2.57 |
| Below medium | | 15.39 | | 12.05 | | 10.71 | | 5.00 | | 11.29 | | 18.33 | | 10.29 | | 16.67 | | 11.11 | | 16.15 | | 13.24 | | 12.82 |
| Medium | * | 58.24 | | 40.96 | * | 42.86 | | 54.29 | * | 62.90 | | 50.84 | | 47.06 | * | 50.00 | * | 58.59 | | 43.85 | | 43.39 | | 57.69 |
| Above medium | | 17.59 | * | 38.56 | | 35.72 | * | 35.00 | | 19.36 | * | 23.33 | | 30.15 | | 22.22 | | 22.22 | | 26.15 | * | 29.41 | * | 19.23 |
| Large | | 2.19 | | 2.41 | | 10.71 | | 5.71 | | 0.00 | | 2.50 | * | 10.29 | | 8.33 | | 5.05 | | 8.46 | | 6.61 | | 7.69 |
| Total | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 |
| Form— | | | | | | | | | | | | | | | | | | | | | | | | |
| Oblate | | 30.77 | | 13.25 | | 32.14 | | 35.00 | | 35.48 | | 46.67 | | 37.50 | | 18.52 | * | 66.67 | * | 40.00 | | 33.09 | | 14.10 |
| Roundish | * | 53.85 | * | 38.56 | * | 57.15 | * | 53.57 | * | 38.71 | * | 48.33 | * | 36.03 | * | 67.59 | | 31.31 | | 53.08 | * | 61.03 | * | 79.48 |
| Conical | | 13.19 | | 43.37 | | 0.00 | | 11.43 | | 16.13 | | 3.33 | | 26.47 | | 3.70 | | 2.02 | | 3.84 | | 2.94 | | 6.42 |
| Oblong | | 2.19 | | 4.82 | | 10.71 | | 0.00 | | 9.68 | | 1.67 | | 0.00 | | 10.19 | | 0.00 | | 3.08 | | 2.94 | | 0.00 |
| Total | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 |
| Colour | | | | | | | | | | | | | | | | | | | | | | | | |
| Entirely green or yellow | | 2.19 | | 0.00 | | 3.57 | | 2.14 | | 0.00 | | .83 | | 1.47 | | 0.00 | | 5.05 | | 4.61 | | 0.00 | | 0.00 |
| Green or yellow predominating | | 16.49 | | 25.30 | | 78.58 | | 17.14 | | 12.90 | | 24.16 | | 8.09 | | 5.56 | | 29.29 | | 40.77 | | 5.15 | | 15.38 |
| Crimson or red | * | 60.44 | * | 67.47 | | 3.57 | * | 76.43 | * | 58.06 | * | 65.83 | * | 72.79 | | 44.44 | * | 59.60 | | 23.85 | * | 73.53 | * | 66.67 |
| Pink or pinkish red | | 14.29 | | 0.00 | | 3.57 | | .72 | | 8.07 | | 5.00 | | 2.21 | | 7.41 | | 1.01 | | .77 | | .73 | | 1.28 |
| Orange or orange red | | 6.59 | | 7.23 | | 10.71 | | 3.57 | | 20.97 | | 4.18 | | 15.44 | * | 42.59 | | 5.05 | | 23.08 | | 20.59 | | 16.67 |
| Russet | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | * | 6.92 | | 0.00 | | 0.00 |
| Total | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 |

CHARACTERS of Seedling Apples Originated in the Horticultural Division—*Concluded.*

| | Character of female parent. | Fameuse seedlings. | Character of female parent. | Gano seedlings. | Character of female parent. | Bullock (Am. Gold. Russet) seedlings. | Character of female parent. | Langford (Beauty) seedlings. | Character of female parent. | Lawyer seedlings. | Character of female parent. | McIntosh seedlings. | Character of female parent. | Northern Spy seedlings. | Character of female parent. | Salome seedlings. | Character of female parent. | Shiawassee seedlings. | Character of female parent. | Swayzie seedlings. | Character of female parent. | Wealthy seedlings. | Character of female parent. | Winter St. Lawrence seedlings. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flavour— | | | | | | | | | | | | | | | | | | | | | | | | |
| Sweet | | 16.49 | | 9.64 | | 0.00 | | 3.57 | | 16.13 | | 19.16 | | 6.62 | | 17.59 | | 2.02 | | 10.77 | | 13.97 | | 16.67 |
| Mildly subacid | | 6.59 | | 16.87 | | 3.57 | | 5.00 | | 11.29 | | 4.18 | | 5.15 | | 11.11 | | 2.02 | | 7.69 | | .73 | | 5.12 |
| Subacid | * | 56.04 | * | 56.62 | * | 75.00 | * | 60.71 | | 59.68 | * | 60.00 | * | 60.29 | * | 46.30 | * | 65.66 | * | 53.08 | | 38.97 | * | 56.41 |
| Briskly subacid | | 18.69 | | 16.87 | | 21.43 | | 29.29 | * | 11.29 | | 15.83 | | 25.00 | | 22.22 | | 26.26 | | 24.62 | * | 36.77 | | 19.23 |
| Acid | | 2.19 | | 0.00 | | 0.00 | | 1.43 | | 1.61 | | .83 | | 2.94 | | 2.78 | | 4.04 | | 3.84 | | 9.56 | | 2.57 |
| Total | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 |
| Quality | | | | | | | | | | | | | | | | | | | | | | | | |
| Poor | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | .73 | | 0.00 |
| Below medium | | 1.10 | | 1.20 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 2.02 | | 0.00 | | 2.21 | | 1.28 |
| Medium | | 27.47 | * | 67.47 | | 57.15 | | 15.71 | | 40.32 | | 11.66 | | 23.53 | | 41.67 | | 18.18 | | 23.85 | | 27.94 | | 24.36 |
| Above medium | | 50.55 | | 31.33 | | 35.71 | | 49.29 | * | 41.94 | | 41.67 | | 50.00 | | 40.74 | | 47.48 | | 47.69 | | 50.74 | | 48.72 |
| Good to very good | * | 20.88 | | 0.00 | * | 7.14 | * | 35.00 | | 17.74 | * | 46.67 | * | 26.47 | * | 17.59 | * | 32.32 | * | 28.46 | * | 18.38 | * | 25.64 |
| Total | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 |
| Season— | | | | | | | | | | | | | | | | | | | | | | | | |
| Aug.-mid-Sept. | | 10.99 | | 0.00 | | 0.00 | * | 16.43 | | 6.45 | | 1.67 | | .74 | | 8.33 | | 20.21 | | 5.39 | | 26.47 | | 26.92 |
| Mid-Sept. to mid-Oct. | | 21.98 | | 10.84 | | 7.14 | | 27.86 | | 12.90 | | 18.33 | | 14.70 | | 19.45 | | 24.24 | | 6.15 | | 16.18 | | 15.38 |
| October-November | * | 31.87 | | 14.46 | | 28.58 | | 29.29 | | 22.59 | | 28.33 | | 38.23 | | 20.37 | | 24.24 | | 30.77 | * | 36.77 | | 19.23 |
| November-February | | 29.67 | | 25.30 | | 32.14 | | 20.71 | | 29.03 | * | 34.17 | | 27.21 | | 26.85 | * | 18.18 | * | 30.00 | | 11.76 | * | 34.62 |
| December-April | | 5.49 | * | 49.40 | * | 32.14 | | 5.71 | * | 29.03 | | 17.50 | * | 19.12 | * | 25.00 | | 13.13 | | 27.69 | | 8.82 | | 3.85 |
| Total | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 | | 100.00 |
| Resemblance— | | | | | | | | | | | | | | | | | | | | | | | | |
| In outward appearance | | 19.78 | | 21.69 | | 10.71 | | 22.86 | | 12.90 | | 15.83 | | 25.00 | | 25.00 | | 13.13 | | 3.08 | | 41.18 | | 19.23 |
| In flesh | | 36.26 | | 56.62 | | 21.43 | | 47.14 | | 20.97 | | 18.33 | | 40.44 | | 71.30 | | 52.53 | | 23.85 | | 46.32 | | 29.49 |
| In flavour | | 34.07 | | 48.19 | | 35.71 | | 26.43 | | ..... | | 25.00 | | 34.57 | | 36.11 | | 32.32 | | 37.69 | | 19.12 | | 28.21 |
| No resemblance | | 38.46 | | 4.82 | | 32.14 | | 30.00 | | 35.48 | | 28.33 | | 27.94 | | 14.81 | | 32.32 | | 40.77 | | 27.94 | | 28.21 |
| In whiteness of flesh only | | 5.49 | | ..... | | ..... | | 1.43 | | ..... | | ..... | | ..... | | ..... | | 5.05 | | ..... | | ..... | | ..... |
| In form and not colour | | 3.30 | | 20.48 | | 17.86 | | 12.14 | | 1.61 | | 7.50 | | 8.09 | | 3.70 | | 26.26 | | 11.54 | | 5.15 | | 6.42 |
| In colour and not form | | 2.19 | | 0.00 | | 3.57 | | 7.86 | | ..... | | 17.50 | | 1.47 | | 30.56 | | 2.02 | | .77 | | 2.21 | | 25.64 |
| In large seeds | | ..... | | 66.27 | | ..... | | ..... | | 46.77 | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... |
| In form only | | ..... | | 2.41 | | 10.71 | | ..... | | ..... | | ..... | | 2.94 | | ..... | | ..... | | ..... | | ..... | | ..... |
| In colour | | ..... | | 12.05 | | ..... | | ..... | | 8.07 | | ..... | | 13.24 | | ..... | | ..... | | ..... | | ..... | | ..... |
| In colour only | | ..... | | 1.20 | | ..... | | ..... | | 3.23 | | ..... | | 4.41 | | ..... | | ..... | | ..... | | ..... | | ..... |

## Names Given to Varieties of Apples and Crab Apples Originated in the Horticultural Division at the Central Experimental Farm, Ottawa, Canada.

The following names, with reference as to where the original descriptions may be found, have been given to apples and crab apples originated at the Central Experimental Farm. When the names were given it was thought that these varieties promised to be useful in some part of Canada. Their hardiness, which is one of the most important considerations, is being determined at the different Farms and Stations. This list of names was given up to Spring of 1915.

| Seedling Varieties. | Female Parent. | Date of Sowing Seed. | Date of Planting Tree. | Date of First Fruiting. | Fruit Described. |
|---|---|---|---|---|---|
| Ascot | Northern Spy | Autumn 1898 | Spring 1903 | 1912 | R. 1913, P. 222 |
| Bingo | " " | " 1898 | " 1902 | 1910 | R, 1911, P. 110 |
| Donald | " " | " 1898 | " 1902 | 1909 | R. 1912, P. 92 |
| Elmer | " " | " 1898 | " 1902 | 1911 | R. 1912, P. 92 |
| Emilia | " " | " 1898 | " 1902 | 1914 | R. 1915, P. 595 |
| Epsom | " " | " 1898 | " 1902 | 1912 | R. 1913, P. 293 |
| Galton | " " | " 1898 | " 1906 | 1912 | R. 1915, P. 595 |
| Glenton | " " | " 1898 | " 1902 | 1909 | R. 1911, P. 111 |
| Homer | " " | " 1898 | " 1902 | 1908 | R. 1910, P. 135 |
| Lipton | " " | " 1898 | " 1902 | 1914 | R. 1915, P. 595 |
| Marcus | " " | " 1898 | " 1902 | 1911 | R. 1912, P. 93 |
| Nestor | " " | " 1898 | " 1904 | 1912 | R. 1912, P. 93 |
| Niobe | " " | " 1898 | " 1902 | 1909 | R. 1911, P. 111 |
| Rocket | " " | " 1898 | " 1902 | 1910 | R. 1911, P. 112 |
| Rosalie | " " | " 1898 | " 1901 | 1908 | R. 1911, P. 112 |
| Sandow | " " | " 1898 | " 1902 | 1911 | R. 1912, P. 94 |
| Sparta | " " | " 1898 | " 1901 | 1912 | R. 1914, P. 495 |
| Marne | " " | " 1898 | " 1903 | 1913 | R. 1915, P. 595 |
| Orlando | " " | " 1898 | " 1902 | 1911 | R. 1913, P. 294 |
| Pandora | " " | " 1898 | " 1902 | 1908 | R. 1913, P. 294 |
| Tasty | " " | " 1898 | " 1902 | 1911 | R. 1912, P. 94 |
| Thurso | " " | " 1898 | " 1901 | 1909 | R. 1908, P. 103 |
| 22 Varieties. | | | | | |
| Brisco | Langford (Beauty) | " 1898 | " 1903 | 1910 | R. 1913, P. 292 |
| Cora | " " | " 1898 | " 1902 | 1907 | R. 1911, P. 110 |
| Diana | " " | " 1898 | " 1903 | 1912 | R. 1913, P. 292 |
| Dulcet | " " | " 1898 | " 1903 | 1911 | R. 1914, P. 494 |
| Galena | " " | " 1898 | " 1903 | 1911 | R. 1913, P. 293 |
| Garner | " " | " 1898 | " 1902 | 1907 | R. 1908, P. 101 |
| Gerald | " " | " 1898 | " 1903 | 1911 | R. 1912, P. 92 |
| Horace | " " | " 1898 | " 1902 | 1908 | R. 1912, P. 93 |
| Kildare | " " | " 1898 | " 1902 | 1908 | R. 1911, P. 111 |
| Kim | " " | " 1898 | " 1902 | 1908 | R. 1911, P. 111 |
| Linda | " " | " 1898 | " 1902 | 1908 | R. 1915, P. 595 |
| Moreno | " " | " 1898 | " 1902 | 1908 | R. 1913, P. 293 |
| Monitor | " " | " 1898 | " 1903 | 1909 | R. 1912, P. 93 |
| Ripon | " " | " 1898 | " 1902 | 1908 | R. 1911, P. 111 |
| Sonora | " " | " 1898 | " 1902 | 1907 | R. 1908, P. 102 |
| 15 Varieties. | | | | | |
| Brock | McIntosh | " 1898 | " 1901 | 1908 | R. 1910, P. 134 |
| Carno | " | " 1898 | " 1901 | 1907 | R. 1911, P. 110 |
| Caruso | " | " 1898 | " 1903 | 1909 | R. 1912, P. 91 |
| Casco | " | " 1898 | " 1903 | 1913 | R. 1914, P. 494 |
| Garnet | " | " 1898 | " 1901 | 1908 | R. 1912, P. 92 |
| Gilda | " | " 1898 | " 1904 | 1909 | R. 1914, P. 494 |
| Grover | " | " 1898 | " 1901 | 1908 | R. 1913, P. 293 |
| Lobo | " | " 1898 | " 1901 | 1906 | R. 1910, P. 135 |
| Forerunner | " | " 1898 | " 1904 | 1901 | R. 1915, P. 595 |

Names given to apples originated in the Horticultural Division, &c. *Continued.*

| Seedling Varieties. | Female Parent. | Date of Sowing Seed. | Date of Planting Tree. | Date of First Fruiting. | Fruit Described. |
|---|---|---|---|---|---|
| Melba | McIntosh | Autumn 1898 | Spring 1901 | 1908 | R. 1909, P. 111 |
| Nemo | " | " 1898 | " 1901 | 1908 | R. 1912, P. 93 |
| Joyce | " | " 1898 | " 1901 | 1911 | R. 1912, P. 93 |
| Pedro | " | " 1898 | " 1903 | 1911 | R. 1913, P. 294 |
| Service | " | " 1898 | " 1901 | 1908 | R. 1912, P. 94 |
| Seton | " | " 1898 | " 1901 | 1908 | R. 1911, P. 112 |
| Toshlet | " | " 1898 | " 1901 | 1912 | R. 1914, P. 495 |
| Valerie | " | " 1898 | " 1903 | 1908 | R. 1914, P. 495 |
| Winton | " | " 1898 | " 1901 | 1908 | R. 1915, P. 596 |
| 18 Varieties. | | | | | |
| Humber | Bullock (American Golden Russet) | " 1898 | " 1902 | 1911 | R. 1913, P. 293 |
| 1 Variety. | | | | | |
| Lucia | Salome | " 1898 | " 1902 | 1912 | R. 1914, P. 494 |
| Cleaver | " | " 1898 | " 1902 | 1910 | R. 1912, P. 92 |
| Manda | " | " 1898 | " 1902 | 1910 | R. 1913, P. 293 |
| Nepean | " | " 1898 | " 1902 | 1908 | R. 1910, P. 135 |
| Oswald | " | " 1898 | " 1902 | 1908 | R. 1910, P. 136 |
| Rondo | " | " 1898 | " 1902 | 1911 | R. 1912, P. 94 |
| Rouleau | " | " 1898 | " 1902 | 1907 | R. 1910, P. 136 |
| Stella | " | " 1898 | " 1902 | 1908 | R. 1910, P. 136 |
| 8 Varieties. | | | | | |
| Petrel | Shiawassee | " 1898 | " 1901 | 1907 | R. 1910, P. 136 |
| Ramona | " | " 1898 | " 1902 | 1908 | R. 1913, P. 294 |
| 2 Varieties. | | | | | |
| Albert | Winter St. Lawrence | " 1898 | " 1901 | 1909 | R. 1912, P. 91 |
| Anson | " " | " 1898 | " 1901 | 1909 | R. 1910, P. 134 |
| Atlas | " " | " 1898 | " 1902 | 1910 | R. 1912, P. 91 |
| Drumbo | " " | " 1898 | " 1902 | 1910 | R. 1915, P. 594 |
| Linton | " " | " 1898 | " 1901 | 1907 | R. 1908, P. 102 |
| Nile | " " | " 1898 | " 1902 | 1908 | R. 1912, P. 94 |
| 6 Varieties. | | | | | |
| Adonis | Wealthy | " 1898 | " 1901 | 1905 | R. 1905, P. 107 |
| Battle | " | " 1898 | " 1901 | 1906 | R. 1910, P. 134 |
| Clive | " | " 1898 | " 1902 | 1907 | R. 1908, P. 101 |
| Consort | " | " 1898 | " 1901 | 1908 | R. 1914, P. 494 |
| Crusoe | " | " 1898 | " 1901 | 1903 | R. 1906, P. 107 |
| Galetta | " | " 1898 | " 1902 | 1906 | R. 1906, P. 108 |
| Jethro | " | " 1898 | " 1902 | 1911 | R. 1914, P. 494 |
| Luke | " | " 1898 | " 1902 | 1906 | R. 1911, P. 111 |
| Medford | " | " 1898 | " 1901 | 1906 | R. 1908, P. 102 |
| Melvin | " | " 1898 | " 1901 | 1905 | R. 1910, P. 135 |
| Mendel | " | " 1898 | " 1902 | 1906 | R. 1906, P. 108 |
| Pinto | " | " 1898 | " 1902 | 1906 | R. 1909, P. 111 |
| Prosper | " | " 1898 | " 1902 | 1908 | R. 1910, P. 136 |
| Noel | " | " 1898 | " 1901 | 1905 | R. 1906, P. 108 |
| 14 Varieties. | | | | | |
| Roger | Gano | " 1898 | " 1902 | 1908 | R. 1911, P. 112 |
| 1 Variety. | | | | | |
| Cobalt | Lawver | " 1898 | " 1902 | 1908 | R. 1910, P. 134 |
| Congo | " | " 1898 | " 1901 | 1906 | R. 1906, P. 107 |
| Danville | " | " 1898 | " 1902 | 1908 | R. 1909, P. 111 |
| 3 Varieties. | | | | | |
| Herald | Fameuse | " 1898 | " 1902 | 1909 | R. 1910, P. 135 |
| 1 Variety. | | | | | |

Names given to apples originated in the Horticultural Division, &c.

*Continued.*

| Seedling Varieties. | Female Parent. | Date of Sowing Seed. | Date of Planting Tree. | Date of First Fruiting. | Fruit Described. |
|---|---|---|---|---|---|
| Ambo | Swayzie | Autumn 1898 | Spring 1904 | 1912 | R. 1914, P. 493 |
| Cromer | " | " 1898 | " 1902 | 1905 | R. 1909, P. 111 |
| Navan | " | " 1898 | " 1902 | 1906 | R. 1906, P. 108 |
| Nome | " | " 1898 | " 1904 | 1909 | R. 1915, P. 596 |
| Ottawa | " | " 1898 | " 1902 | 1906 | R. 1906, P. 108 |
| Radnor | " | " 1898 | " 1902 | 1907 | R. 1909, P. 111 |
| Severn | " | " 1898 | " 1901 | 1906 | R. 1908, P. 102 |
| 7 Varieties. | | | | | |
| Bruno | Scott Winter | " 1898 | " 1901 | 1907 | R. 1908, P. 101 |
| 1 Variety. | | | | | |
| Claire | Russian | " 1889 | " 1890 | 1906 | R. 1906, P. 107 |
| Neville | " | " 1889 | " 1890 | 1904 | R. 1906, P. 108 |
| Oscar | " | " 1889 | " 1890 | 1897 | R. 1908, P. 102 |
| Rupert | " | " 1889 | " 1890 | 1897 | R. 1906, P. 109 |
| Percival | " | " 1889 | " 1890 | 1906 | R. 1906, P. 108 |
| 5 Varieties. | | | | | |
| *Cross-bred Varieties.* | | | | | |
| Rustler | McIntosh x Lawver | " 1899 | " 1903 | 1912 | R. 1913, P. 294 |
| Mavis | " " | " 1899 | " 1903 | 1909 | R. 1915, P. 599 |
| Vermac | Lawver x McIntosh | " 1899 | " 1902 | 1908 | R. 1913, P. 295 |
| Holz | " " | " 1899 | " 1903 | 1911 | R. 1912, P. 92 |
| Granby | McMahan x Scott Winter | " 1895 | " 1896 | 1907 | R. 1908, P. 101 |
| Kelso | " " | " 1895 | " 1896 | 1907 | R. 1908, P. 102 |
| Sorel | " " | " 1895 | " 1896 | 1907 | R. 1908, P. 102 |
| Dorval | " " | " 1895 | " 1896 | 1905 | R. 1906, P. 107 |
| Roberval | " " | " 1895 | " 1896 | 1905 | R. 1906, P. 108 |
| Valois | " " | " 1895 | " 1896 | 1905 | R. 1906, P. 108 |
| Walton | " " | " 1895 | " 1896 | 1903 | R. 1906, P. 109 |
| 11 Varieties. | | | | | |
| Total, 115 Varieties. | | | | | |

The following names recorded first in the Annual Report of the Experimental Farms for 1906 were given to seedling varieties of Russian origin, descriptions of which have not yet been published. These were among the best and apparently the hardiest of 3,000 trees. They have been sent to the prairie provinces for trial and should any of them prove promising descriptions will appear in the annual reports: Arcola, Birtle, Bowie, Bolton, Beaver, Bomba, Bison, Carlyle, Carman, Cicero, Cecil, Carrie, Crescent, Cottage, Dauphin, Dewar, Earliana, Grenfell, Hanley, Hamlet, Harbinger, Jarvis, Jasper, Jacko, Lang, Leroy, Mentor, Melfort, Morden, Murillo, Morley, Nepigon, Osler, Otter, Pingree, Ponoka, Parma, Polaris, Roslin, Rawdon, Selkirk, Snelling, Solina, Sorley, Sanford, Souris, Selwyn, Vesta, Virgil, Varna, Virden, Woburn, and Wesley, —fifty-three varieties.

## Conclusions Reached in Regard to Originating New Varieties of Apples.

(1) To produce a hardy apple where no apples have yet been found hardy: (a) Cross the apple with the wild Siberian Crab Apple (*Pyrus baccata*); (b) Sow seeds of apples which have ripened in a climate as nearly similar as possible.

(2) To produce a hardy long-keeping apple of good quality: Sow seeds of long-keeping varieties of apples of good quality which have ripened fruit and proved hardy in a somewhat similar climate, and when possible have both parents long-keeping varieties.

(3) To produce an apple having certain characteristics, as regards hardiness, vigour and productiveness of tree, and quality, size and appearance of fruit: Sow seeds of varieties having most of the characteristics desired.

(4) If seedlings are to be grown on a large scale, more varieties having the characteristics desired will probably be obtained if trees of several named sorts blossoming at the same time be planted in close proximity in the orchard, and the seeds used from fruit borne on these trees. The trees thus planted should combine all the good points in the standard aimed at, for the variety to be originated.

(5) In cross-breeding apples where quality is an important factor, as it should be in most places, cross two varieties which are both good or very good in quality. It has been the experience at Ottawa that in crossing a variety of good quality with one of inferior quality the crosses will nearly always bear fruit with quality inferior to the one with good quality.

The late Dr. Wm. Saunders, when Director of the Experimental Farms, did some good work in apple breeding for the prairie provinces of Canada, and before his death he published the results of his work in Bulletin 68 of the Experimental Farm Series entitled "Progress in the Breeding of Hardy Apples for the Canadian North-West." The following matter is taken from this bulletin:

"Shortly after the first Dominion Experimental Farms were established experiments were begun, both with large and small fruits, with the object of finding out what varieties, if any, could be successfully grown, especially in the colder districts in the Northwest Provinces. The apple, on account of its relative importance, naturally claimed special attention. During the first eight or ten years more than two hundred of the hardiest sorts of cultivated apple trees obtainable in northern Europe and other northern countries were thoroughly tested, especially at the experimental farms at Brandon, Man., and at Indian Head, Sask. These trees were planted in considerable numbers, often from twenty to fifty trees of a kind, some in shelter more or less dense, others without

shelter, but in no case were any fruits produced. New varieties originated since then, considered to be of especial merit and hardiness, have been subjected to similar trials.

"In 1887, the year during which work on the experimental farms was begun, seed was obtained from the Imperial Botanic Gardens, St. Petersburg, Russia, of a small wild Siberian crab-apple, known as the 'Berried Crab,' *Pyrus baccata*. This crab grows in abundance about the shores of the Baikal Sea and in many parts of Northern Siberia. Young trees were raised from seed of this crab, and, as soon as the specimens were large enough for transplanting, some were sent to Brandon, Man., and others to Indian Head, Sask., and in both places they were found to be entirely hardy. During a trial of about twenty years the Berried Crab has never been injured by winter and the trees have started from the terminal buds on the branches every season. These trees have fruited abundantly for many years, but the fruit of most of them is small — not much larger than a cherry — and is also astringent and acid and in some cases bitter. The fruit of *Pyrus baccata* makes excellent jelly, however, and hence, in its improved form, has been found useful. It is also highly ornamental in the spring, when in blossom, or when adorned with fruit in the autumn. The trees are rather dwarf in habit, low-branched and strongly built, with the fruit firmly attached to the tree. From its general habit of growth, it is well adapted to resist the high winds to which trees are often exposed on the northwestern provinces.

### Commencement of the Work of Cross-Breeding.

"After four or five years' experience had thoroughly established the character of the Berried Crab for extreme hardiness, efforts were made to improve the size and quality of the fruit by cross-fertilizing the flowers of *P. baccata* with pollen from many of the hardiest and best sorts of apples grown in Ontario. This work was begun in 1894, and has since been continued along several different lines. The seeds obtained from the first crosses were sown in the autumn of that year and germinated in the following spring, producing, in all, about 160 young trees. These were planted in the spring of 1896, when many grew rapidly and soon made shapely specimens. These, and other young trees, resulting from similar subsequent experiments, have been planted from year to year in orchards at Ottawa, Brandon, Indian Head and other Northwestern stations. In 1899, thirty-six of the cross-bred apples first produced and grown at Ottawa fruited, and five of them were of such size and quality as to justify their being propagated for more general test. The fact that so many of these fruited on the fourth year from the sowing

of the seed indicates a very early fruit-bearing habit. Since then several hundred more of these cross-bred apples have borne fruit, and the number of varieties worthy of extended cultivation has been considerably increased. Root-grafts of some of the more promising sorts were early made and these have been tested for eight or ten years past at each of the northwestern farms and have shown very slight inclination towards tenderness, even when planted in exposed situations. The cross-bred sorts grafted on roots of seedlings of *P. baccata* have produced trees which, so far as they have been tried, seem to be quite as hardy as the wild form of *baccata*. There seems every reason to expect that they will prove generally hardy throughout the northwestern country.

"In all cases of crosses mentioned in this bulletin the first parent named is the female, the second the male.

"EXPERIMENTS WITH 'PYRUS PRUNIFOLIA' AND 'PYRUS MALUS'."

"In 1896 a series of crosses was begun on another sort of wild crab, known as *P. prunifolia*. This is regarded by some botanists as a distinct species; others believe it to be a hybrid between *P. malus*, the wild crab of Europe, and *P. baccata*. Seeds of this form were also obtained from the Royal Botanic Gardens, St. Petersburg, Russia. The fruit of *P. prunifolia* is usually larger than that of *baccata*, and will average nearly twice the size. Its hardiness in the Northwest has also been established by a test covering a number of years on both the experimental farms at Brandon and Indian Head. The first crosses with this species were made in 1896, and since then many new sorts have thus been originated.

"Another line of work in producing new apples was begun in 1902, in crossing *P. malus*, the wild apple of Europe, with some of the best Canadian sorts. This fruit is about an inch in diameter to start with, and of fair quality. A hardy form of this tree has been secured which has stood several winters at Brandon and Indian Head without injury, and with this additional crosses have been made.

"Many of the best of the crosses produced on *P. baccata* and *P. prunifolia* have been recrossed, thus introducing a second quota of the blood of the larger apple with the hope of obtaining fruits of larger size and higher quality. Regarding these there is as yet not much proof that they are sufficiently hardy to endure the climate of the Northwest; this can only be fully determined by further experiment. Two varieties of these crosses of Ontario and Spy have been tested for several years at Indian Head, but have not yet fruited. Thus far they have been fairly hardy. The first one-year-old trees

produced by this method were planted in the orchard at Ottawa in the spring of 1904, and a full list of those now growing in these orchards is submitted in this bulletin.

### Apples From Which Pollen Has Been Used.

"In the first crosses made on *P. baccata,* in 1904, pollen was used from the Tetofsky, Oldenburg and Wealthy apples, but since then pollen has been obtained from many other varieties and used on *P. baccata, P. prunifolia* and *P. malus,* among them Anis, Beautiful Arcad, Broad Green, Excelsior, Fameuse, Golden Russet, Haas, Herren, Krimskoe, McIntosh, McMahan, Osimoe, Pewaukee, Red Astrachan, Ribston, Scott Winter, Simbirsk (No. 9), Swayzie, Pomme Gris, Talman, Winter St. Lawrence and Yellow Transparent. The number and variety of the crosses have thus been very much increased. Many hundreds of these cross-bred varieties of *baccata* origin have been produced (about 800 in all), and most of them have fruited. While a large number have proved of inferior quality, there have been originated, up to the present time, about sixteen varieties in all, most of which, from their superior size and quality, may be regarded as useful for domestic purposes and deserving more extended trial.

### Second Crosses.

"Many of the best of the crosses produced on *P. baccata* and *P. prunifolia* and their related forms have been recrossed, thus introducing a second portion of the characteristics of the larger apple, with the hope of obtaining fruit of larger size and higher quality. From these second crosses, which were made in 1904 and following years, there are now four hundred and seven trees growing in the orchards at Ottawa, several of which fruited for the first time in 1910."

### Some Hardy Varieties.

After being propagated and thoroughly tested on the prairies some of Dr. Saunders' hybrids have proved hardier than any other varieties of apples or crab apples tested, thus marking a stage of development in hardy apples for the prairie provinces. Some of the hardiest varieties have proved to be Jewel (*P. baccata* x Yellow Transparent, size 1.4 by 1.3 inches), Columbia (*P. baccata* x Broad Green, size 1.8 by 1.6 inches), Charles (*P. baccata* x Tetofsky, size 1.6 by 1.5 inches), Silvia (*P. baccata* x Yellow Transparent, size 1.4 by 1.5 inches), Tony (*P. baccata* x McMahan, size 1.6

by 1.4 inches), Elsa (*P. baccata* x Yellow Transparent, size 1.4 by 1.3 inches), Eve (*P. baccata* x Simbirsk (No. 9), size 1.6 by 1.2 inches), Osman (*P. baccata* x Osimoe). Seedlings grown from these gave, in nearly every case, fruit smaller than the parent. As none of the fruits resulting from these crosses were large enough to compare favourably with less hardy varieties of apples and crab apples, the best of these first crosses were, in 1904, re-crossed with named varieties of apples with the object of obtaining varieties bearing larger fruits but which would retain sufficient hardiness to be grown in the open on the prairies.

In this work Dr. Saunders used the crosses as the mother parents in all cases. The varieties of apples used as male parents are McIntosh, Baldwin, Cranberry, Oldenburg, Northern Spy, October, Scott Winter, Simbirsk (No. 9), Tetofsky, Yellow Transparent, Ontario, Gideon, Rideau, Haas, August, Walter, Wealthy, McMahan. From seeds obtained through this work 407 trees were grown at Ottawa which began to fruit in 1910, and of which a large proportion have borne. While many of these have borne fruit no larger than the mother parent, twenty-four have produced apples two inches and more in diameter. Some of the largest varieties which have fruited are Wapella (Dean x Ontario) size 2.25 by 2.25 inches; Angus (Dean x Ontario) size 2 by 2.5 inches. The parentage of Dean is *P. baccata* x Wealthy. Martin (Pioneer x Ontario), size 2.25 by 2.37 inches; Gretna (Pioneer x Northern Spy) size 2 by 2.25 inches. Piotosh (Pioneer x McIntosh) size 1¾ by 1⅞ inches. The parentage of Pioneer is *P. baccata* x Tetofsky. Most of these second crosses retain the long, slender stem, the thin, tender skin, and the crisp, breaking flesh which are characteristic of *P. baccata*, but a few are quite apple like.

It is not known yet whether these will be sufficiently hardy or not, but this will soon be determined.

It is to be regretted that the apple *(P. malus)* was not used as the mother in these crosses, as it is believed by the writer that larger apples would have been obtained more quickly, but size might have been obtained at the expense of hardiness, which is the first consideration on the prairies. If these second crosses prove hardier than any other apples or crab apples which have been tested they will mark another step in advance.

As it is important to obtain apples suitable for the prairie provinces of Canada as soon as possible, another method than that followed by the late Dr. Wm. Saunders is being practised by the writer. Seed was sown in 1910 of some of the hardiest Russian apples, including Yellow Transparent, Charlamoff, Beautiful Arcad, Oldenburg, Tetofsky, Anis, Antonovka and Hibernal, and the Moscow Pear Apple. More seedlings of these and other varieties have

been grown since and from these about 75,000 were sent as yearlings to the Dominion Experimental Farms in the prairie provinces and planted close together in nursery rows. Some of those which have shown greatest hardiness have been removed to orchards for further test, others are left to fruit in the nursery row. It is planned to continue this work in the hope that from some of these hardy Russians, which stand so much cold in Russia, will be obtained some which will be useful in the cold districts of Canada, where early growth in the spring followed by frost seems as destructive as low temperatures of winter.

In addition to the trees sent from Ottawa, other trees of the same varieties have been grown from the seed of fruit ripened in Manitoba for comparison. At the Brandon Experimental Farm some seedlings of the Cluster, a cross-bred variety, fruited there, are promising.

CROSS-BREEDING APPLES IN THE HORTICULTURAL DIVISION, OTTAWA.

A little work in cross-breeding was done in the Horticultural Division in 1895 when McMahan was crossed with Scott Winter and Walbridge with Northern Spy, but beginning in 1899 some work has been done almost every year since. The parents used in making crosses are Anis, Anisim, Antonovka, Baldwin, Barnack (Beauty), Baxter, Bethel, Bingo, Cobalt, Cox Orange, Crusoe, Oldenburg, Dyer, Danville, Fameuse, Forest, Glenton, Gravenstein, Hibernal, Joyce, Lawver, Livland, Malinda, Milwaukee, McIntosh, McMahan, Newton, Northern Spy, Northwestern, R. I. Greening, Rosalie, Rouleau, Scott Winter, Stone, Wagener, Winter Rose, Walton. Reciprocal crosses have been made in many cases. There have been two main objects in view in this work, first, to obtain hardier winter apples for the colder parts of Canada where apples are grown commercially and, second, to obtain early bearing varieties covering the whole season, as there seems to be no good reason why more apples of the Northern Spy type should not be obtained which will bear as early as Wealthy and Wagener.

More than one thousand trees are now growing as a result of a little crossing almost every year and over one hundred of these have already fruited. So far not many apples have fruited which have been thought worthy of propagation, but there have been a few from a cross between McIntosh and Lawver where the object was to obtain varieties which would keep better than McIntosh.

In six out of ten crosses which have fruited with Lawver as the mother no marked resemblance to either parent is recorded, and similarly in three of the six with McIntosh as the mother. Of the four varieties with Lawver as the mother that have marked charac-

PLATE III. TYPICAL MASSACHUSETTS HOME SCENE.

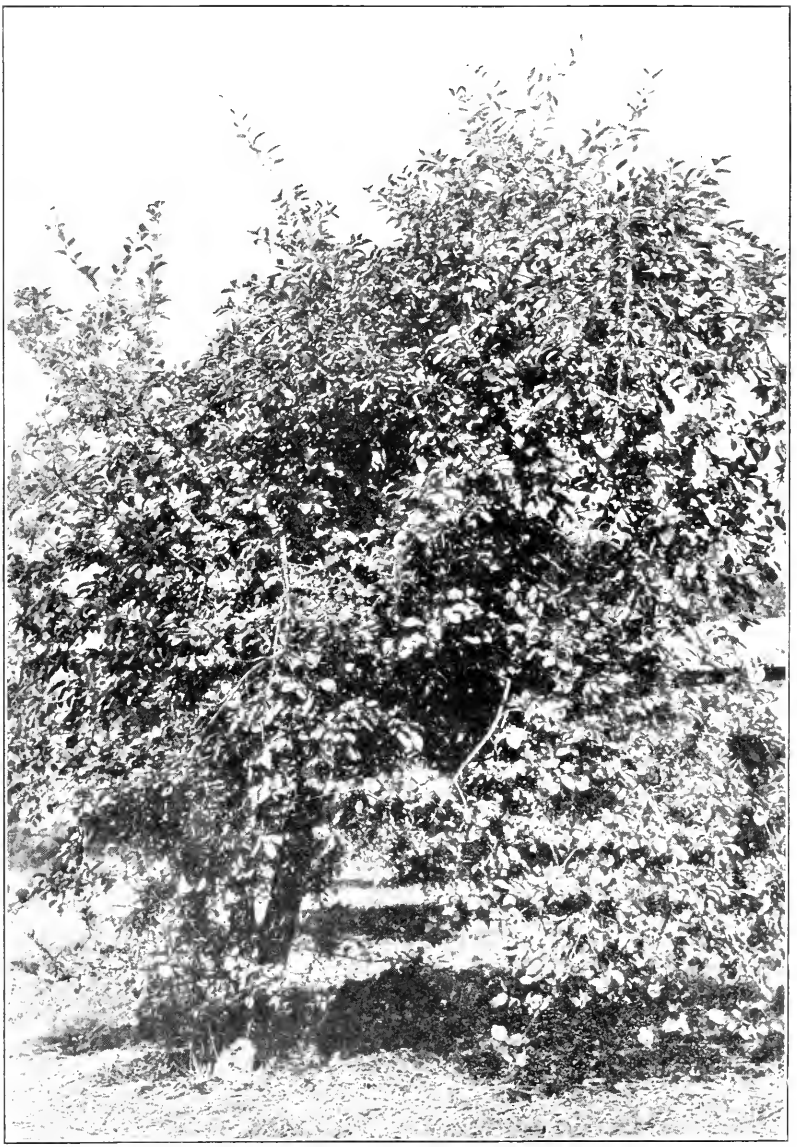


PLATE IV. THE ORIGINAL TURLEY APPLE TREE.

Fruit described on pp. 27.

teristics of the parent, two have distinct McIntosh flavour and two resemble McIntosh in colour. The Lawver characteristics are not very marked. Of the six varieties with McIntosh as the mother only two show marked resemblance to either parent in the important characteristics of colour, flesh and flavour, although as regards season a large proportion resembles both parents. The McIntosh seedlings from open pollination have given a larger proportion with marked McIntosh characteristics than has been the case in this cross. While there are none of the sixteen varieties of this cross which have yet fruited which are as good as McIntosh in quality, ten of the sixteen are better than Lawver in quality and thirteen of the sixteen are later in season than McIntosh, and most of the varieties are of high colour and attractive in appearance. Following are those which have been named: Lawver x McIntosh, Holz, Vermac. McIntosh x Lawver, Mavis, Rustler.

### ORIGINAL DESCRIPTION OF THE TURLEY APPLE.

The Turley apple is a seedling of the Winesap and originated in 1900 in Lawrence Co., Indiana, by Joe A. Burton, Mitchell, Indiana. A few trees and scions have been distributed. Compared with Stayman Winesap it is as large, a more solid red color like its parent, and has the same juicy, crisp flesh and superlative flavor and quality. The following specific description is herewith appended:

*Turley:* Size, large to very large; shape, round conic and regular; cavity, medium breadth and depth, sometimes compressed, green like Rome Beauty; stem short, stout, fuzzy; basin narrow, medium depth, furrowed and wrinkled; calyx small, closed, lobes long and recurved, tube conical, stamens median; skin color rich yellow, almost entirely washed with rich red and mottled or indistictly striped with purple, very attractive; dots large and scattering toward cavity, small and numerous toward basin, light russet color and sometimes with dark centre; core small to medium, irregular round-conic, partly open; seeds medium size, long obovate, light brown; flesh tinged with rich yellow, very crisp and breaking, full of refreshing juice, rich, vinous, mild sub-acid flavor, very best quality. It is in season in early winter. (See plate IV.)

## STUDIES IN BIENNIAL FRUITING.

R. H. ROBERTS, *Wisconsin.*

The habit of biennial fruiting of certain apple varieties is of such common occurrence that this condition is often considered to be a normal functioning of the tree. The earliest writers ascribe this failure to fruit in successive years to a weakened condition of the tree due to heavy fruiting the previous season. There has been little disposition to seriously question either of these viewpoints. As a result, little systematic inquiry has been made into the immediate causes and conditions associated with the occurrence of the "off year."

Studies in tree growth and functioning with special reference to biennial fruiting as it occurs with the Wealthy apple in Wisconsin have been conducted at the Wisconsin Experiment Station for the last three seasons. This paper is a brief review of a part of the data secured in these investigations. The inquiries into the conditions related to this irregular performance have been largely limited to gross examinations of the tree growth conditions such as the duration of the growth period, blossom bud formation, leaf areas and the setting of the fruit. In addition, experiments in the effect of fruit and leaf thining and pruning have been carried on.

It is well established that blossom bud formation is dependent upon the presence of a large supply of the so-called stored products in the plant. The question of the annual production of blossom buds is directly concerned, therefore, with the factors that have to do with the manufacture and utilization of these products. The factors which tend to unduly limit the leaf surface or to unduly utilize the stored products of the tree are of greatest concern in attempting to account for biennial flower and fruit production.

Some tests in leaf thinning emphasize how important it is from the standpoint of bud formation and spur growth to protect the foliage of the tree from destruction by insects, diseases, or even spray materials. One-half the leaves were removed from a number of limbs. On these branches, the buds were very late in starting growth the next season and some of the smaller limbs entirely failed to fully develop their foliage.

The direct relation of the leaf surface to the consequent functioning of the spur was further shown by a study of the spurs growing from one-year-old wood. It was found that the largest spurs developed from the buds which had been in the axis of the petioles of the largest leaves the year previous; that is, there was a direct relation between the size of the leaf on the new terminal growth of the tree and the length and vigor of the spur arising from the bud which grew in the axis of its petiole. This initial vigor of

the spur was found to be, to a great extent, the determining factor in its functioning during the following seasons.

In addition to the case already cited, other instances were noted of the influence of the previous season's vigor upon the spur functioning. The diameter of the spur growth was apparently the prime factor in influencing its development during the season following. Therefore the spurs which were larger during their first season of growth will function more vigorously through a much longer period than the smaller spurs. It was also found that the blossom buds were plumper and larger at the time of breaking and produced larger blossom clusters in cases where the spurs made a greater growth the preceeding year. These larger spurs also gave superior performances throughout the season, especially with regard to the setting and maturing of the fruit.

The early season development of the blossom spurs also is very closely related to the vigor of the spur in the preceding year. The number of leaves on a cluster base and the number of blossoms per cluster are definitely determined in the summer before they appear in the spring. The current season's conditions, however, enter in to prevent the development being in entire accord with the vigor of the spurs in the year preceding.

The direct relation between the growth of the spur one year and its subsequent functioning was a matter of great interest, but a determination of even greater significance was the fact that the response to a certain growth condition is not constant. This was established by a study of the fruit spur functioning, on Fameuse and Northwestern. It was found that in cases where the growth of the previous season was very short, for example, as three to five mm., a leaf bud was formed on the spur. If this growth was longer, five to eight mm., a blossom bud was formed, but the growth from this bud did not have sufficient vigor to set fruit. In cases where the previous growth was eight to twelve mm. long, a blossom bud was formed which produced a spur that was vigorous enough to set fruit. When the growth was much longer, twenty-five to fifty mm., a leaf bud was formed on the end of the spur. While similar ratios regularly prevail between growth and blossom bud formation, they are not constant but vary between varieties, trees, parts of trees, or from season to season. For example, the growth of the spurs in the year preceding fruiting was found to average as follows: 1912, seventeen mm.; 1913, nineteen mm.; 1914, fifteen mm.; 1915, thirteen mm.; and 1916, eighteen mm.

It might be argued, then, that the consistent biennial fruiting of the trees during varying seasonal and growth conditions was evidence of this phenomena being a definite plant habit. Experiments in fruit thinning, as reported later, show that the off year

cannot be accounted for in this way. It is suggested, as stated by Kraus,* that the blossoming of the tree is dependent upon the proportion of the elaborated products to the unassimilated substances in the plant. Blossom bud formation would be dependent, then, upon a so-called balance between the plant foods originating in the leaves and the materials gathered by the roots. The amount of growth is known to be especially related to the amount of water and mineral substances the plant gathers from the soil. If the growth is excessive, all the elaborated foods are utilized by combining with the root substances to form new tissues. On the other hand, if there is an under supply of moisture and soil elements, very little growth is made, normal functioning is prevented and consequent extreme storage of foods occurs. Between these extremes there is a condition of balance which is associated with fruiting. At least this theory, which has been demonstrated for other plants, explains the observed condition of the same fruiting response occuring from a relatively wide range of growth conditions.

The effect of the season's early growth upon the reserve food of the plant would evidently play an important part in blossom bud formation. Studies in spur elongation and leaf enlargement conducted this year, 1917, which was a fairly normal season except for lateness, showed that the period of growth on healthy, mature Wealthy trees of average vigor was surprisingly short. Over eighty per cent of the spurs had made their total growth in length in five to six days after the buds were well broken. All growth in length except a few limb terminals and practically all leaf enlargement was completed by the time the fruit had set. Thus practically all the growth occurred during a period of about four weeks. During this period the leaves could have been of but minimum value in producing carbohydrates due to the relatively short time in which they were of much size. The principal supply of products utilized in developing the flowers, spurs and leaves therefore necessarily comes from the reserves in the plant.

Blossom bud differentiation on non-fruiting spurs was observed to have begun about three to four weeks later than the setting of the fruit. Thus what we may call the critical period for blossom bud formation comes at a time when the reserve in the plant has been largely utilized by this rapid early season growth of the tree. If the reserve is further decreased by excessive blossom production, this prevents the tree being in condition to form blossom buds the same season in readiness for successive bearing. When there were less than thirty to thirty-five per cent of vegetative buds on the trees last year, little blossom bud formation occurred. When there

*Kraus, E. J. Vegetation and Reproduction with Special Reference to the Tomato. Doctors Thesis, University of Chicago, 1917.

were seventy to eighty per cent of vegetative spurs, the remaining twenty to thirty per cent which were fruiting were observed to often form flower buds the same year.

It is generally considered that excessive bearing is the cause of the "off year." This is not necessarily true as the failure to fruit in successive years may be due to the mere production of an excess number of blossoms. That the excessive production of blossoms without regard to their ultimate maturity into fruits was the factor which directly prevented the formation of blossom buds, seems to be clearly indicated by some experiments in fruit thinning. Thinning the fruit has often been suggested as a corrective measure for biennial bearing. In practically all cases it has been reported as having failed. A series of experiments in fruit thinning or more properly, fruit removal, has shown why thinning as commonly practiced in commercial orchards, has failed to produce successive bearing. In commercial thinning it is the practice to limit the number of fruits on a spur and to thin to certain distances on the limbs. The tests conducted were made more clear cut by removing all the blossoms from certain percentages of spurs or from entire limbs. Removals were made at definite times throughout the season. Because of its extreme "off year" habit, a local variety, Dartt (Dartt's Seedling) was used for a majority of the tests. The season following the one in which there was a heavy production of blossoms, the only limbs producing blossoms were those from which the blossoms had been removed the previous season. Of even greater significance was the fact that no blossom buds were formed as a result of the removals, where the operation was performed at a period later than the setting of the fruit. This apparently explains the failure of commercial thinning which is done much later in the season, and also indicates the impracticability of using thinning in an attempt to secure successive blossoming of large numbers of individual spurs.

The question of the formation of blossom buds in successive years, whenever this occurs, was found to be largely a matter of the size of the vegetative shoot developed. While it is true that with other conditions equal, the more vigorous cluster bases will develop the larger vegetative shoots, other factors which enter into their growth may produce opposite results. The shoot which arises from the cluster base after growth is resumed in the spring is of course dependent for its development upon current seasonal conditions. Thus it often happens that on trees having high percentages of blossom buds, the bases are large and have a large number of leaves, but owing to the influence of excessive blossom production, the shoots arising from the bases are relatively small; likewise the opposite condition is constantly found in which a low

percentage of blossom spurs which have small bases, develop relatively large shoots. Thus the trees which may have small fruiting spurs but few in number, will have more of a tendency to blossom again the next year than the trees with large but excessive numbers of blossom spurs.

The setting of the fruits was also found to be largely influenced by the percentage of blossom buds to vegetative buds present. The setting of the fruit was found to be inversely proportionate to the percent of blossom buds on the tree. Thus a larger quantity of better quality fruit was produced when there were fifty per cent of blossom buds than when there were eighty to one hundred per cent. As much fruit was borne on wood having but twenty to twenty-five per cent of blossom buds as where there were seventy-five to one hundred per cent, owing to a higher per cent of fruits set and more fruits per spur. The trees having forty to sixty per cent of blossom spurs will normally fruit again the next year. As these trees were actually bearing more fruit than trees with higher percents of blossom spurs, we have the condition of annual bearing trees producing the most fruit in the "on year" as well as fruiting again in the off year. Evidently then, the solution for the off year is not concerned with excessive fruit production, but it would seem rather to be found in the prevention of the formation of an excessive number of blossom buds.

While no definite solution of the off year question is attempted, two statements bearing upon this matter can be made as a result of the investigations.

First: Biennial blossoming and fruiting is not due to a constitutional habit of the tree. If it were due to a definite plant habit, successive blossoming could not have been induced by blossom removal. Investigations with other plants show that blossom bud production is associated with the amount of plant foods present. Qualitative tests indicate the same condition in the apple. The off year then evidently results from a condition of nutrition within the plant and not from a growth habit.

Second: Annual bearing by successive blossoming of individual spurs cannot be expected. When the spur produces blossoms and develops them to the point of setting fruit, it seldom blossoms again the next year. The development of blossoms to the stage at which the fruit can be said to have set together with the presence of excessive numbers of blossom spurs seems to be the determining factors in the ability of the spur to blossom in successive seasons. If annual bearing can be produced, it must apparently be brought about by having a double system of spurs on the tree which fruit in alternate seasons. How this may be accomplished fully cannot be stated further than to refer to the condition as pointed

out before, that excess growth as well as very weak growth was associated with the failure to form blossom buds. The normal blossom spurs are usually one-eighth to one-half inch in length. If their growth is increased to one to two inches they usually fail to produce blossom buds. Such a change which must come from an influence on individual spurs would require prunning of a rather detailed nature. The influence of cultivation and soil fertility in increasing the general growth of the tree would also have a large part to play in causing an increased growth that is associated with the failure to produce an excessive number of blossoms. These factors have been shown by practice and experiment to have a marked corrective influence on biennial bearing.

Blossom bud formation is due to a condition within the plant. This condition is subject to modification by a number of external factors. In working to obtain annual bearing it may be necessary to modify the orchard cultivation, the amounts of fertilizer applied, the available moisture content of the soil, the pruning, or various combinations of these factors. After observing the growth conditions of the fruiting wood of the tree, the orchardist can formulate a schedule of treatment fitted to his individual needs. Care should be exercised to avoid too extreme measures as relatively slight changes often greatly affect the functioning of the tree. A very severe treatment might have a very injurious effect upon the trees. On the other hand the severity of the corrective measures could be gradually increased if satisfactory results are not obtained.

While the present investigations are far from completed, the observations and experimental results obtained thus far suggest that we can confidently expect to be able by using judicious modifications of the cutural operations, as suggested by the functioning of the tree, to largely eliminate the biennial fruiting of the apple, which is at present such a serious economic problem of apple producers.

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*Our orchards of today with their better care and more feed will be longer lived and more productive than their predecessors.*—U. T. Cox.

*Self-sterility and self-fertility are not altogether varietal factors. The food conditions of the soil are quite important: for example, Lewis a year ago obtained from five to ten times the product off trees supplied with a "quick fertilizer" like nitrate of soda. Thus nitrogen applied at the right time may be an important aid in pollination.*—J. P. Stewart.

## FERTILIZATION OF APPLE ORCHARDS.

DR. JOHN P. STEWART, *Pennsylvania.*

Experiments on this subject were started by the Pennsylvania Experiment Station in the principal fruit-growing sections of the state in 1907 and 1908, and they have been in continuous operation since. The plots and treatments involved in these experiments are as follows:

*Plot. Treatment.*

1. Check (unfertilized).
2. Nitrogen and phosphorus.
3. Nitrogen and potash.
4. Check.
5. Phosphorus and potash (muriate).
6. Phosphorus and potash (sulfate).
7. Check.
8. Nitrogen, phosphorus and potash.
9. Nitrogen.
10. Check.
11. Acid phosphate alone, 1907-12. Basic slag, nitrogen and potash since 1912.
12. "Floats" alone, 1907-12. Floats, nitrogen and potash since 1912.
13. Check.
14. Stable manure.
15. Lime alone, 1907-12. Lime plus a complete fertilizer since 1912.
16. Check.

This plan has been followed in four experiments, while in four others these treatments have been reduced to a ten-plat experiment, by the omission of treatments five, six, eleven, twelve, thirteen and sixteen. The rates of application have been fifty pounds of actual nitrogen, carried in a combination of about equal parts of nitrate of soda and dried blood, one hundred pounds of actual $P_2O_5$, carried in acid phosphate, and one hundred and fifty pounds of $K_2O$, carried in muriate of potash. These are the annual rates per acre. The stable manure has been used at the rate of twelve tons per acre annually, and the lime at the rate of 1000 pounds per acre. These rates have been maintained since 1907, except the potash, which was cut to seventy-five pounds of $K_2O$ to the acre in 1915 and 1916, and to thirty-seven and one-half pounds in 1917.

TABLE I.—INFLUENCE OF FERTILIZATION ON YIELD AND GROWTH—*Johnston Orchard.* (Average annual yields of fruit per acre, and per cent. of gain in growth, 1908-16.)

| Plot. | Treatment. | 1909-12. Bu. | 1913-17. Bu. | 1909-17. Bu. | Gain Over Normal Yield. Bu. | Gain Over Normal Growth. Per Ct. |
|---|---|---|---|---|---|---|
| 1. | Check (unfertilized). | 136.7 | 252.4 | 201.0 | ..... | .... |
| 2. | Nitrogen and phosphorus ..... | 542.1 | 445.8 | 488.6 | 265.8 | 38.4 |
| 3. | Nitrogen and potash. | 467.7 | 437.5 | 450.9 | 206.3 | 69.1 |
| 4. | Check ..... | 213.0 | 309.4 | 266.5 | ..... | .... |
| 5. | Phosphorus and potash ..... | 277.6 | 303.2 | 291.8 | 34.1 | 0.2 |
| 6. | Nitrogen, phosphorus and potash..... | 513.8 | 452.7 | 479.9 | 230.9 | 27.9 |
| 7. | Check ..... | 186.7 | 283.2 | 240.3 | ..... | .... |
| 8. | Manure ..... | 637.5 | 424.1 | 519.0 | 280.3 | 88.8 |
| 9. | Lime (and NPK, 1912—) ..... | 165.9 | 441.8 | 319.2 | 102.0 | 35.8 |
| 10. | Check ..... | 160.5 | 241.8 | 205.7 | ..... | .... |
| 11. | Tillage and covercrop (fertilized 1912—).. | 417.6 | 452.2 | 436.8 | 124.7* | 33.7* |
| 12. | Mulch (fertilized 1912—) ..... | 365.8 | 482.6 | 430.6 | 118.7* | 9.3* |
| 13. | Sod (fertilized 1912—) | 205.1 | 397.4 | 311.9 | ..... | .... |

*Gain over Sod. The check plots have averaged 228.4 bushels per acre.

## RESULTS IN THE JOHNSTON ORCHARD.

The effects of the various treatments are best appreciated by noting the results obtained in a few of the more striking cases. For the first of these cases we may take experiment three hundred and thirty-eight, located in the Johnston orchard in western Pennsylvania, about eight miles north of New Castle. The soil in this case is Volusia silt loam, which is one of the most extensive series in Pennsylvania and adjacent states. The trees are Baldwins, planted in the spring of 1889. The experiment is in two sections, the first being a ten-plot fertilizer experiment, and the other being a three-plot experiment on cultural methods.

In the fertilizer section of this experiment no tillage nor outside mulching has been applied since the experiment started. The soil is covered with a light, herbaceous growth consisting chiefly of grass. The fertilization has simply been spread broadcast under the trees and left to be carried down by the rains. The results obtained from the three cultural treatments in the adjacent section, are also included for comparison. The results to date on yield and growth are given in Table I.

Confining our attention to the fertilizer section, plots one to ten, we may note that plot five, receiving phosphorus and potash only, has shown no important gain over the adjacent checks in either yield or growth. Its average increase in yield has been about thirty-four bushels per acre, annually, but its growth has actually been slightly less than normal over the entire period. There are also no evident differences in the field, either in the appearance of the foliage or in the amount of annual twig growth, between the trees of plot five and those in the adjacent checks. The small increase in yield, therefore may be at least partly due to normal variation in the soil of this plot. At any rate it is obvious that there has been no important profit from this particular combination even at normal prices for the phosphorus and potash used. This treatment moreover is the one which has been generally recommended for increasing yields in orchards, and is still widely used whenever available.

## Lime.

The lime application in plot nine also has failed to show any direct benefit to yield. This is apparent both in the first four-year period, in which lime was applied alone, and in the second period in which it has been used in connection with a complete fertilizer. In the latter period, the yield in plot six, which receives no lime, has been a trifle higher than that in plot nine, which differs only in the addition of lime. The gain in growth shown for the entire period has been chiefly effected by the fertilizer addition during the last four years. In this orchard, therefore, lime applications have shown little or no direct value. Lime may often have an important indirect value, however, through its ability to increase the growth of clover or other leguminous covers between the trees, and these covers when properly handled may exert considerable influence on the yields of fruit.

The addition of potash here has also largely failed to show any important effect, except apparently in the matter of growth. In yields, the combination of nitrogen and phosphorus alone in plot two has actually given a larger increase than plot six which differs only in the addition of potash. The reason for this is not yet apparent.

NITROGEN IMPORTANT.

*Nitrogen the Important Element.*—On the other hand, there is one fertilizing material which has exerted a very great influence on both yield and growth in the present experiment. That material is evidently nitrogen. Wherever this element has been applied, either in manure or in commercial forms, it has greatly increased the yields. The difference in nitrogen supply, moreover, is the only important difference, either in trees or treatment, that exists between these plots. There can be no doubt, therefore, but that the striking differences shown in both yield and growth are the direct result of the nitrogen additions.

The cost of the commercial nitrogen used here is about nine dollars to ten dollars per acre at normal prices or about twice that at present prices. The manure costs twenty-five dollars to thirty dollars. Both forms of nitrogen are probably being used in considerable excess of the real requirements, although they are still showing profits equal to many times their cost, even at present rates and prices.

PHOSPHOROUS.

The phosphorus application is probably of some importance here also, as indicated by the relatively large gains where it is applied in addition to the nitrogen, but this cannot be determined definitely as in the next experiment. Its rate of application is also relatively high—in fact about double the amount which we now recommend—and its cost at the present rates and prices is about six dollars or seven dollars an acre.

The cultural treatments in plots eleven to thirteen are of interest here in showing that none of them alone is equivalent to proper fertilization in an orchard of this kind, where fertility is evidently needed. They also show that the tillage and leguminous cover-crop treatment, unaided by fertilization, is likely to be better than either the mulch or sod treatments alone, in a mature orchard, but that, in the presence of proper fertilization, either of the latter treatments may be nearly or fully as efficient as the tillage treatment at least in respect to yield. In stimulating growth, however, the tillage treatment has shown its usual high efficiency here, and wherever such stimulation is especially needed, this treatment should be used at least occasionally.

RESULTS FROM THE BROWN ORCHARD. (Experiment 220.)

This experiment is located in Bedford County within about eighteen miles of the Maryland line. The soil is DeKalb stony loam, and hence represents the most extensive soil series in Penn-

sylvania. It had been farmed heavily for many years before the orchard was planted, and was in a low state of fertility when the experiment started. Two varieties were involved in this case, York Imperial and Baldwin. They were planted in 1888 and 1898, respectively. The Baldwin section was dropped in the fall of 1916, principally because of important damage by the San Jose scale in some of the plots.

The same fertilizer treatments are involved as in the Johnston orchard, and in addition some comparisons are made of different carriers of phosphorus and potash. The present experiment also has a plot receiving nitrogen alone. Owing to the rough stony nature of the soil, no tillage has been given during the progress of the experiment, which was started in 1907.

TABLE II.—INFLUENCE OF FERTILIZATION ON YIELD AND GROWTH—*Brown Orchard.* (Average annual yields of fruit per acre, 1908-17, and per cent. gain in growth, 1907-16.)

| Plot. | Treatment. | 1908-12. Bu. | 1913-17. Bu. | 1908-17. Bu. | Gain Over Normal Yield. Bu. | Gain Over Normal Growth. Per Ct. |
|---|---|---|---|---|---|---|
| 1. | Check | 233.7 | 240.0 | 236.8 | ..... | .... |
| 2. | Nitrogen and phosphorus | 553.0 | 419.2 | 486.1 | 308.9 | 37.5 |
| 3. | Nitrogen and potash. | 383.0 | 253.4 | 318.2 | 200.5 | 40.5 |
| 4. | Check | 76.8 | 39.5 | 58.1 | ..... | .... |
| 5. | Phosphorus and muriate | 162.0 | 64.2 | 113.1 | 37.5 | 4.6 |
| 6. | Phosphorus and sulphate | 98.2 | 84.4 | 91.3 | 1.8 | 9.3 |
| 7. | Check | 116.4 | 105.0 | 110.7 | ..... | .... |
| 8. | Nitrogen, phosphorus and potash | 336.9 | 247.5 | 292.2 | 187.9 | 45.6 |
| 9. | Nitrogen | 199.0 | 173.3 | 186.2 | 88.2 | 54.6 |
| 10. | Check | 94.1 | 89.1 | 91.6 | ..... | .... |
| 11. | Acid phosphate (slag and NK, 1912—) | 72.4 | 218.4 | 145.4 | 39.8 | 13.7 |
| 12. | Floats (and NK, 1912—) | 44.7 | 277.0 | 160.9 | 41.4 | 10.1 |
| 13. | Check | 105.4 | 161.6 | 133.5 | ..... | .... |
| 14. | Manure | 323.1 | 488.0 | 405.1 | 302.9 | 48.9 |
| 15. | Lime (and fertilizer, 1912—) | 73.7 | 355.8 | 214.8 | 133.8 | 39.7 |
| 16. | Check* | 48.8 | 30.5 | 39.7 | ..... | .... |

*Check plats have averaged 116.7 bushels per acre.

In general the results here are very similar to those in Table I, nitrogen again being clearly the most important element, and little or no benefits being shown by potash, except when used in connection with nitrogen.

The exceptionally high yields in plot two are due in part to the fact that these trees are being benefited by leachings from the forest floor on the mountainside above, from which the experiment is separated by a single row of trees. This leaching influence is especially evident on the first check plot, but it has wholly disappeared before the fourth plot is reached, so far as the yields and growth are concerned. Its influence in plots two and three has been partly eliminated in the table by the use of the normal yields as the basis for calculating the gains, but it seems probable that a further decrease of about twenty-five per cent in the yield of plot two and of approximately ten per cent in plot three would be necessary in order to bring these plots down fully to the level of the others in the experiment. Such a reduction would leave annual gains of two hundred and thirty-two bushels per acre in plot two and about one hundred and eighty bushels in plot three, which would still compare very favorably with those from the other treatments.

### Effects of Nitrogen and Phosphorous.

One of the chief contributions of this experiment, however, is the light it throws on the effects of nitrogen and phosphorus when applied alone as compared with their effect when applied together. In plots eleven and twelve, for example, acid phosphate and "floats,"—the finely pulverized unacidulated phosphate rock,—were applied alone for six years, without any visible benefits, as shown by their average yields in the first column. At the same time nitrogen alone in plot nine has increased the yields for the entire period by about eighty-eight bushels per acre annually. When these two materials are combined as in plot two, however, the combination has given an average increase of at least two hundred and thirty-two bushels per acre annually after making the deduction indicated in the preceding paragraph. This would indicate that even where nitrogen is of chief importance, it is likely to need some assistance from other materials before its full influence can be exerted.

In regard to the permanence of the benefit of the nitrogen and phosphorus application, good evidence is available in the results shown in plot two of the present experiment. Beginning with 1907, in which year the first application was made on July eighth, the yields in bushels per acre have been as follows: 75.4, 569.6, 80.6, 312.0, 304.3, 998.6, 160.4, 720.0, 198.5, 932.6, and 84.5. The average gain over the normal yield of the plot, obtained from

this combination during the last ten years of the eleven-year period has been practically three hundred and nine bushels per acre annually, while the average unfertilized yield for the entire experiment has been only one hundred and seventeen bushels during the same period. These results do not show evidence of any lack of permanence in beneficial effect, and it is highly probable that very similar effects can be secured in many other orchards, wherever the fertility need is beginning to be felt.

Lime has again shown no direct benefits when applied alone, but its effect in conjunction with a complete fertilizer has been quite marked during the last five-year period. This is chiefly due to the large difference in crops on plots eight and fifteen in the one season of 1917, so that its special significance remains to be proved.

TABLE III.—INFLUENCE OF FERTILIZATION ON YIELD AND GROWTH—Strode Orchard (Average Annual Yields of Fruit per Acre, 1908-17, and Gain in Growth, 1908-16).

| Plot. | Treatment. | 1908-12. Bu. | 1913-17. Bu. | 1909-17. Bu. | Gain Over Normal Yield. Bu. | Gain Over Normal Growth. Per Ct. |
|---|---|---|---|---|---|---|
| 1. | Check | 105.1 | 350.2 | 241.3 | .....* | ..... |
| 2. | Nitrogen and phosphorus | 145.7 | 391.2 | 282.2 | 45.9 | 15.9 |
| 3. | Nitrogen and potash. | 135.3 | 383.3 | 273.1 | 41.8 | 6.4 |
| 4. | Check | 139.7 | 295.5 | 226.3 | ..... | ..... |
| 5. | Phosphorus and potash | 147.7 | 287.1 | 225.1 | 15.4 | 1.7 |
| 6. | Nitrogen, phosphorus and potash | 151.8 | 309.9 | 239.6 | 46.4 | 19.8 |
| 7. | Check | 121.2 | 221.1 | 176.7 | ..... | ..... |
| 8. | Manure | 215.1 | 350.2 | 290.2 | 91.9 | 16.8 |
| 9. | Lime (and NPK, 1912) | 141.1 | 324.9 | 243.2 | 23.3 | 8.7 |
| 10. | Check | 109.9 | 346.8 | 241.5 | ..... | ..... |
| | | | | 1913-16 | 1909-16 | |
| 11. | Tillage and covercrop | 51.5 | 198.3 | 124.9 | 60.1 | 42.5 |
| 12. | Sod-Mulch | 60.1 | 237.6 | 148.9 | 84.1 | 23.0 |
| 13. | Sod | 26.4 | 103.2 | 64.8 | ..... | ..... |

*The check plots have averaged 221.5 bu. per acre.

## Results in Younger Orchards.

Tables III and IV show the results obtained in two younger orchards, on soil that is heavier and apparently more fertile. The first of these is from the Strode orchard near Westchester, about eight or ten miles from the Delaware line, and the other is from the Tyson orchard, located about nine miles north of Gettysburg. The trees in the Strode experiment were planted in 1901 in plots one to ten, and 1903 in plots eleven to thirteen. The varieties there are Grimes, Smokehouse, and Stayman Winesap. The Tyson trees were planted in 1900, and the varieties are York Imperial and Stayman Winesap. The usual orchard tillage has been followed annually in both of these experiments. The treatments are the same as before.

TABLE IV.—INFLUENCE OF FERTILIZATION ON YIELD AND GROWTH—Tyson Orchard (Average Annual Yields in bu. per Acre, 1908-17, and per cent Gain over Normal Growth, 1907-16).

| Plot. | Treatment. | 1908-12. Bu. | 1913-17. Bu. | 1908-17. Bu. | Gain Over Normal Yield. Bu. | Gain Over Normal Growth. Per Ct. |
|---|---|---|---|---|---|---|
| 1. | Check | 58.7 | 390.1 | 224.4 | .....* | ..... |
| 2. | Nitrogen and phosphorus | 60.3 | 497.8 | 279.1 | 55.1 | 0.8 |
| 3. | Nitrogen and potash. | 79.9 | 621.0 | 350.4 | 126.8 | 14.4 |
| 4. | Check | 50.1 | 396.4 | 223.2 | ..... | ..... |
| 5. | Phosphorus and muriate | 76.2 | 508.7 | 292.4 | 74.0 | –1.3 |
| 6. | Phosphorus and sulphate | 77.8 | 509.0 | 293.4 | 79.8 | 0.4 |
| 7. | Check | 56.4 | 361.3 | 208.8 | ..... | ..... |
| 8. | Nitrogen, phosphorus and potash | 66.6 | 530.5 | 298.5 | 89.9 | 11.6 |
| 9. | Nitrogen | 50.4 | 423.3 | 236.8 | 28.3 | 5.3 |
| 10. | Check | 44.9 | 371.7 | 208.3 | ..... | ..... |
| 11. | Acid phosphate (slag and NK, 1912-) | 42.5 | 519.0 | 280.7 | 51.0 | 12.3 |
| 12. | Floats (and NK, 1912-) | 59.2 | 492.0 | 275.6 | 24.5 | 0.3 |
| 13. | Check | 51.5 | 493.3 | 272.4 | ..... | ..... |
| 14. | Manure | 54.8 | 553.6 | 304.2 | 50.3 | 12.1 |
| 15. | Lime (and NPK, 1912-) | 61.0 | 490.5 | 275.7 | 40.2 | 3.5 |
| 16. | Check | 54.9 | 379.3 | 217.1 | ..... | ..... |

*Check plots have averaged 225.7 bu. per acre. Trees planted in 1900.

These results are notable in at least three respects, viz., the high yields of the checks for the age of the trees, the relatively small increases in yield secured from the fertilization in most cases, and the very large increases shown on all plots in the second five-year periods.

In Table III, the relative gains from the various treatments are about what should be expected and the nitrogenous fertilizers especially are showing some important increases in growth. In most cases, however, the actual size of the yield increase is hardly sufficient as yet to clearly justify the cost. In both experiments, the gains due to the mere increase in size and age of the trees have been much the most important, up to the present time. In the Tyson experiment, however, the value of fertilization is beginning to appear rather distinctly in the second five-year period, and its importance may be expected to increase so long as the present high yields are maintained. The growth benefits are also indicating the importance of more fertility, especially in the Strode orchard. In general these results may be considered typical of orchards of the general ages involved here, although we have some important exceptions.

### Interesting Results with Potash.

Table IV is also of interest in the fact that it shows one case in which potash has been of greater importance in improving yields than either of the other principal elements. The gains are not entirely consistent throughout, but in general potash is clearly in the lead in this experiment, with nitrogen and phosphorus following in the order named. By reducing the increases to percentages, and comparing the two-element plots, it appears that potash has increased the yields here by thirty-three per cent during the entire period, with nitrogen showing a twenty-four per cent increase and phosphorus only one per cent. In one other experiment,—in the Mynard orchard in Bradford Co.,—potash has shown even greater importance than in the present case, its gain there being sixty-nine per cent as against twenty-seven per cent for nitrogen and three per cent for phosphorus.

By similar calculations the complete fertilizer has shown a forty-three per cent increase in the Tyson experiment and manure only twenty per cent. In the Strode experiment, nitrogen has shown a fifteen per cent increase, phosphorus four per cent, potash three per cent, complete fertilizer twenty-four per cent and manure forty-six per cent, during the entire period.

The relative failure of manure, along with nitrogen and phosphorus in the absence of potash, is especially notable in the Tyson experiment. This is in sharp contrast with the high efficiency shown

by both manure and the nitrogen-phosphorus combination in the first two experiments. In the Strode orchard, the relatively high value of the manure is apparently largely due to its moisture- conserving capacity, which is further indicated by the similar gains shown by the treatment of mulch alone in plot twelve.

## Plan for Local Fertilizer Test.

The preceding results are sufficient to show the great importance of orchard fertilization in many cases. The marked differences in response that have been shown by individual orchards, however, evidently make it advisable to run some definite test on the fertility needs of any orchard before making any large financial outlays in this direction. A simple plan for such a test is given in Table V. A test of this kind naturally requires some time and effort, but there is no other method yet known of securing reliable information on the fertility needs of a particular orchard. Without the information which such a test will furnish, one simply remains in the dark in all his fertilizing operations.

Table V.—Plan for Local Orchard Fertilizer Test.

(Rates are indicated for a mature tree in bearing.)

1. Check (Unfertilized).
2. Nitrate of soda, 5 lbs.
3. Nitrate, 5 lbs.; Acid phosphate, 10 lbs.
4. Nitrate of soda, 5 lbs.; Potash, 2 lbs.
5. Check.
6. Acid phosphate, 10 lbs.; Potash, 2 lbs.
7. Nitrate, 5 lbs.; Acid phosphate, 10 lbs.; Potash, 2 lbs.
8. Manure, 400 lbs.
9. Check.

This test should be located in a typical section of the orchard and should include not less than six average trees of the same variety and age in each plot. It is also best to have the trees in double rows whenever possible, and the plots separated by a single row, which is left unfertilized. All the trees should be labeled and carefully measured at a fixed point on the trunk, and the applications and exact records of both yield and growth should be maintained for at least three years. Good indications of an orchard's needs may often be obtained in much less time, but this period should be allowed in the plans.

Where the number of trees permit, and especially where annual leguminous covercrops are being used, it may often be advisable to add another single-element plot, possibly between 1 and 2, to carry acid phosphate. A plot for potash or for a leguminous cover alone might also be inserted between five and six, if still fuller information is desired. The test as above shown, however, will give most of the information required on fertility needs in the majority of orchards, and will do this with a surprisingly small expenditure in time, money and effort.

### Time and Method of Application.

In making this test and also in the general fertilization of orchards, it appears that the time of application is important. This applies especially to the nitrogen. At present, the principal evidence indicates that the most efficient time to apply nitrate of soda is very soon after the buds start and before the blossoms open. In both Ohio and Oregon, applications at this time made decided increases in the crop of the same year. This was accomplished apparently by a material increase in the size and vigor of the blossoms and hence in the percentage of fruit set. The injury from frost was also reduced. The actual number of blossoms was naturally not affected by such applications, as the blossom rudiment are developed during the preceding season. The applications for one year, however, will often materially increase the number of blossoms in the following year. This has been shown regularly in the present series of experiments.

### Immediate Returns from Fertilizers.

For the most direct and immediate returns, therefore, it now appears that applications shortly after the buds start or at least somewhat ahead of the blossoms are preferable for the nitrogen, and hence are advisable for all commercial materials. This is because the other fertilizer elements are apparently not so exacting in their time requirements. It should be most convenient, therefore, to apply them along with the nitrate, at the time considered best for it. Manure can be applied at almost any time, excepting possibly in late summer or early fall, without danger of loss or of ill-effects.

One of the functions of proper fertilization, however, is to develop and maintain steadier yields, as well as those that are larger. To do this most efficiently and economically, our present evidence indicates that it is advisable to apply some of the nitrogen after the fruit has set. This enables one to vary the rate of appli-

PLATE V. VIEW BETWEEN PLOTS 1 AND 2 IN JOHNSTON ORCHARD.

Nitrogen and phosphorus were used in plot on the right, and no fertilization on the plot on the left. The average annual gain from the fertilized trees has been 265 lbs. per acre during the last nine years.

PLATE VI. A VINIFERA VINEYARD IN NEW YORK STATE.

cation somewhat in accord with the size of the crop set on the trees. In general, therefore, the best results are likely to be secured by dividing the nitrogen application, or the entire application if preferred, and applying part of it ahead of the bloom as above stated, and the remainder after the fruit has set. About a month after fruit-setting is probably as good a time as any, although we have had some excellent results from the applications made as late as July eight.

As to method of application, our practice has been merely to scatter the fertilizer or manure broadcast under the trees, taking care not to get it too close to the trunks, where there are few absorbent roots, and extending the application well out beyond the spread of the branches. To conform more closely with the usual distribution of feeding roots, the application has usually been made heaviest over the area covered by the outer two-thirds of the branches. This fertilization may be left on the surface to be carried down by the rains or it may be harrowed or lightly plowed into the soil. The latter is apparently preferable in some cases, especially where the mineral elements, phosphorus and potash, are chiefly involved.

### An Orchard Fertilizer for Immediate Use.

Where some fertilization is apparently needed at once, before the results of the above test are available, I would suggest that the application named in plot three of the local test be used. The total amounts per tree may naturally be varied with the size and condition of the trees, and the amount of nitrogen might be reduced somewhat when good leguminous covers are grown.

The manure application mentioned in No. eight is excellent, when available, though it is considerably slower in action. Manure is also the best application on young trees, as a rule. Nitrate of soda alone, at the rate of five pounds per tree, applied as stated above, is undoubtedly the simplest and quickest fertilizer available, for apple orchards, and in some cases it may be all that is needed. From the data above, however, the combination of nitrogen and phosphorus is more likely to give large and permanent effects, and hence both materials should be used until the results from a properly conducted local test show something else to be preferable.

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*Potash as a fertilizer has not paid its way in Ohio orchards as yet.*—U. T. Cox.

## EUROPEAN GRAPES IN EASTERN AMERICA.

DR. U. P. HEDRICK, *New York.*

I need only remind this audience of the many early efforts to grow European grapes in Eastern America, all of which failed. The various attempts, some involving individuals, others corporations and in early days even colonies, form some of the most instructive and dramatic episodes in the history of American agriculture. All endeavors, it will be remembered, were failures, so dismally and pathetically complete that we are wont to think of the two hundred years from the first settlements in America to the introduction of the Isabella, a native grape, as time wasted in futile culture of a foreign fruit. The early efforts were far from wasted, however, for out of the tribulations of two centuries of grape-growing came the domestication of our native grapes, one of the most remarkable achievements of western agriculture.

The advent of Isabella and Catawba wholly turned the thoughts of vineyardists from Old World to New World grapes. So completely, indeed, were viticulturists won by the thousand and more native grapes, that came in like the traditional thousand of brick, that for the century which followed no one planted Old World grapes east of the Rockies, while vineyards of native species may be found North and South from the Atlantic to the Pacific.

Meanwhile, much new knowledge has come to agriculture, old fallacies have had many hard knocks and chains of tradition in which the culture of plants were bound, have been broken. In no field of agriculture have workers received greater aid from science than in viticulture. Particularly, this is true of the diseases of the vine. The reports of the old experimenters were much the same, "a sickness takes hold of the vines and they die." What the sickness was and whether there were preventives or remedies, no one knew a hundred years ago. But we have learned much about the ills of "grape flesh" and know preventives or remedies for most of them. We know, too, that the early vine-growers failed, in part at least, because they followed empirical European practices. Is it not possible that with the new knowledge we can now grow European grapes in Eastern America? The Geneva Experiment Station is putting this question to test, with what result I am now to tell.

In the Spring of 1911 the Station obtained cuttings of one hundred and one varieties of European grapes from the United States Department of Agriculture and the University of California. The object was to obtain European varieties to hybridize with American grapes. I hasten to say that at first there was no thought to

experiment with these grapes as a cultivated crop. The cuttings obtained were grafted on the roots of a heterogenous collection of seedlings, five years set, representing a half dozen species of *Vitis*. These stocks had little to recommend them except that all were vigorous, well established and all were more immune to phylloxera than the Old World varieties. From four to six grafts of each of the hundred varieties were made and a stand of three hundred and eighty vines resulted, the percentage of loss being exceedingly small. The success in grafting was due, we believe, to the method used, the value of which had been proved in previous work on the station grounds. The method follows:

In grafting, the earth was removed from the plants to a depth of two or three inches. The vines were sawed squarely off below the surface of the ground. The stock was then split for a cleft graft. Two scions were inserted in each cleft and tied in place with waxed string. Wax was not used as it does not stick in grafting grapes because of the bleeding of the stock. After setting the scion the earth was replaced and enough more of it used to cover stock and scion to prevent evaporation. This method of grafting is available to those who have old vineyards. It is so simple that the veriest tyro can thus graft grapes. Were young plants or cuttings used as stocks some method of bench-grafting would, of course, be resorted to.

The cultivation and spraying have been precisely that given native grapes. There has been no codling of vines. The fungous diseases which helped to destroy the vineyards and vexed the souls of the old experimenters have been kept well in check by two sprayings with bordeaux mixture; the first applications have been made just after the fruit set, the second when the grapes have been two-thirds grown. Some years a third spraying with a tobacco concoction has been used to keep thrips in check. Phylloxera is present in the vineyard but no one of the varieties seems to suffer from this pest. The stocks used in the present work are not those best suited either to the vines grafted on them or to resist the phylloxera. Unquestionably some of the standard sorts used in France and California from *Vitis rupestris* or *Vitis riparia*, or hybrids of these species, would give better results. From theoretical consideration, it would seem that the *Vitis riparia* stocks should be best suited to the needs of Eastern America.

It was thought by the old experimenters that *Vitis vinifera* failed in the New World because of unfavorable climatic conditions. It was said that the winters were too cold and the summers too hot and dry for this species. During the years the Station vineyard of Viniferas has been in existence we have had stresses of all the kinds of weather to which the variable climate of New York is

subject. Two winters have been exceedingly cold, killing peach and pear trees; one summer gave us the hottest day in twenty-five years; the vines have withstood two severe summer drouths and three cold, wet summers. These test seasons have proved that European grapes will endure our climate as well as the native varieties except in the matter of cold,—they must have winter protection.

To growers of American grapes the extra work of winter protection seems to be an insuperable obstacle. The experience of several seasons at Geneva has demonstrated that winter protection is a cheap and simple matter. Two methods have been used; vines have been covered with earth and others have been wrapped with straw. The earth covering is cheaper and more efficient. The vines are pruned and placed full length on the ground and covered with a few inches of earth. The cost of winter protection will run from two to three cents per vine. Since European vines are much more productive than those of American origin, the added cost of winter protection is more than offset by the greater yield of fruit. Trellising, too, is simpler and less expensive for the European species, helping further to offset the cost of winter protection.

It is apparent at once that European grapes must have special treatment in pruning if they are to be annually laid on the ground. Several modifications of European and California practices can be used in the East to bring the plants into condition for winter laying-down. All methods of pruning must have this in common; new wood must be brought up from the base of the plant every year to permit bending the plant. This can be done by leaving a replacing spur at the base of the trunk. If two-eye scions are used when the plants are grafted and both buds grow, the shoot from the upper can be used to form the main trunk while that from the lower bud will supply the replacing spur. Each year all but one of the canes coming from this spur are removed and the remaining one cut back to one or two buds until the main trunk begins to be too stiff to bend down easily, then one cane from the spur is left for a new trunk and another cane is pruned for a new renewal spur.

The main trunk is carried up only to the lower wire of the trellis. At the winter pruning, two one-year canes are selected to be tied along this wire, one on each side, and two renewal spurs are left as close to the top of the main trunk as possible. A year later canes which will grow from these renewal spurs are selected for tying up and new renewal spurs left. For the best production different varieties require different lengths of fruit canes but the work at Geneva has not progressed far enough so that recommendations can be made for particular varieties. We have found it best to

prune weak vines heavily and vigorous ones lightly. Under normal conditions from four to eight buds are left on each cane, depending upon the vigor of the vine. Some of the older seedlings which were used for stocks in 1911 were so large that two scions were used and in many of these where the roots seemed to have sufficient vigor to support the larger top two trunks were formed, one from each graft. By spreading these into a V and making the inner arms shorter, very satisfactory results were secured.

The type of growth in Vinifera is different from that of our native kinds. The young shoots which spring from the one-year canes, instead of trailing to the ground or running out along the trellis wires, grow erect. Advantage is taken of this in the pruning system adopted at the Station. The canes and renewal spurs as described above are tied along the lower wire, then the young shoots which come from these grow upward to the second wire. When they are four to six inches above this they are pinched off just above the wire and any which have not already fastened themselves are tied to prevent the wind breaking them off. At the same time if any of the axial buds on the shoots have begun to form secondary shoots, they are rubbed off, beginning with the node next above the upper cluster and going down to the old cane. This gives the clusters more room and better light. Soon after the first heading-back the upper buds of the young shoot start lateral growth. These secondary branches usually grow upright and when they are several inches high they are topped with a sickle. This heading-back results in stockier and more mature canes for the following year and if properly done adds to the fruitfulness of the vine and the fruit matures better.

The grower of European grapes grafted on American vines may be prepared to be surprised at the growth the vines make. At the end of the first season the grafts attain the magnitude of full-sized vines; the second season they begin to fruit more or less abundantly, and the third year they produce approximately the same number of bunches as a Concord or Niagara vine, and as the bunches of most varieties are larger than those of the American species, therefore, the yield is greater. The European varieties, too, may be set more closely than the American sorts since they are seldom such rampant growers.

It is quite too soon to reason from this short experiment that we are to grow varieties of *Vitis vinifera* commonly in New York, but the behavior of the vines on the Station grounds seems to indicate plainly that we may do so. At Geneva the European vines are as vigorous and thrifty as American vines and quite as easily managed. Why may we not grow these grapes if we protect them from phylloxera, fungi and cold? In Europe there are varieties of grapes

for nearly every soil and condition in the southern half of the continent. In Eastern Europe and Western Asia the vines must be protected just as we shall have to protect them here. It seems almost certain that from the many sorts selected to meet the various conditions of Europe we shall be able to find varieties to meet the diverse soils and climates of this continent. And here, by the way, we have one of the chief reasons for wishing to grow these grapes—that American grape-growing may not be so localized as it now is. Probably we shall find that European grapes can be grown under a greater diversity of conditions than native varieties.

The culture of *Vitis vinifera* in the East gives us essentially a new fruit. If any considerable degree of success attends their culture, the wine-making in Eastern America will be revolutionized for the European grapes are far superior to the native sorts for this purpose. Varieties of *Vitis vinifera* have a higher sugar and solid content than do those of the American species and for this reason as a rule keep longer and we may thus expect that through these grapes the season for this fruit will be extended. The European varieties are better flavored, possessing a more delicate and a richer vinous flavor, a more agreeable aroma, and are lacking in the acidity and the obnoxious foxy taste of many American varieties. Many consumers of fruit will like them better and the demand for grapes will thus be increased.

The advent of the European grape in the vineyards of Eastern America ought to greatly encourage the production of hybrids between *Vitis vinifera* and the American species of grapes. As all know, we have many such hybrids but curiously enough scarcely more than a half dozen varieties of European grapes have been used in crossing. Most of these have been greenhouse grapes and not those that could be expected to give best results for vineyard culture. As we come to know the varieties best adapted to American conditions we ought to be able to select European parents to better advantage than we have done in the past and thus produce better hybrids.

From the eighty-five varieties of *Vitis vinifera* now fruiting on the Station grounds we may name the following as worth trying on a larger scale: Actoni, a table grape; Golden Chasselas, for the table; Cinsaut for table or wine; Feher Tzagos, another table sort; Kuristi Mici, for the table; Lignan Blanc, a very early table grape and one of the best; Mantuo de Pilas, Muscat Hamburg, Pinot Gris* or Rulander, three of the best table grapes; Poulsard,† a wine and table grape; Palomino or Listan, a table and wine grape; Rozaki, a table grape; Sultanina Rosea, a seedless table sort; and Gamai Teinturier, Petit Syrah, Franken Riesling and Zinfandel, all wine sorts.

*Or Chauche Gris.
†Or Plusard.

I have briefly set forth the essentials of the work with *Vitis vinifera* in New York but I shall have missed an opportunity if this simple statement of facts ends here. Permit me to suggest several phases of the work in need of careful experimental attention.

First, it is imperative that we know more about the adaptation of European varieties to American conditions. More than a thousand varieties of grapes are grown in Europe but few of which have been tried in Eastern America. Those most promising for the different States should be carefully tried out.

Second, it is very certain that we shall have to grow European grapes on American stocks. We must determine experimentally what stocks are best for Eastern America; here the experience of European countries and California will be most helpful.

Third, a great obstacle in the way of growing European grapes in this region is the difficulty in getting a good stand of grafted plants. Possibly we shall have to modify the methods used elsewhere, and to determine which will be best for us we must do experimental work in grafting and propagating.

Fourth, European varieties will be affected differently by fungi and insects than are our native sorts and it is possible that we shall have to modify remedial treatments of pests for the foreign grapes.

Fifth, there is a tremendous field for plant breeders in hybridizing European and American grapes. The half dozen European sorts that have been used in hybridization are for the most part those that would be least expected to give good results, namely, greenhouse grapes. It is probable that the American grapes of the future will be European grapes with a dash of American blood in them. Plant breeders have a wonderful opportunity to breed grapes despite the fact that more work has been done with this fruit in the past hundred years than with any other.

In conclusion let me exhort those of you who have the opportunity to carry on experiments with European grapes. The work to be done is so vast that we cannot make an appreciable showing unless the task be divided among a number of workers. If viticulturists in the different States will but concentrate on particular problems in the culture of *Vitis vinifera,* sifting the experience and knowledge of the world in regard to them for use under our conditions, it is almost certain that we can successfully grow some European grapes in Eastern America. Here, it seems to me, is a splendid opportunity on your part and mine to serve viticulture.

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*Certain European varieties of grapes ought to flourish here (Boston) rather than some distance south. I should fear they would make too much growth southward. Migonne Black, and Muscat Hamburg are the two most promising ones for the home garden.*— U. P. HEDRICK.

## THE MUSCADINE GRAPES—THEIR CULTURE AND USES.

CHARLES DEARING, *Washington, D. C.*

The culture of Muscadine grapes, a distinct type of American viticulture, has received the attention of this society on only one other occasion. I take pleasure in supplementing this paper with a small exhibit of grape products which I hope will be of interest to you. Unfortunately this meeting is held too late in the season and at too great a distance from the Muscadine grape territory to make the exhibit as comprehensive as desirable.

### INTRODUCTION.

At a recent meeting of the fruit growers of western New York an appeal was made for improved horticulture, and in discussing means for bringing about better results the speaker emphasized the importance of selecting the species and varieties best adapted to each locality. I am glad to note that the American grape industry is building along these lines, for we have many species and varieties of grapes at our disposal and each thrives best under certain environmental conditions. While there are also sub-districts, it is true that at the present time there are only three leading viticultural districts characterized by distinct types of grape production. I refer to the European grape district on the Pacific Coast, the native bunch grape district in the central and northeastern United States, and the Muscadine grape district of the southeast.

The Muscadine grapes are recognized as the grapes for the southeast, not only because they are native there, but because of their proven ability to thrive under such environmental conditions as marked humidity, intense heat, and poorly drained and sandy soils. They are so different from other grapes in habit and character that the two species *V. rotundifolia* and *V. munsoniana* are set apart by botanists as a distinct group of the grape family called *Muscadinia,* while all the other species are grouped together and designated as Euvitis.

The Muscadine grapes were the first native American grapes to be brought under cultivation in this country, and it is true that the Scuppernong variety is our oldest named native, cultivated grape, though this distinction has been given generally to varieties originating farther north. The fact, however, that Scuppernong is still the leading variety, and that less than one dozen varieties of Muscadine grapes are propagated by commercial nurserymen indicates that the Muscadine has not advanced as an industry as rapidly as some other native grapes, notably the northeastern fox grape, *Vitis*

PLATE VII. — THE MUSCADINE GRAPE AND ITS CULTURE.

Plate VII, Figure 1. A typical muscadine grape arbor such as occurs near almost every farm home of the South.

Figure 2. Trunk of an old Scuppernog vine which still bears profitable crops, though over 125 years of age. There are many vines of this type in northeastern North Carolina.

Figure 3. Muscadine grape pergola showing the adaptability of muscadine grapes for ornamental use.

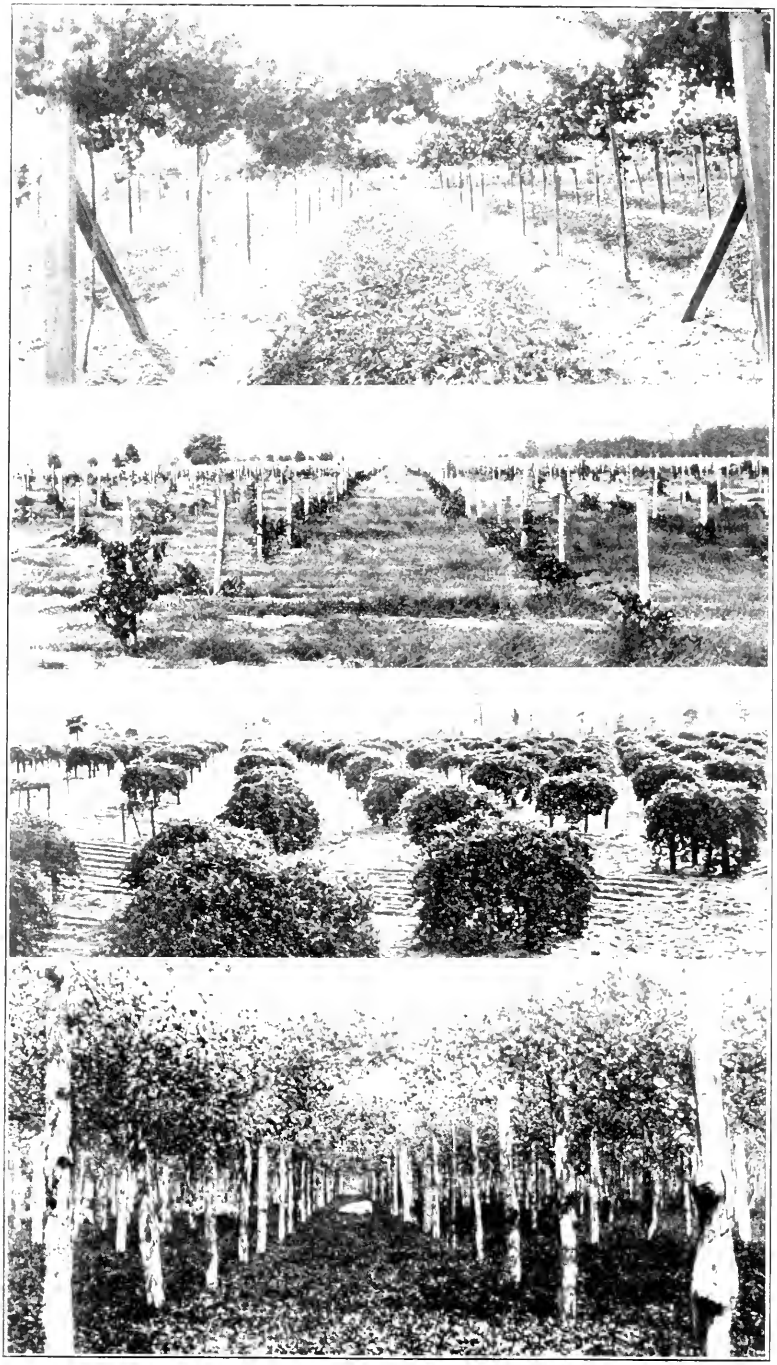


PLATE VIII.—THE MUSCADINE GRAPE AND ITS CULTURE.

For legend see p. 64-71.

Plate VIII, Figure 1. A view of varietal collection section of the Government Co-operative Muscadine Grape Experiment Vineyard, showing cowpeas interplanted between vine rows.

Figure 2. A view of a young commercial muscadine grape vineyard in the Costal Plain section.

Figure 3. A commercial vineyard in the Sand Hill country. Vines trained to individual arbors.

Figure 4. A commercial muscadine grape vineyard in the Piedmont section.

*labrusca*. A number of reasons probably unite to account for this and among these can be mentioned: (1) The extensive nature of southern agriculture before the Civil War, and consequent lack of interest in horticulture. (2) The relative slowness of travel development precluding the distribution of varieties and varietal knowledge. (3) Setbacks due to the Civil War devastation, such as the destruction of varieties not yet disseminated and of seedling vineyards, such as that of Dr. Peter Wiley, of Chester, South Carolina. (4) The dioeciousness of the species which has made plant breeding more difficult owing to the necessity of having to use wild male vines, and (5) the presence in the species of such undesirable characters as poor shipping quality, which has limited the market area of the fresh fruit.

In more recent years, however, a great deal of attention has been given to the Muscadine grapes and this has resulted in stimulating greater activity and the development of a real industry.

## History.

Before discussing present conditions, however, let us trace very briefly the earlier development of this industry. This will enable you to appreciate how generally conditions have changed. When the colonists landed in Virginia and on Roanoke Island they noted the wild Muscadines. We have historic reference to them dating back to 1584. As the settlements began to develop, the observing people selected from the wild vines those of superior merit and transferred these to their homes, giving them names which seemed appropriate. Generally these vines were named for the location where found, or for the person bringing them under cultivation. Among the first varieties to be so introduced was the Scuppernong, named for the Scuppernong River, where found. This variety of the Muscadines has persisted as the leading grape in its territory, just as such varieties as Concord and Catawba have persisted further north. After introducing these vines to the home premises there was a period of exchanging varieties as gifts. In this way they gained a certain renown and distribution. It became known that they had value for wine making, and accordingly numerous small commercial vineyards were started. Probably the first of these was the vineyard of Sidney Weller, at Enfield, North Carolina, which still exists as one of the leading commercial vineyards, and one of the most unique and interesting horticultural sights of the South. Sections of this vineyard, over eighty years of age, are still bearing profitable crops. From time to time the commercial vineyards increased their acreage, and especially after the Civil War small vineyards developed throughout the South. In more recent years there has been a wave of large vineyard planting again.

In the vineyards planted prior to the last decade the vines have been extensively trained to the overhead canopy system, and no pruning has been practiced. Scuppernong has been chiefly planted, but other native varieties, especially James, Flowers, Mish, Thomas and Memory have gained prominence. No care worthy of mention has been given the vineyards and the fruit has, in most cases, been harvested by jarring it from the vines on to canvas sheets. Little effort to ship the fresh fruit was made and no effort was made to increase utilization by the preparation of products other than wine.

## Recent Progress.

In recent years a marked change has been wrought through the impetus of enthusiastic individuals, and in describing the present conditions, methods of culture, and utilization, I can do no better than to report the results of the investigations of the United States Department of Agriculture during the last ten years, since I am especially familiar with these. It would be unjust, however, not to refer to the simultaneous important work of Messrs. Reimer, Detjen, Hutt, Newman, Stuckey and others in the state experiment stations of the Muscadine grape region, and to the earlier work of Messrs. Van Buren and P. J. Berckmans, of Georgia; Wiley, of South Carolina; Munson, of Texas, and last, but not least, to the leading vineyardists and commercial interests of the South. The present favorable status of the industry is due to the combined effort of all.

## Work of the United States Department of Agriculture.

The Muscadine grape investigations of the United States Department of Agriculture have covered nearly every phase of the subject, but they may be classed under four general heads: Field Survey, Production, Breeding, and Utilization.

### Field Survey.

The first work was naturally field survey for the purpose of determining existing conditions. This work furnished definite information regarding the past history of the industry, cultural conditions and problems, varietal data, yields, and prices. Moreover, sufficient plant material was secured to form a varietal collection which has served as the nucleus for an extensive Muscadine grape experimental vineyard, located by co-operative agreement on the Willard (North Carolina) State Test Farm. This vineyard now contains approximately 11,000 vines and has definite blocks for

studying culture, fertilizer, pruning, training, breeding and other problems. The field survey brought out these interesting facts: Grapes could be sold in bulk under contract covering periods of twenty-five years; prices were always profitable in the cities, but in the rural districts where almost every home had its Muscadine arbor, there was a surplus supply of fruit which was not used. It was evident from the survey that anything aiding better distribution and greater and more varied utilization would greatly assist the industry.

## PRODUCTION INVESTIGATIONS.

While the major project of the department is breeding work, there are more immediate problems relating to cultural methods and fruit production which have demanded first attention. Reference to these will now be made.

The usual method of Muscadine grape propagation was by layers, but investigation has shown that it is preferable to propagate by cuttings planted slanting, which have been held in a callousing bed until sprouts begin to start. Such varieties as Thomas, Flowers, and James root from cuttings more readily than Scuppernong. Cuttings bench grafted on short sections of Muscadine grape root, or on Euvitis stock, take root more successfully than ordinary cuttings.

Fertilizer applications have been found advantageous when intelligently used to promote vigorous but not excessive growth. Strong nitrogeneous fertilizer applications are desirable for young vines not yet in bearing.

In co-operation with the North Carolina State Department of Agriculture a system of culture, characterized as three-story agriculture, has been worked out at the Muscadine Grape Experiment Vineyard for the general farmer who wishes a small, acre vineyard. Such vineyards have been found a most profitable feature where the farms are near the cities and large towns. This system requires that the vines be trained on overhead, horizontal trellis. After plowing, fertilizing, and cultivating the vineyard until midsummer,, soy beans or similar intercrops are grown, furnishing a profitable seed crop for sale and leguminous organic matter to be turned into the soil. In August of the first year burr clover is sown and as this crop annually reseeds itself it requires no further attention. Each autumn it comes on after the soy beans harvest and yields a winter cover crop, then two months of early spring grazing for farm livestock, and finally a profitable seed crop. Moreover, with the exception of the vintage season the acre vineyard is the ideal range for farm poultry.

It has long been claimed that Muscadine grapes should not be plowed owing to their very shallow spreading root systems, but investigation shows that regular plowing and harrowing started with the planting of the vineyard is advantageous.

When the department began its investigations it was generally believed that pruning was not only detrimental but actually endangered the life of the vines. The department's experiments have shown that pruning when properly practiced is not only desirable but actually essential. By comparative test it has been found that unpruned vines resort to an undesirable habit of periodic die-back as a means of natural pruning, that in such years they bear little or no fruit, and that in the years of their plenty the production is in the nature of overcropping, with the result that a very inferior quality of fruit is obtained. Proper pruning regulates this and keeps the vines in balance so that they produce annual crops of high quality fruit. The department has worked out a simple method of spurred arm pruning in which the arms are progressively renewed, each arm bearing at least four crops of fruit. This system has been found much superior to the customary pruning systems of the northern grape districts because it allows for greater bearing surface which is essential to proper tonnage as the Muscadine grape has smaller clusters than northern types.

While pruning requirements are most specific there is room for choice among training systems. For intensive grape growing the department favors the fan system and the six-arm system of training on a three-wire vertical trellis. The vigorous varieties, like Scuppernong and Thomas, yield most when trained with horizontal arms, while weaker growing varieties, such as James and Flowers, profit by the growth stimulus of the vertically placed arms of the fan system.

Pollination studies by the department have shown that the standard varieties are for practical purposes self sterile, though apparently these varieties do occasionally have a fertile grain of pollen on their rudimentary stamens. For satisfactory yields, however, it is desirable to plant a male vine at frequent intervals in the vineyard. Our experiments show that the insects are the agents of cross pollination which carry the fertile male vine pollen to the pistils of the fruiting vines. There is a remarkable co-ordination between the blossoming of male and fruiting vines and the activities of the insects, but I must not go into the details of explanation here. It is sufficient to say that the insects are wonderfully alert and efficient, though normally they cause fruit yields on less than fifteen per cent. of the blossom buds. The nature of insect visitation varies from season to season, but several small mining bees,

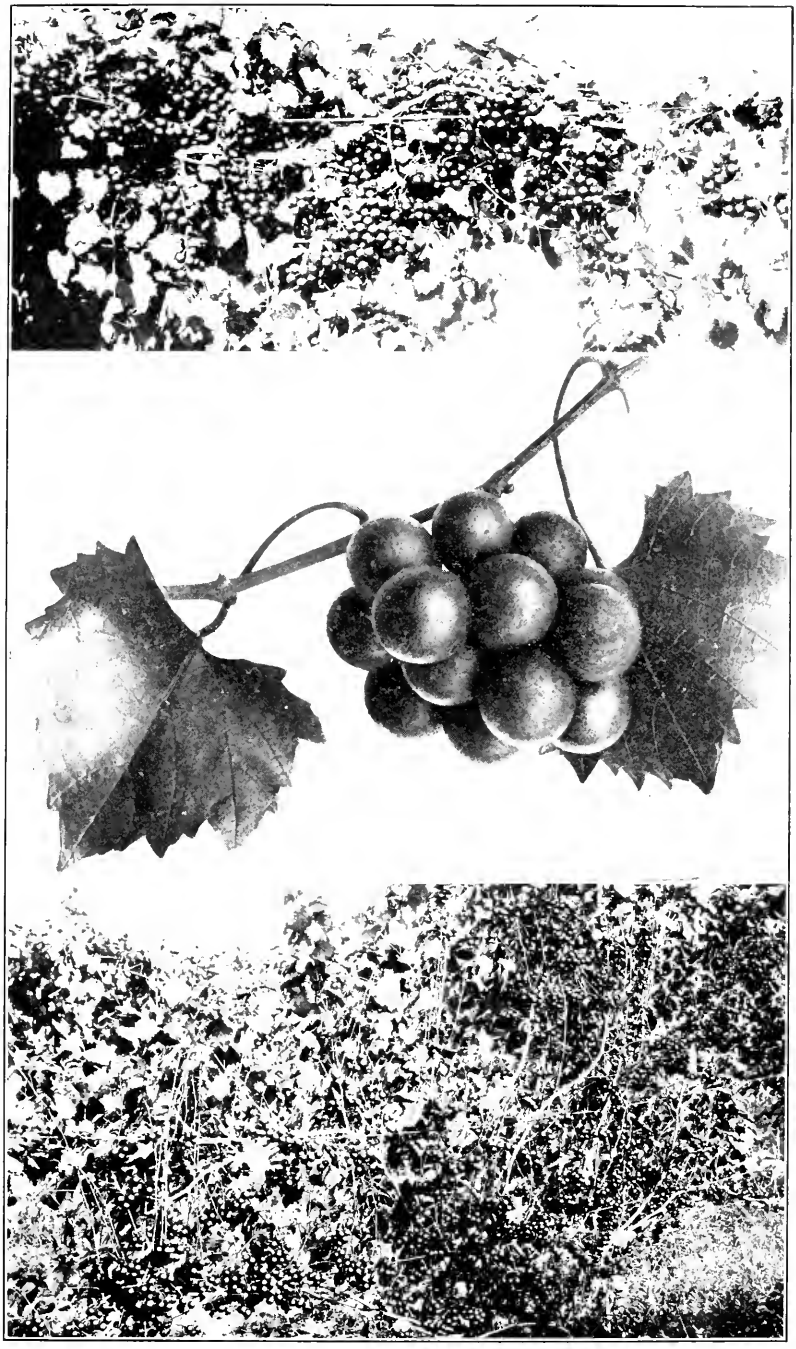


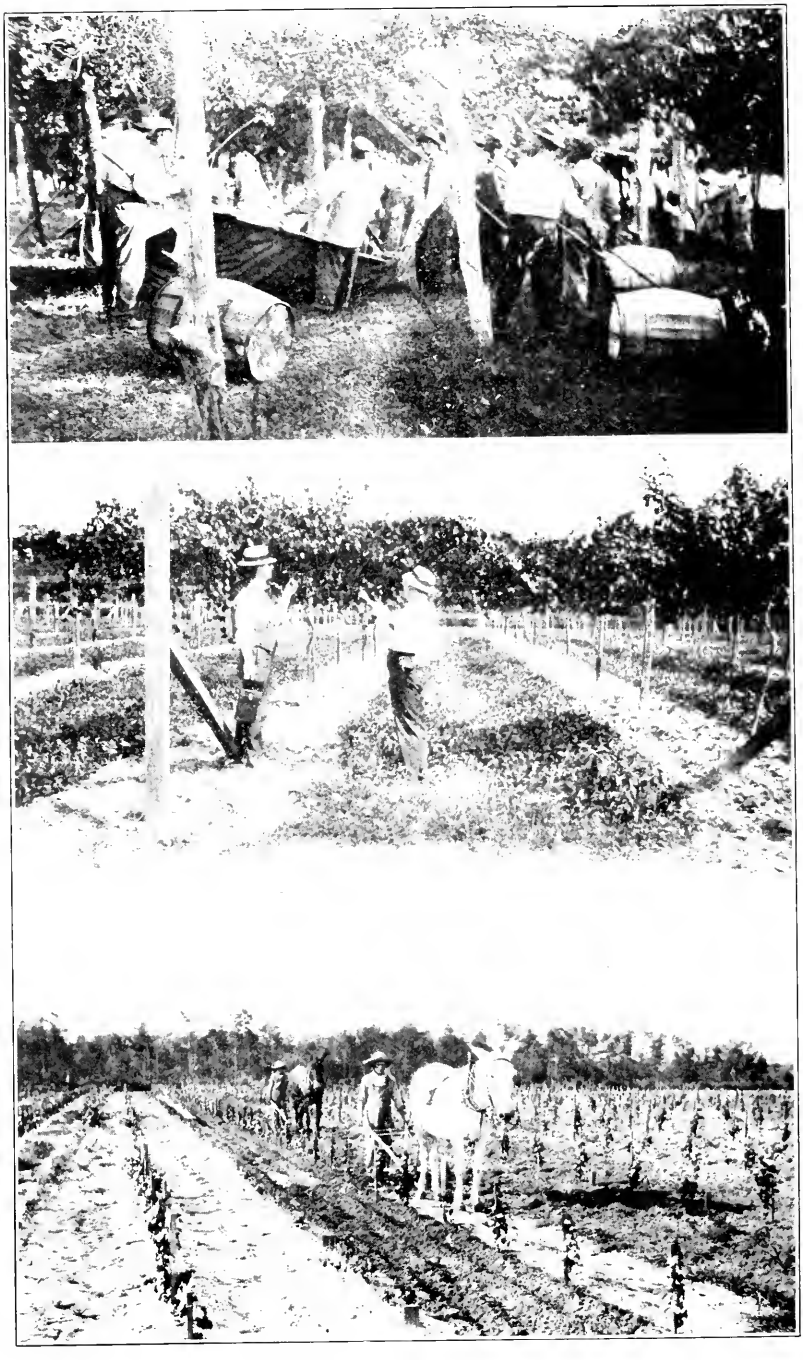
PLATE IX. — THE MUSCADINE GRAPE AND ITS CULTURE.

Vines trained to continuous overhead wire trellis; sheep grazing on crimson clover beneath vines.

Plate IX, Figure 1. A typical fruiting arm of Luola, one of the best late varieties of muscadine grapes.

Figure 2. A cluster and leaves of the Thomas variety of muscadine grape. This is the leading variety for home use.

Figure 3. A fruiting vine of the James variety of muscadine grape, trained to fan system on vertical trolleys. This is the best shipping variety of the muscadines.



THE MUSCADINE GRAPE AND ITS CULTURE.

Plate X, Figure 1. Scene in a commercial vineyard showing method of harvesting grapes for wine making.

Figure 2. The late Professor A. V. Stuvenrauch and Professor W. N. Hutt, studying varieties in the Government Cooperative Muscadine Grape Experiment Vineyard.

Figure 3. A block of young seedling vines resulting from muscadine grape breeding investigations.

all belonging to the genus *Halictus,* are the most abundant, alert and efficient. Nent to these should be mentioned in order of importance a metallic-green colored bee, *Agapostemon splendens;* a greyish bee, *Megachile sp-;* a small bumble bee, *Bombus impatiens;* the honey bee, *Aphis mellifera;* the ornate flower fly, *Milesia virginiensis,* and a large bumble bee, *Bombus scutellosis.* Of all of these let me again emphasize that the most important is the minute mining bee, *Halictus sparsus.*

BREEDING WORK.

The pollination question has recently ceased to be of as great importance as formally for the department's breeding work has resulted in the production of a new race of Muscadine grape varieties, which are perfect flowered and self fertile and capable of setting as fruit an average of over twenty-five per cent. of the blossom buds, whereas the natural setting heretofore has been less than fifteen per cent. Some of the new type grapes ripen as high as fifty per cent. of their blossom buds. When the department began its breeding work there was not such a thing as a perfect flowered, self fertile, or hermaphroditic, Muscadine grape known to be in existence. Today we have approximately 1,000 seedling varieties of this type in our breeding blocks. These are being studied, selected, and used in breeding work for the purpose of securing a self fertile substitute of like character for each of our standard varieties and also of new types of grapes combining the desirable characters found scattered among our present varieties. In producing this new type of grape the department has accomplished four important things as follows: (1) An opportunity is afforded to cross-breed within the species without using as one parent in each cross a wild male vine of unknown fruit quality; (2) a cluster of increased size has been produced, for the self fertile varieties are the result of perfecting the large clustered male blossom; (3) greater productiveness is assured owing to more thorough pollination, and (4) greater vineyard production is possible for the giving over of space to nonproductive male vines will in the future be unnecessary.

The production of the new self fertile race of Muscadines is not the only breeding result secured. In practically every detail in which improvement seemed desirable results are being obtained. Among the 7,000 seedling vines now growing in the department breeding plots there are selected individuals which represent progress toward certain goals, and the best of these are being multiplied and thoroughly tested. When they prove their worth and are sufficiently multiplied to enable equitable distribution, and not until then, they will be introduced as named varieties.

These seedlings show improvement along the following lines: Greater productiveness; increased size of cluster; better berry adherence; higher sugar and lower acid content; better pulp quality; smaller seeds; thinner skin; more uniform ripening.

In addition a collection of true Muscadine grape hybrids with *Euvitis* species has been produced by extensive and painstaking effort, the pollen having been transported by mail from the department's several experiment vineyards in different grape districts of America to the Muscadine Grape Vineyard at Willard, North Carolina. Among these hybrids the first known successful crosses between the Muscadine grape and the European grape *(V. rotundifolia* and *V. vinifera)* are represented. The fruiting results of these hybrids are anxiously awaited. However, the greatest results are expected from the secondary cross in which these hybrids will be crossed with varieties of the parent species.

## UTILIZATION.

If the Muscadine grape is to fulfill our expectations in the future it will be necessary to develop greater and more varied utilization. The department has endeavored to assist in bringing about such results by testing the value of the Muscadine grape for various uses and directing attention to the value of such utilization as seems practical and wise. Shipping tests have been run and these have demonstrated that with the choice of varieties which do not shell, the use of small, attractive containers, and the exercise of care in handling, choice, hand-picked fruit may be profitably shipped to markets where the grapes are known. This is a form of utilization that is sure to grow more popular. After making such experimental shipments it was found impossible the next year to meet the demands of trade secured with fruit grown at the Experiment Vineyard.

The making of culinary products from Muscadine grapes is a new field which the department has developed. It has been determined by experimental means that most excellent and distinctive products can be made from this type of grape. Moreover, these products can, in most cases, be cheaply made. The department has given first attention to home manufacture and utilization of these products, and through the energetic co-operation of the Office of Home Demonstration Work in the South the speaker has reached with lecture, literature, and practical demonstration almost the entire Muscadine grape territory. The Home Demonstration Workers have taken up the work vigorously and throughout the territory the value of the culinary products is now appreciated, and the people are in fact making these products in their homes from sur-

PLATE XI.—THE MUSCADINE GRAPE AND ITS CULTURE.

Plate XI, Figure 1. Scuppernog grapes packed for shipment to southern city markets.

Figure 2. A young muscadine grape hybrid parentage, Thomas ♀ X Noah ♂.

Figure 3. The only known scuppernog hybrid, Scuppernog ♀ X Winchell ♂.

Figure 4. An arbor vineyard with beehives below vines. The pollinating insects are essential to muscadine fruit production, due to the fact that they carry fertile pollen at blooming time, from wild male vines, to the cultivated fruiting vines.


PLATE XII.—THE MUSCADINE GRAPE AND ITS CULTURE.

Plate XII, Figure 1. Types of muscadine grape bloom clusters. The cluster on left is of the male type, while the small Scuppernong cluster on right is typical of the fruiting vines, the large cluster in center is perfect flowered and self-fertile and typical of the new hermaphrodite type of muscadine grape which has been produced by the United States Department of Agriculture.

Figure 2. Prominent muscadine grape pollinating insects. These are in order of diminishing importance:

1. Mining bee—Halictus sparsus.
2. Mining bee—Halictus sp.
3. Green bee—Agapostemon splendens.
4. Grey bee—Magachile sp.
5. Honey bee—Aphis mellifera.
6. Small bumble bee—Bombus impatiens.
7. Large bumble bee—Bombus scutellosis.
8. Ornate Flower Fly—Milesia virginiensis.
9. Beetle—Oxacis thoracica (Fabr.).
10. Beetle—Chavliognathus margenatis (Fabr.)

plus home-grown fruit. Best methods have been determined for making the following products from the Muscadines; unfermented grape juice, sirups, flavoring sirups, jelly, catsup, mincemeat, canned grapes, spiced grapes, conserves, preserves, jam, marmalade, butter, paste and candied hulls. The preparation of still other products is under investigation. The quality of these products, their distinctiveness, and relative cheapness would indicate that at least some of them are destined to become standard commercial products. A culinary use for every type of Muscadine grape variety has been worked out. Certain varieties, notably the Thomas, are especially adapted for culinary use. While the Thomas is not a shipping grape, owing to its poor berry adherence, it is perhaps the most satisfactory variety to grow, and with the development of an outlet for its fruit in the form of culinary products it should become the leading grape variety for the South, and occupy additional acres of poorly drained, cut over pine lands, which now lie idle.

Summarizing it may be said: That with the development of better cultural methods, greater and more varied utilization, and the production through plant breeding of new and improved varieties, the Muscadine grape industry seems to offer great promise of filling in the future a far more important role in American viticulture than it has in the past.

## THE LITCHI—LITCHI CHINENSIS.*

J. E. Higgins, *Hawaii.*

Many tropical fruits, hitherto unknown or neglected outside their native countries, are now receiving attention, not only in the markets of the temperate zone, but among growers in the tropics and in subtropical regions, where some of the more hardy of these fruits are being acclimated. Within a generation the banana has passed from a rare luxury to a staple food product, the pineapple from a little known fruit used for flavoring to a highly prized article of food, sold by the millions of cases of canned as well as fresh fruit. These two fruits are but the pioneers, and others are following close after them to popularity. The (grapefruit) pomelo has already established itself. The avocado, the most conspicuous aspirant for popular favor at the present time, has overcome much skepticism and now appears in varieties that can be grown just outside the tropics, hundreds of acres being planted in Florida and California.

The litchi is another of these tropical or subtropical fruits which is just beginning to attract commercial attention outside of China, its native country, where it has been cultivated for centuries. To

* Abstracted from a Bulletin of the Hawaii Experiment Station by the author.

the people who have lived upon the shores of the Pacific the litchi "nut" is a more or less familiar article of food, especially at the season of the Chinese New Year. Few of those who dwell east of the Philippines, however, have seen the fresh fruits, which, when dried, form the litchi nuts of commerce. In most varieties the ripe fruit has an outer shell-like covering of brilliant red, giving a dish of them a striking resemblance to large strawberries. The flesh within this tough outer covering is white with about the consistency of a Muscat grape. Its delicious flavor makes the litchi highly prized by those who are familiar with it. In Honolulu the limited crop is retailed at prices ranging from fifty to seventy-five cents per pound. Borne in clusters on medium-sized trees with dark green foliage, these fruits usually mature about May or June in Hawaii.

## Common Names of the Fruit.

The name of the fruit appears in many forms as "litchi," "lichee," "litchee," "leechee," etc. Most of these are presumably attempts at a form which represents the sound of the Chinese name, but none of them quite appears to have succeeded. The sound, as nearly as it may be represented in the English language, may be indicated by "ly-chee," with about equal stress on each part of the word. But since the form "litchi" is fixed definitely as a part of the botanical name of the tree, since it accurately represents the sound if the first "i" be marked long and the second short, and since this form probably is used as frequently as any other, it seems desirable that it should be adopted as the common name and that the others should be discarded.

## History and Distribution.

References to the litchi occur in Chinese writings produced long before the beginning of the Christian era. Though it seems impossible to determine when this fruit was first brought under cultivation, it is very generally admitted that it is native to south China. De Candolle states that "it does not seem that any botanist has found it in a truly wild state,"* and suggests that this may be due to the fact that the southern part of China toward Siam has been little visited by botanists. Long since introduced into India, Ceylon and other parts of the Orient, the litchi now extends to southern Japan, Formosa, Australia and Mauritius. In comparatively recent years it has found its way into the Western Hemisphere and is grown in Brazil and in some of the West Indies, though in the latter region it is rare.

* Origin of cultivated plants, London, 1884, p. 315.

Mr. Ching Shai, of Honolulu, is authority for the statement that the first litchi tree was brought to Hawaii about the year 1873 by Mr. Ching Cheek. The tree was planted on the property of Mr. C. Afong and is now the best known of the litchi trees in Honolulu. Usually it has borne fruit abundantly, and the crop of this single tree is said to have sold at prices ranging from seventy-five dollars upward in ordinary years, so rare and so highly prized is this fruit. Other introductions have been made by the United States Department of Agriculture and by Messrs. Sing Chong, Wong Kwai, Wong Leong, Luke Chan, E. W. Jordan and others. In transit and immediately after arrival the rate of mortality among the plants usually has been extremely high, so that comparatively few trees have become established. In one instance where four hundred trees were imported, only four are said to have survived. These losses have been due in part to the shipment of plants without an established root system and in part to the long voyage, followed by the treatment necessary to prevent the introduction of dangerous insects and diseases. In order to introduce and establish the choicest varieties it will be necessary to make special arrangements to insure their safe arrival. It is probably because of the difficulty of transporting the plants, the impossibility of shipping the seed under ordinary conditions, the slowness of the present cumbersome methods of propagation, and the extreme tardiness of many seedlings in coming into bearing that the litchi is represented by only a few trees in countries where the soil and climatic conditions favor its extensive production.

The litchi is believed to have been introduced into Florida about 1886 or 1887. Since that date several introductions have been made by the United States Department of Agriculture and by private nurserymen. Very many of these trees died before they became established. Of the few that now remain some are said to promise success. In a letter to this station under date of August 29, 1916, Mr. W. S. Taylor, of Tampa, Florida, stated that litchi trees sent him by the Office of Foreign Seed and Plant Introduction, of the Department of Agriculture, fruited in July. Mr. Taylor, who is familiar with the litchi in China, reports that the Florida fruit was "exceptionally large and fine." Although it has taken many years to demonstrate the possibility of the litchi's fruiting in Florida, an ardent hope is now revived that with suitable varieties the litchi may become the basis of an industry.

The first litchi tree to be introduced into California is said to have come from Florida and was planted by Mr. E. W. Hadley in Santa Barbara about 1897. This tree was obtained as a small plant from Reasoner Brothers, Oneco, Florida. Mr. E. N. Reasoner states that this California tree was originally imported from Saharanpur, India. It first fruited in 1913. It is possible that varieties from

the hill country of India may prove best adapted to California and Florida conditions. The United States Department of Agriculture has placed a number of litchi trees in different parts of California, and the writer distributed a considerable number of seed in that state in July, 1914.

## Natural Requirements.

The litchi appears to belong just within or near the border of the Tropics. When the tree is young it is very sensitive to frost, but when mature it is reported that considerable cold is endured without injury. Mr. A. C. Hartless, superintendent Government Botanical Gardens, Saharanpur, India, states in a letter to the writer, that the trees "have been known to stand eleven degrees of frost." In south China the litchi is grown on comparatively low lands, but nearer the Equator in India its cultivation is extended to considerable elevations. Definite data are not available as to the optimum atmospheric moisture, but the evidence indicates that a rather high humidity is desirable. Abundant rainfall is important unless irrigation is applied, but heavy rains during the flowering season are injurious.

A deep, moist, alluvial soil seems best adapted to the needs of the litchi, but it prospers in a rather heavy and compact soil. In China, a favorite place for planting is along the banks of streams or on the dikes between rice fields. Though the litchi has been grown chiefly in very heavy soils in Hawaii, in the absence of exhaustive experiments it is impossible to state positively that it would not do equally well in light soils, provided the moisture requirements were well maintained.

## Cultural Requirements.

Much is yet to be learned regarding the cultural requirements of this tree. No orchard experiments with the litchi are on record in any of the meager and fragmentary literature available on the subject. Unless there is a liberal rainfall or a constant subterranean supply of water, abundant irrigation is necessary. It is well known also that large quantities of fertilizer are used in the cultivation of litchi. It is a custom of some of the Chinese growers to apply night soil several times during the year. For this purpose a shallow trench, dug near the ends of the roots of the tree, is filled with the fertilizer which is covered with soil. Duck manure also is a favorite fertilizer with the growers in the Orient. Some growers prefer to put the manure on as a top dressing and cover it with a heavy mulch because of the tendency of the litchi to form surface

roots. No experiments with chemical fertilizers have been reported.

Considerable difference of opinion appears to exist with regard to pruning, some growers stating that no pruning should be practiced, others insisting that the breaking off of the ends of old branches is beneficial. The customary manner of gathering fruit, by breaking with it branches ten or twelve inches long, provides in itself a form of pruning which some growers insist is necessary for the continued productivity of the tree, but here also there is much need for more exact data.

The trees should be planted at least thirty feet apart, and under good conditions they will require even more space before they have attained full size. Opinions differ as to the value of shade, but young trees in a country of clear skies doubtless will benefit by some protection from direct sunlight. It is important that the plantings be protected from heavy winds at all times, but particularly during the flowering season. For this purpose a sheltered spot should be chosen as a site for the plantings, or windbreaks should be provided in a region where strong winds prevail.

## PROPAGATION.

### SEEDS.

The litchi reproduces readily by seeds, this being the simplest method of reproduction, since most of the varieties of this fruit produce viable seeds which germinate quickly. In experiments conducted at the Hawaii Experiment Station it has been found that some seeds will begin to germinate within three days after planting.

The seeds are extremely short lived, retaining their viability not more than four or five days under ordinary conditions, and begin to shrivel in less than twenty-four hours.

To preserve the germinability of litchi seeds it is necessary to prevent in some way the loss of moisture. In the fruit the seed is protected to a considerable degree, but in a dry atmosphere the rapid drying of the aril causes, after a few weeks, a marked loss of viability, varying with conditions. Fruits spread out in direct sunlight quickly change to litchi "nuts," but if closely packed in a closed room remain moist a fairly long time.

Seeds packed in sphagnum moss containing water equal to slightly over two hundred per cent. of its own weight when air dried were very successfully shipped from Hawaii to Florida. It is probable that a smaller amount of moisture would result in longer preservation of the seeds since in the presence of this quantity of water the seeds began to germinate.

Unless it is necessary to preserve the seeds by some artificial means they should be planted at the earliest possible moment after they are removed from the fresh fruits. They should be sown in well drained soil in pots in which uniform moisture conditions can be maintained and the young seedlings should receive some shade.

LAYERING.

As seeds do not reproduce the variety from which they have been taken, and as the seedlings are of rather slow growth and require many years to come into bearing, it has for many years been the custom in China, the land of the litchi, to propagate the best varieties by layering or by air-layering, a process which has come to be known as "Chinese layering," and is applied to many kinds of plants. In air-layering, a branch is surrounded with soil until roots have formed, after which it is removed and established as a new tree. In applying the method to the litchi, a branch from three-fourths inch to one and one-half inches in diameter is wounded by the complete removal of a ring of bark just below a bud where it is desired to have the roots start. The cut usually is surrounded by soil held in place by a heavy wrapping of burlap or similar material, although sometimes a box is elevated into the tree for this purpose. Several ingenious devices have been made to supply the soil with constant moisture. Sometimes a can with a very small opening in the bottom is suspended above the soil and filled with water which passes out drop by drop into the soil. Again, sometimes the water is conducted from a can or other vessel placed above the soil, by means of a loosely woven rope, one end of which is placed in the water, other on the soil, the water passing over by capillarity.

Air-layering usually is commenced at about the beginning of the season of most active growth, and several months are required for the establishment of a root system sufficient to support an independent tree. When a good ball of roots has formed, the branch is cut off below the soil, or the box, after which it generally is placed in a larger box or tub to become more firmly established before being set out permanently. At first it is well to provide some shade and protection from the wind, and often it is necessary to cut back the top of the branch severely, so as to secure a proper proportion of stem to root.

Some modifications of this Old World method have been practiced with success at the Hawaii Experiment Station. One of these consists in using a long trough-shaped box, in which several branches may be rooted at the same time, thus increasing the number of plants which may be propagated with a given amount of labor and attention. For this purpose rather small branches not more

than a half inch in diameter are laid across the trough through notches cut in the sides of the box. With the low trees used here, it has been much more economical to apply the water by hand daily than to prepare the contrivance mentioned above for maintaining the moisture. When the branches have established root systems, the box is removed from the tree and the soil washed out carefully with a stream of water. This process, without injuring the roots, permits easy separation of the root stems of the different branches, if these have not been allowed to remain too long on the tree.

Although layering has the advantage of exact reproduction of varieties and rapid fruiting, nevertheless, it is a slow and cumbersome method not well adapted to the rapid multiplication of varieties usually desired by American nurserymen. There is also ground for the belief that its excessive use may have a devitalizing effect upon the parent tree. Girdling for the purpose of forcing heavy production of fruit is generally believed to have such an effect upon fruit trees, perhaps because the root system and other parts of the parent tree are robbed of the energy used in forcing fruit production in the girdled branches. It is not unreasonable to suppose that something of the same effect may follow the production of new root systems on many branches. While no definite data can be recorded, there is some evidence supporting this belief.

It is probable that methods of grafting or budding will be devised which in American practice will largely replace layering and it is not improbable that other species may be used as stocks for certain conditions. By means of bark-grafting the litchi has been worked upon the Longan, a related fruit-bearing tree of the Orient, now generally separated from the litchi in generic rank; but there is some reason for doubting the permanent congeniality of the graft union..

Few fruits have so wide a range in their bearing age as does the litchi. Seedling trees are usually extremely tardy in coming into bearing. Trees have been known to grow and prosper for a quarter of a century without bearing fruit or flowers under conditions in which other trees continued to bear well. Other seedling trees have been known to come into bearing in five or six years. Layered trees from bearing stock under congenial conditions come into bearing in a few years. The productivity of the litchi when once established is said to continue for centuries in its native home, but on this point there is perhaps little scientific data although the fact is well established that the trees continue to bear well for long periods.

Litchi fruits must be marketed rather quickly after being gathered from the trees or must be kept in refrigeration in order to prevent the loss in the attractiveness of the fruit. It early loses its color which is one of its most attractive features in the market, being bright red, so that a dish of these fruits in the distance resembles closely in appearance a dish of huge strawberries. In refrigeration the fruits can be shipped long distances and retain well their appearance and flavor.

The litchi "nuts," which are simply dried fruits, are prepared either by sun drying or artificial heat, the sun dried nuts usually commanding the higher price. The drying process begins soon after the fruits are exposed to free ventilation and to direct sunlight. A large part of the litchi crop in China is marketed in the dried form and finds its way to many parts of the world. Considerable quantities of the litchi fruit is canned in syrup. There are many ways in which the fresh litchi fruits can be preserved and served. Besides being eaten fresh from the hand, they can be used in making sauces, spiced litchi, sweet pickles, etc.

There are many varieties of the litchi in its native country. Among those which are regarded as best may be mentioned Hak-yip or "black leaf" litchi, Kwai-mi or "cinnamon flavor," and No-mai-chi or "glutinous rice cake."

## GROWING CURRANT GRAPES.

### A promising new industry for this country.

GEORGE C. HUSMANN, *Washington, D. C.*

Because there is a bush fruit grown called currant, many people imagine that the dried grapes used so extensively in cakes, puddings, etc., are the dried fruit of the currant bush (*Ribes* species), when in reality the currants of commerce are dried grapes.

According to Eisen, they are referred to by Pliny as being grown in Greece in 75 A. D., after which there appears to be no further historical record of them for nearly a thousand years. During the eleventh century in the old herbals and in the literature of the fourteenth, fifteenth and sixteenth centuries, reference to them occur as "reysyns de corauntzs," "Corauntz," "Corent," "rey sonys of Corawnce," "raysns of Coren" and "currans."

The name currant appears by gradual evolution to have developed from the name Corinth, the port whence the early supplies of this fruit reached western Europe; furthermore, the currant grapes were heard of 1600 years before and the name "currant" or "currantes" was applied to these grapes as early as 1578, several centuries before the common garden currant was first cultivated late in the sixteenth century.

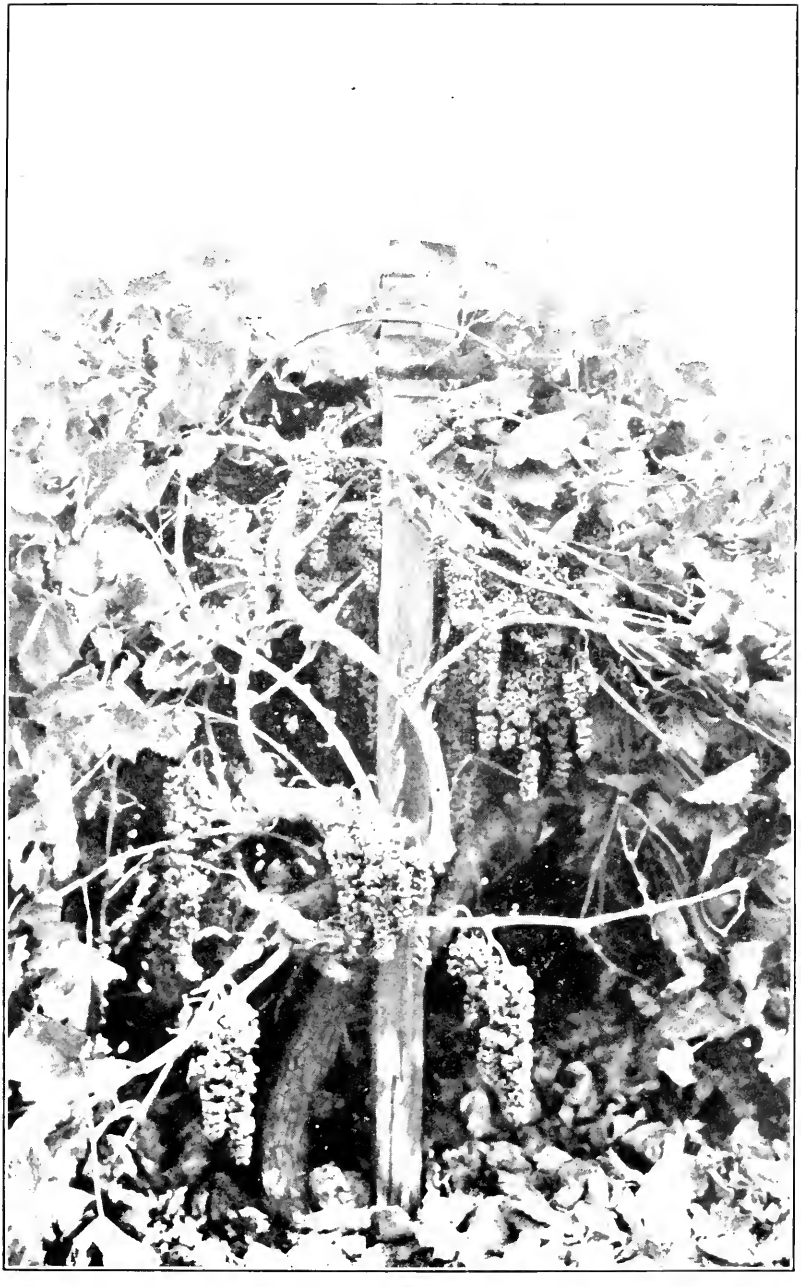


PLATE XIII.— Panariti vine, grafted on Rupestris St. George. Unincised. Yield six and one-half pounds of fresh fruit.

PLATE XIV.—Panariti vine. Grafted on Rupestris St. George. Incised. Yield thirty seven and one-half pounds fresh fruit

The following, relative to the importance of the currant grape industry in Greece, will prove interesting:

The destruction of the vineyards in France by phylloxera during the middle of the last quarter of the last century, caused a heavy demand at high prices for dried currants for use in the making of wine, brandy, etc. This resulted in the planting of so large an acreage of such grapes in Greece that in some regions it became the sole industry.

The re-establishing of the French vineyards on Phylloxera resistant grape stocks introduced from the United States, and the imposing of import taxes on dried currants by France in 1896, practically excluded them from France, resulting in a serious crisis in the currant industry of Greece, the production of them then being far in excess of the demand.

The "parakratesis" or "retention" act was passed by the Greek Parliament in 1895 for the purpose of maintaining prices and controlling the yearly output and preventing as far as possible the overstocking of the markets. This law imposes on the producer a tax of fifteen per cent. of the currants he exports, payable either in money or by deposits of the required quantity of currants in the government warehouses. The currants received by the government must be put to other than the usual uses made of them. This tax is one of the principal sources of revenue of the Grecian government. In connection with the passing of the retention act the establishing of the "currant bank" of Greece was agitated, to enable producers depositing a certain quantity of currants in a government warehouse, either to draw money from such bank or to hypothecate the crop. Such a bank was finally established in 1899, with a capital of 300,000 drachmas (about $675,500), realized by the government from the sale of currants to distillers, etc.

The United States previous to this war annually imported over 30,000,000 pounds of such dried currants, the equivalent of 100,000,000 pounds or 50,000 tons of fresh grapes, as it takes about three pounds of these fresh grapes to make one pound of dried.

The United States Department of Agriculture has succeeded in demonstrating that these currant grapes can be profitably grown in this country. This paves the way for the establishment of another very important and extensive phase of the grape industry in this country. Another exceedingly important matter is that the currant grapes are among the very earliest grapes to ripen, in fact, ripen so early that they will be dried and put away before the earliest rains occur in districts where other raisin varieties are too late in ripening and in the present raisin sections of this country currants can be grown as an advance crop and be cured and stored

by the time other raisin grapes ripen, so that the same labor employed in harvesting and curing currant grapes, can after having accomplished that, harvest and cure raisin grapes.

Currant grape varieties were introduced into California as early as 1861, and these were followed by later introductions. Among all these, however, there appears to have been no valuable dark colored ones, but there were some fairly productive red and white strains producing fruit of inferior quality.

The "Panariti" was introduced by the United States Department of Agriculture through Mr. David Fairchild, agricultural explorer of the department, a consignment of cuttings of them reaching Washington, D. C., May 9, 1901. Concerning this Mr. Fairchild stated, "The variety of grapes producing the currants or corinth of commerce. These cuttings were purchased in the village of Panariti, which lies among the mountains back of Xyloncastron. This village is noted as producing some of the finest corinths in Greece."

The importance of the Panariti in the currant group of grapes suggests a description of its fruit. Cluster, fairly compact; cylindrical to tapering; long, narrow; usually prominently shouldered; often in two parts; berry, very small; usually less than one-quarter inch in diameter; globose; color, purple-black with whitish bloom; surface, smooth; skin, thin, tender; flesh, pearly white; soft, juicy; seedless; flavor, rich, very sweet and characteristic of the currant grapes; relatively high in saccharine and acid; excellent in quality, both as fresh fruit and dried; ripens from July 15th to August 15th. Usually produces a small second crop of small loose clusters, of larger, seeded berries.

Several currant grape varieties are grown in Greece, though the crop differences are not distinguished in that country by varieties, but by the name of the region in which they are produced.

Some of the Panariti cuttings were distributed to grape growers in California, Arizona and southern Nevada and some used in experiments with it in the department's experiment vineyards in California. Exceptional difficulties were encountered in successfully growing these and it became a problem for the viticultural investigations of the United States Department of Agriculture to find out where the trouble was. The knotty parts of this problem appear now to be solved.

Two cardinal points must be observed in order to grow them successfully, namely, they should be grown grafted on phylloxera resistant stocks congenial to them and suited to the soil and other conditions in which grown; and the vines need to be thoroughly incised at the proper time.


PLATE XV. PANARITI CLUSTERS.

1. From unincised. 2. From incised vine.

PLATE XVI. PANARITI VINE.

Showing trunk incision healed two months after incising was done.

In a ten years' test of growing them on various resistant stocks, a sufficient number of varieties of resistant stocks have been found from which to select such as are adapted to any of the soil types and other conditions and that are congenial to the currant grape varieties and on which they show a good fruiting tendency.

It has been ascertained that to make the blossoms set and secure a full crop of fruit, the vines must be incised. This incising consists in making two parallel incisions through the bark, around either the trunks, arms or canes of the vines and taking out the bark between the two parallel cuts. This incising must be thoroughly and cleanly done and done while the vines are in blossom. Incising the vines is not only necessary to promote a full setting and maturing of the fruit, but thereby more than twice again as much and better quality of fruit is obtained.

Vines in the United States Department of Agriculture Experiment Vineyards produced from eighteen to forty-five pounds of fruit to the vine, the crop depending largely on the variety of resistant stock upon which the vines were grafted. When vines are planted eight by eight feet apart (the usual distance) they will yield a crop of fresh grapes ranging from six to fifteen tons, an average of ten and one-half tons, or conservatively from two to five tons of dried currants to the acre. From this we conclude there are from 4,000 to 8,500 acres of these grapes necessary to produce the 30,000,000 pounds we annually import and consume, and no doubt the consumption of them could be much increased beyond this.

The berries being seedless, delicious in flavor, rich in quality and so very early in ripening, they also make an exceedingly desirable fresh fruit for the table.

It is, of course, a great advantage in growing grapes for drying purposes to be in a district which permits sun drying. All the districts in California in which grapes for the various purposes are now grown, appear to possess suitable conditions for the growing of currants. Protection against the dew at night will likely be necessary in some of the coastal districts, but as it is preferable that the currants while drying be shaded during the great heat of the day, the same shelter will do for both purposes.

## THE NATURAL GROUPS OF MANGOS CULTIVATED IN FLORIDA.

WILSON POPENOE, *Washington, D. C.*

Among students of the mango, both in the Orient and the Occident, the question of classification has been attracting an increasing amount of attention during the past three or four years. While at first glance this problem may seem to be of interest solely to systematic pomologists, its practical bearing upon mango culture is great. For some time we have recognized that certain groups of mangos are characterised by productiveness, by lateness of ripening, or by acidity of flavor, and so on; these groups have, however, been poorly defined, and in fact our understanding of the whole subject must still be considered decidedly hazy. But as we study the foliage, the flowers, the fruiting habits and the fruits of the cultivated mangos more closely, we begin to feel that we have sufficient material upon which to base a natural classification that will be of some practical value. Such a classification cannot be perfected for years to come, yet a beginning can be made, and if close study of the subject is continued we should eventually succeed in putting the subject upon a satisfactory basis.

Looking back over the history of mango classification, it becomes apparent that most of the efforts of Indian mangologists (if we may use the term coined by that eminent Anglo-Indian horticulturist, Dr. Bonavia) have been directed toward an artificial or arbitrary system, while those of American investigators have almost without exception been toward a natural system. The reason for this, I believe, is evident,—in America we have dealt mainly with a small number of seedling forms, most of which are practically constant and easily recognizable. With the subject thus simplified, a natural classification seems easily within reach. In India, however, it has been necessary to work with an infinite number of seedlings as well as widely differing horticultural forms propagated asexually and probably derived from a number of different prototypes or wild species of Mangifera. It has seemed easier, therefore, to approach the task by attempting first a classification based upon one or two characters. It is comparatively simple to choose some particular character, such as form of fruit, which is relatively constant in a given variety, and use it as a basis for an arbitrary classification, whereas it is a hard task to recognize natural groups based upon resemblances in a considerable number of characters, especially when dealing with a large number of varieties, as in India.

A natural system of classification is, however, the goal of every systematic pomologist.

In one of the most recent contributions to this subject, Burns and Prayag[1] offer an artificial system, but point out that such a classification, based upon one character,—form of fruit,—will serve to throw related mangos together and eventually work toward the desired end,—a natural classification into groups of related varieties. This is doubtless true, in a broad sense, yet among the Indian mangos cultivated in Florida, with which this paper is concerned, there are instances where the shape of the fruit alone would not place it in its natural group, and other characters must be considered.

The number of Indian varieties cultivated in Florida is not great, yet thirty or more have come into bearing, some of them having borne fruit for several years. A study of these varieties, together with those introduced from Indo-China, the West Indies, and other regions, indicates that most of them can be placed in well defined groups, based upon apparent relationship as evidenced by similarity in characters of growth, foliage, flowers and fruit, as well as fruiting habits.

The only previous attempt to classify the mangos of Florida is that of P. H. Rolfs[2], who deals with the seedling races as well as with the vegetatively propagated varieties of foreign origin, throwing them all into eight groups, based primarily upon fruit characters, but also to a more limited extent upon the habit and general appearance of the tree. Most of these groups established by Professor Rolfs will be referred to later on.

One of the most perplexing questions encountered in this work has been the practicability of including the seedling races and the grafted Indian varieties in the same scheme of classification. It has been impossible as yet to penetrate deeply enough into the subject to see just how this can be done. All of these seedling races which have so far been observed are polyembryonic, to which character they doubtless owe their constancy. If polyembryony is a more primitive trait than monembryony, as advanced by Chauveaud[3], then it follows that the seedling races are in a more primitive state than the monembryonic Indian varieties propagated by grafting, which seems logical enough. It has been advanced that a classification might commence with two great divisions, monembryonic and polyembryonic mangos; this was suggested by the fact that all the cultivated Indian varieties, so far as observed, are monembryonic, while the seedling races in Indo-China, the Philippines, and tropical America are known to be polyembryonic. But if the monembryonic grafted varieties, when grown from seed, will revert to polyembryony in the first generation (as has been observed by the writer in Florida) then such a classification is worthless, and must be discarded. Burns and Prayag suggest a territorial or geographical

classification, forming an Indian, a West Indian, a Philippine group and so on. Here again we meet with difficulties, for there are several distinct races growing in some of these regions.

In classifying the seedling mangos of Cuba, the writer[4] divided them into races and types, the first division being broader than the second. This appears to answer for the mangos of the particular region considered, though the use of the word "type" in this connection has been questioned by Professor Waugh, who argues[5] that this term should be used to designate a characteristic central form in a group rather than a group itself. The seedling types of Cuba, however, are so remarkably constant that it would practically be impossible to define them as groups and distinguish a central form or "type" in each group.

The groups which have been termed *races* in the classification of Cuban mangos referred to are considerably more variable, and present an infinite number of slightly varying but nevertheless racially constant forms. Any of these propagated by budding or grafting, as well as forms of any of the seedling types, would constitute horticultural varieties.

In considering the budded varieties of Indian origin, we do not find constant types, but great diversity among the members of each natural group in form, coloring and quality of fruit, as well as in numerous other characters. It has seemed best, therefore, to adopt the word *group* for these classes of horticultural varieties, leaving the term *type* to be applied only to seedlings. One group, i. e., Cambodiana, is distinct enough from the others to deserve higher rank, and if we were to attempt a broad general classification into races, then sub-dividing the races into groups of horticultural varieties, the Cambodiana group, including the "Philippine" mangos of tropical America, would undoubtedly deserve racial rank. But in the present imperfect state of our knowledge it seems inadvisable to attempt a broad classification of this sort, and we must content ourselves with the horticultural classification of groups until further study may bring to light the necessary facts on which to base a general classification.

In defining the following groups, consideration has been given to characters of growth, foliage, inflorescence, fruiting habits, and the fruit itself. Several varieties cultivated in south Florida have of necessity been omitted from the classification, as they do not appear to belong to any of the groups described, and it was not thought advisable to establish a group for a single variety, though in certain cases, e. g., Malda, the single variety which we have growing in Florida, is perhaps representative of an important group in India. But there is no advantage to be gained from burdening ourselves with a large number of group names unless we have a

sufficient number of varieties in each group to make it worth while.

To illustrate the possible usefulness of a natural classification, a glance at the following six groups brings out some important points of practical application. Thus the Mulgoba group appears to be characterised by a very low degree of productiveness, with the exception of the variety Haden. As this is a seedling of Mulgoba it possesses several characteristics not visible in the parent, which is to be expected. We know so little regarding the ancestry of the grafted varieties from India that it is impossible to predict what characters may be developed by the seedlings. The Sandersha group is characterised by a rather high degree of productiveness, and more especially by regularity in bearing, but the fruits are rather acid and not so well suited for dessert use as are those of the Alphonse group, which, taken all around, is one of the best groups of all. As a rule the varieties of the Alphonse group do not produce heavy crops, but with favorable conditions most of them are moderately productive. The Cambodiana group contains the varieties from Indo-China and the Philippines, among them some fruits of very good quality, though lacking the richness of flavor which characterises the Alphonse group and possessing a peculiar twang all their own; they are distinct in form of fruit and always yellow or orange in color. The bearing habits of the varieties from Indo-China are remarkably good. The differences between the Indo-Chinese varieties and the "Philippine" mangos, which have probably come to us from the Philippines by way of Mexico and Cuba, are rather marked, yet both seem in general to belong to the same group.

## Principal Diagnostic Characters of the Groups.

Before proceeding to a detailed discussion of the groups, it may be well to point out, in as few words as possible, the principal characteristics of each:

1. Bark rough; leaves having commonly 18 to 24 pair of primary transverse veins.

*Mulgoba Group.* Leaves slender, flat; panicles long, slender, axis and laterals pinkish green to pink, heavily pubescent; flowers with very large disk, the perfect flowers comparatively few, staminodes strongly developed; fruit ovate or oval, not beaked, the flesh orange-yellow, flavor variable.

*Alphonse Group.* Leaves medium broad to broad, arched longitudinally, the surface undulating and curved upward toward the margin; panicles large and broad, the axis and laterals pale green to dull pink, finely and sparsely pubescent; perfect flowers numerous, usually scattered throughout the panicle, staminodes

poorly developed; fruit longer than broad, usually oblique at the base, not beaked but with the stigmatic point often prominent, flesh deep orange in color, flavor usually rich.

*Sandersha Group.* Leaves rather broad, flat, broadly pointed; panicles broad, axis and laterals deep pink to maroon, pubescence very minute; perfect flowers numerous only on upper part of panicle, staminodes weakly developed; fruit long, prominently beaked, the flesh orange-yellow, subacid in flavor.

*Madras Group.* Leaves moderately broad, arched, free from undulations but strongly curved upward toward the margin; panicles very short, the axis and laterals pale green, heavily pubescent; perfect flowers scattered throughout the panicle, staminodes poorly developed; fruit broadly oval, slightly beaked, flesh deep orange, of rich flavor.

*Julie Group.* Leaves small, usually narrow, the surface more or less undulating; panicles small to medium sized, axis and laterals red, sparsely and finely pubescent; perfect flowers abundant throughout the panicle, staminodes strongly developed, one or two often becoming fertile stamens; fruit ovate or kidney shaped, not prominently beaked, flesh orange-yellow, not rich in flavor.

2. Bark smooth; leaves having commonly 26 to 30 pairs of primary transverse veins.

*Cambodiana Group.* Leaves medium to large, almost flat, long-acuminate at the apex; panicles very large, the axis and laterals green to dull pink, very finely pubescent; perfect flowers outnumbering the staminate ones throughout the panicle, staminodes weakly developed; fruits long, pointed at the apex, strongly compressed laterally, the flesh bright yellow, of characteristic subacid flavor.

These characters will serve, in a general way, to identify the groups, yet in studying varieties in the field the differences sometimes appear rather obscure. A careful study of the group characteristics presented in the following consideration should, however, enable one to recognize each group without difficulty.

### Mulgoba Group.

In this group the tree is usually erect, with a broad, dense crown, but in at least one variety the growth is rather straggling and weak. Branchlets quite slender, the growths sometimes long. Bark rough. Foliage usually abundant, lighter in color than in the Madras group. The leaves distinctly slender, somewhat smaller, especially in the variety Mulgoba, than in some of the other groups; blades flat, not arched longitudinally, but the surface usually undulating slightly toward the margin; primary transverse veins 22 to 24 pairs, moderately conspicuous.

PLATE XVII.

INFLORESCENCE OF THE MULGOBA MANGO, TYPICAL OF THE MULGOBA GROUP.

In this group the panicles are slender, sparsely branched, with comparatively few flowers in some varieties, an abundance in others. The axis and lateral branches are pale green to rose pink in color. The proportion of perfect to staminate flowers is low in most varieties of the group. Reduced in size.

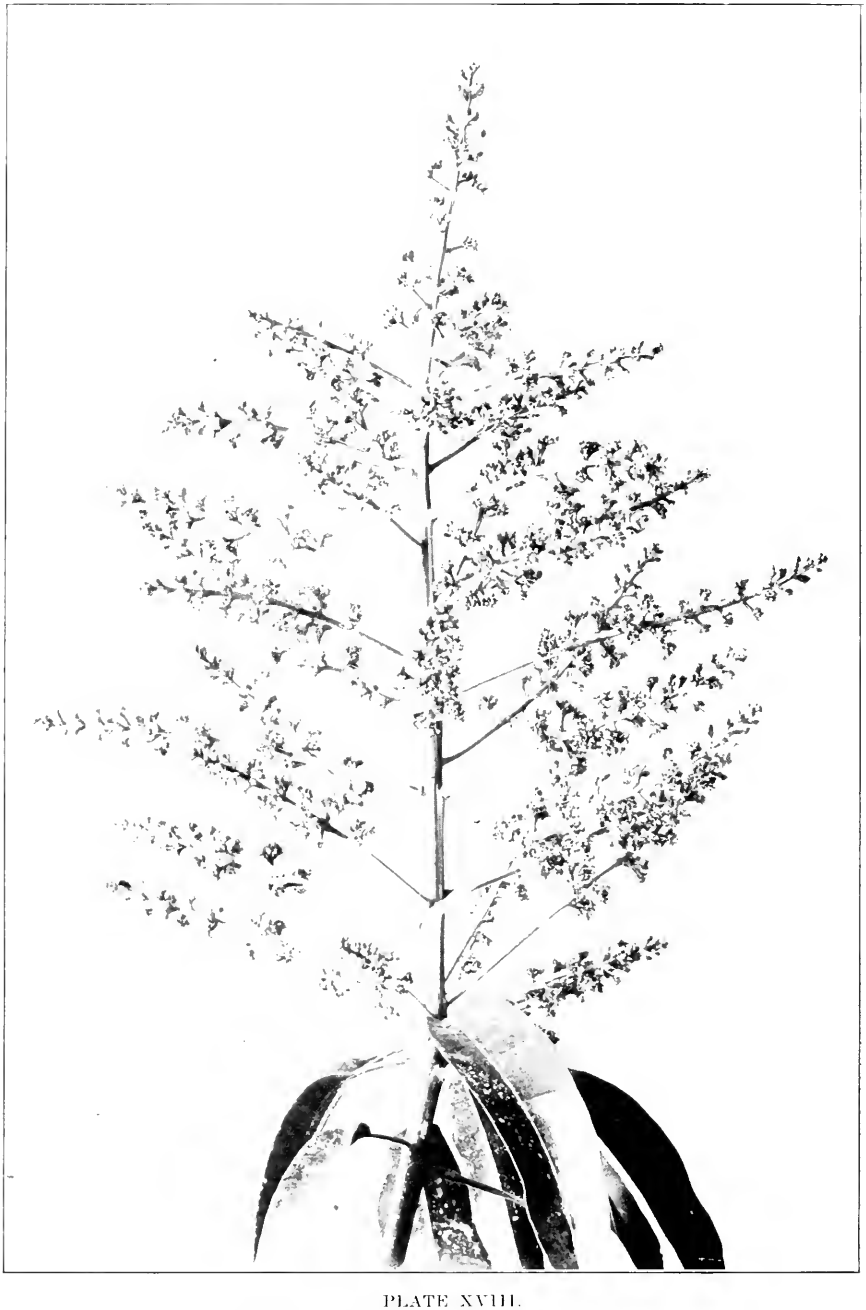


PLATE XVIII.
INFLORESCENCE OF THE PAIRI MANGO.

A typical inflorescence of the Alphonse group. The panicle is large, very broad toward the base, the axis and lateral branches pale green to dull pink in color. The flowers are not densely crowded on the panicle. Reduced in size.

Panicle usually slender, long, not as stiff as in most groups, frequently drooping, 12 to 18 inches in length, the axis and laterals varying from pale green tinged pink to rose pink, the pubescence heavier than in most other groups. Flowers usually very abundant on the panicle, characterised by an unusually large disk, the perfect flowers, except in Haden, limited to the uppermost laterals and the apex of the main axis. In Haden the perfect flowers are abundant and scattered throughout the panicle. Staminodes strongly developed, often capitate, one or two sometimes fertile.

In general, the varieties of this group require the stimulus of dry weather to make them flower profusely, and they show a decided tendency to drop most of their fruits. Haden is the only variety listed which regularly holds its fruits well, the others rarely carrying a good crop. Only one fruit develops on a panicle, as a rule, and this is usually borne close to the apex.

The fruit is usually ovate or oval, very plump laterally, medium to medium large or large in size, varying in color from dull green to yellow blushed red, a distinct beak always lacking. The flesh is deep yellow to orange-yellow, variable in quality, Mulgoba being the finest in this respect of all the varieties grown in Florida, while Mullgoa is rather inferior, and Haden is somewhat fibrous. Seed oblong to reniform-ovate, rather thick, lacking a beak near the apex, normally monembryonic.

*Mulgoba,* introduced to the United States from Poona, India, but said to have originated at Chittur, Madras.

*Jamshedi,* S. P. I. 8734, from the garden of J. N. Tata, near Bombay, India.

*Mullgoa,* S. P. I. 7102, from Bangalore, India.

*Haden,* originated at Coconut Grove, Florida, as a seedling of Mulgoba.

The varieties which Rolfs includes in this group, with the exception of Mulgoba and Haden, have been placed in the Alphonse group. The variety *Nucka,* listed in this group and figured by Rolfs, appears to be Mulgoba, the tree having been wrongly labeled. The true Nucka has not yet been studied in Florida.

### Alphonse Group.

The trees of this group are usually broad and spreading in habit, but in a few cases, e. g., Amini, they may be rather tall, with an oval crown. Branchlets usually stout, stiff, the growths rather long. Bark rough. Foliage abundant, bright to deep green in color, the leaves medium to large in size, medium broad to broad, the blades acute at the base and tapering uniformly to a long slender point at the apex, arched longitudinally, the surface undulating, often heavily so, and curving upward toward the margin; primary transverse veins 20 to 24 pairs, fairly conspicuous.

Panicle large, very broad toward the base, stiff, sometimes stout, erect or drooping under its own weight, 10 to 18 inches long, the axis and laterals pale green to dull rose pink in color, glabrate to very finely and sparsely pubescent. Flowers not crowded on the panicle, medium sized, the perfect ones usually scattered throughout the panicle, sometimes wanting on the lower laterals, most abundant toward the apex of the axis. Staminodes poorly developed, rarely capitate.

In general, the varieties of this group are not heavy bearers. Flowers are often produced sparingly, or on only one side of the tree, but a much higher percentage of flowers develops into fruits than in the Mulgoba group. Under average conditions most of the varieties bear small to fair crops of fruit, only one fruit developing on a panicle.

The fruit is somewhat longer than broad, usually oblique at the base (left shoulder high, right shoulder rounded or falling) and lacking a pronounced beak at the apex, but with the stigmatic point often forming a prominence on the ventral surface above the apex. The size varies from rather small to medium, the color from yellowish green to bright yellow blushed scarlet. The flesh is orange colored, free from fiber, and is characterized by a rich, luscious flavor which is in some cases nearly as good as that of Mulgoba. Taking an average of all the varieties, the quality of fruit is better in this group than in any other here considered. The seed is oblong or oblong-reniform, sometimes with a small beak on the ventral surface above the apex, plump, and contains but one embryo.

### Varieties.

*Alphonse,* S. P. I. 8733, from the garden of J. N. Tata, near Bombay, India. There are various other strains of Alphonse beside the one introduced to the United States under this number, not to mention the various subvarieties, or varieties of the same group, which bear this name in connection with another word, such as White Alphonse and Gola Alphonse.

*Bennett,* S. P. I. 8419 and 8727, from Bombay, India. These two numbers seem to be slightly different strains, and should probably be kept separate. This is one of the varieties known as Alphonse in India.

*Pairi* (syn. *Paheri*), S. P. I. 8730, from the garden of J. N. Tata, near Bombay ,India.

*Amini,* S. P. I. 7104, from Bangalore, India.

*Fernandez,* S. P. I. 7039, from Bombay, India.

*Gola Alphonse,* S. P. I. 29506, from Poona, India.

*Pakria,* S. P. I. 8444, from Poona, India.

*Peters*, S. P. I. 3706, from Trinidad, British West Indies. (Originally obtained from India as a grafted variety).

*Rajpuri*, S. P. I. 7105, from Bangalore, India.

*White Alphonse*, S. P. I. 22970, from near Bombay, India.

### Sandersha Group.

The tree is erect, stiff, with the crown less broad than in the Mulgoba group and usually not so umbrageous. Branchlets stiff and moderately stout. Bark rough. Foliage fairly abundant to abundant, rather deep green in color, the leaves comparatively small but broader than in the Mulgoba group, the blades narrowing rather abruptly at both ends, not arched longitudinally, the surface flat, practically free from undulations; primary transverse veins 18 to 24 pairs, moderately conspicuous.

Panicle small to large, broad toward the base, 8 to 18 inches long, stiff, usually erect but sometimes drooping under its own weight, the axis and laterals deep magenta-pink to bright maroon, the pubescence very minute and inconspicuous. Flowers abundant but not so closely crowded on the panicle as in some of the other groups, the perfect flowers occasionally on the lower laterals, becoming fairly numerous toward the upper part of the panicle, and numerous on the apex of the main axis. Staminodes weakly developed, rarely capitate or fertile.

Varieties of this group will often flower in weather so unfavorable that Mulgoba and many of the Alphonse group show no signs of flowering, and they remain in bloom during a longer period than most of the other groups. The group can be said to be characterized by insistence and persistence in flowering. Sandersha usually carries a good crop; some of the others show a tendency to carry only a few fruits, dropping the rest, but as they have not been fruiting in the United States for more than a few years it is too early to draw definite conclusions regarding their bearing habits. On the whole, the group seems to be characterized by a higher degree of productiveness than any other group of Indian mangos yet grown in this country.

The fruit is long, usually tapering to both base and apex and terminating in a prominent beak at the apex, large in size, deep yellow in color, the flesh orange-yellow, subacid in flavor, free from fiber, lacking the richness of many varieties of the Alphonse group, hence less desirable as a dessert fruit. Seed long, usually tapering toward the base and beaked at the apex, moderately plump, containing normally one embryo, the cotyledons often not filling the endocarp completely.

### Varieties.

*Gordon,* S. P. I. 3705, introduced from Trinidad, British West Indies.

*Kistapal,* S. P. I. 9536, from the Government Botanical Gardens, Saharanpur, India.

*Salamar,* S. P. I. 9535, from the Government Botanical Gardens, Saharanpur, India.

*Sandersha,* S. P. I. 7108, from Bangalore, India.

*Totapari,* S. P. I. 8732, from the garden of J. N. Tata, near Bombay, India.

This group was established by Rolfs, but he listed only one variety belonging to it, i. e., Sandersha itself. Totapari was placed by him in the Pineapple group, which contains some seedlings of Mexican origin.

### Madras Group.

Tree broad, spreading, with a dense, dome-shaped crown. Branchlets stiff, light green, stout. Bark rough. Foliage abundant, of an unusually dark green color, the leaves medium sized, with the blades moderately broad, acute to rounded at the base, long acute at the apex, strongly arched longitudinally, the surface free from undulations, strongly curved upward toward the margin; primary transverse veins 20 to 28 pairs, not very conspicuous.

Panicle broad, short, stiff, erect, 8 to 12 inches long, the axis and laterals very pale green or whitish green, heavily pubescent. Flowers not thickly crowded on the panicle, medium sized, with rather slender petals, the perfect flowers scattered throughout the panicles from the lowermost laterals upward, most abundant toward the apex of the axis. Staminodes poorly developed, rarely fertile.

The two varieties fruiting in Florida which belong to this group bloom regularly but very sparingly, producing each year a few panicles of flowers and a few fruits. More than one fruit sometimes develops on a panicle.

The fruit is broadly oval or nearly spherical, very plump laterally, medium to medium large in size, dull orange-yellow when ripe, slightly beaked at the apex. The flesh is deep orange in color, free from fiber, but marked by peculiar fine black streaks from base to apex which may represent the vascular system; flavor rich and luscious in Madras, not so good in Lamba Bhadra. Seed broadly oval, sometimes broadest toward the apex, slightly beaked on the ventral edge, rather thin, containing but one embryo.

PLATE XIX.

INFLORESCENCE OF TOTAPARI, A TYPICAL MANGO OF THE SANDERSHA GROUP.

In this group the panicle is small to large in size, the axis and laterals deep magenta-pink to bright maroon in color. The flowers are abundant but not closely crowded on the panicle. Reduced in size.

PLATE XX.

INFLORESCENCE OF THE JULIE MANGO.

In this West Indian variety, typical of a large group, the panicle is small, abundantly branched, the axis and laterals rose red to deep crimson in color. The flowers are abundant, and a large proportion of them are perfect. Reduced in size.

### Varieties.

*Madras*, S. P. I. 10657, from the Government Botanical Gardens, Saharanpur, India.

*Lamba Bhadra*, S. P. I. 9537, from the Government Botanical Gardens, Saharanpur, India.

### Julie Group.

Tree rather dwarf in habit, less so in Perrine than in the others, with a broad, dense crown. Branchlets slender but stiff, sometimes dark colored. Bark rough. Foliage usually abundant, varying from bright to deep green in color, the leaves small, medium broad, sometimes slender, the blades tapering at both ends, the surface slightly undulating and curved upward toward the margin; primary transverse veins 18 to 26 pairs, moderately conspicuous.

Panicle small to medium sized, rather slender in Julie and D'Or, stouter in the others, stiff, erect, 6 to 12 inches long, the axis and laterals rose red to deep crimson in color, sparsely and finely pubescent. Flowers abundant to crowded on the panicle, the perfect ones abundant throughout. Staminodes strongly developed, one or two often becoming fertile stamens.

The varieties of this group are very dependable in regard to flowering, usually commencing to bloom early in the season and continuing until late. In productiveness the group is one of the very best, though in Julie there seems to be a tendency for the tree to cast its fruits even after they are half grown.

The fruit is ovate to ovate-reniform, slightly longer than broad, lacking a well defined beak but with the stigmatic point sometimes prominent, small to medium in size, varying from golden yellow (D'Or) to reddish (Julie) in color, the flesh orange-yellow, pleasant but lacking in richness of flavor, rather fibrous in all but D'Or, which is the best of the group. The seed is oblong-oval, rather plump, polyembryonic so far as has been observed.

### Varieties.

*D'Or*, S. P. I. 28085, from Trinidad, British West Indies.

*Julie*, S. P. I. 21515, from Trinidad, British West Indies.

*Divine*, S. P. I. 21516, from Trinidad, British West Indies.

*Perrine*, originated as a seedling near Miami, Florida.

The varieties of this group appear to belong to the common seedling race of the West Indies, and are generally inferior in quality to the Indian groups. D'Or seems rather distinct in fruit from the other members of the group, but resembles them in most characters.

### Cambodiana Group.

In this group the tree is quite erect, with the crown usually oval,—never broadly spreading,—and densely umbrageous. Branchlets slender, the growths sometimes long. Bark very smooth, a characteristic which distinguishes this group from all others. Foliage abundant, deep green in color, the leaves medium sized to rather large, broad, the blades broadly acute at the base and long-acuminate at the apex, not arched longitudinally, the surface undulating slightly toward the margin; primary transverse veins more numerous than in other groups, commonly 26 to 30 pairs, quite conspicuous. The odor of the leaves is also distinctive.

Panicle very large, long, loose, slender, 12 to 20 inches in length, usually more or less drooping, the axis and laterals pale green to dull magenta-pink, very finely pubescent. Flowers rather small and not thickly crowded on the panicle, the perfect flowers usually outnumbering the staminate ones, and occurring throughout the panicle. Staminodes poorly developed, rarely capitate or fertile.

The varieties of this group usually bloom profusely; those from Indo-China are productive, while the Philippine seedlings in Florida sometimes bear excellent crops and in other seasons drop all their flowers. Three to five fruits, or even more, may develop on one panicle.

In form the fruits are always long, strongly compressed laterally, and usually sharply pointed at the apex, lemon yellow to deep yellow in color, with bright yellow flesh almost free from fiber and of characteristic sprightly, subacid flavor, lacking the richness of some of the Indian mangos but very pleasant. Seed oblong, narrowing toward the apex in Cambodiana, comparatively thin in Cecil but more plump in Cambodiana, normally polyembryonic.

### Varieties.

*Cambodiana,* S. P. I. 8701 and 11645. From Saigon, Cochin China. Under this name and these two numbers a quantity of seedlings have been grown in south Florida, some of them having been propagated recently by budding. They vary slightly among themselves, and it will probably be necessary to distinguish some of the best by varietal names.

*Cecil.* Originated as a seedling on the property of J. L. Hickson, near Miami, Florida. The seed was introduced from Cuba.

A number of seedlings belonging to this group are grown in south Florida, where they are called Philippine mangos. Cecil is the only one of these which has been named and propagated.

Professor Rolfs includes in this group the *Manila* race of seedlings grown in eastern Mexico, which is the same as the *Filipino* race of Cuba and the Philippine mango south Florida; Cambodiana; Cecil; and Moulmein (erroneously Malmain) a seedling grown near Miami.

PLATE XXI.

INFLORESCENCE OF THE CAMBODIANA MANGO.

The panicle of varieties belonging to the Cambodiana group, which comes from Cochin China, is very long and sparsely branched, commonly drooping, the axis and lateral branches pale green to dull pink in color. The proportion of perfect to staminate flowers is much higher than in the other groups. Reduced in size.

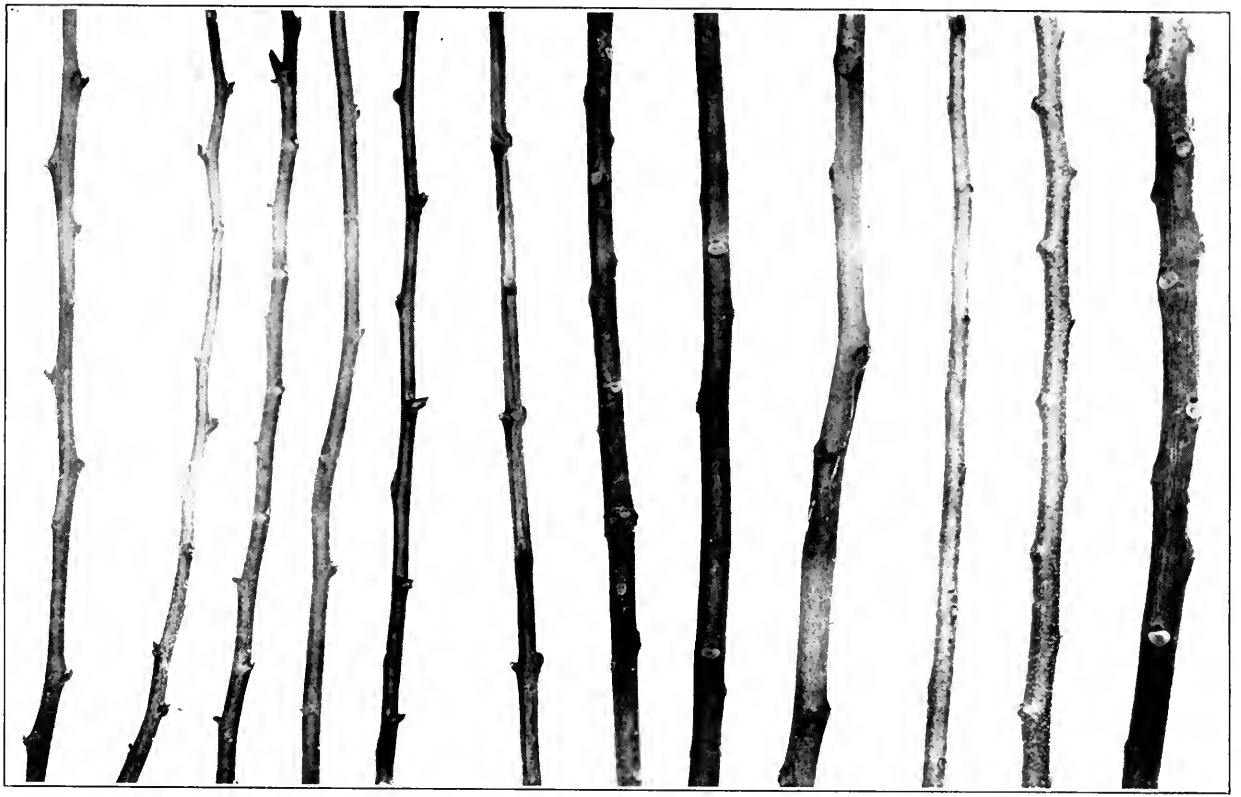


PLATE XXII.—SCIONS OF VARIOUS SPECIES OF TROPICAL FRUIT PLANTS.

Left to right — Petioled scions of Mandarin, Vilatti, Tamarind, Barobo, Carambola and Guava; non-petioled scions of Mango, Cacao, Santol, Sugar apple, Cherimoya and Iba.

The following varieties, which have been studied at Miami, do not seem to fall in any of the above groups:

*Brindabani*, S. P. I. 9506, from Saharanpur, India. A dwarf grower, precocious, and unusually productive. The fruit is small and spherical or nearly oblate. Its affinities do not seem to lie with any of the groups described.

*Itamaraca*, S. P. I. 23426, from Rio de Janeiro, Brazil. A dwarf variety, like Brindabani, with fruit of similar size and form. The character of the inflorescence is entirely different, however, and it is scarcely probable that the two varieties belong together, especially in view of the fact that they have come from widely different sources.

*Amiri*, S. P. I. 9808, from Saharanpur, India. In an artificial classification based upon form of fruit, this variety would fall in the same group as Sandersha, but it appears to have nothing in common with this group except its elongated form.

*Gola*, S. P. I. 10662, from Saharanpur, India. The leaves of this variety are much larger than those of any other Indian mango grown in Florida. The fruit is large and rather long. The inflorescence and several other characters suggest that it may belong with the Alphonse group, but it is so distinct from the group in foliage and in form of fruit that it scarcely seems safe to include it.

## Seedling Races and Types of South Florida.

Apparently the majority of seedling mangos grown in southeastern Florida, i. e., the Miami region, have been derived from Cuba, and a study of them has shown that they can be classified with the principal Cuban races and types. Since this classification has been considered in detail in a separate paper[6], it need not be repeated here.

## References.

1 Burns, W., and Prayag, S. H., "The Classification of Mango Varieties," Agrl. Journal of India, Vol. X, Part IV, 1915.
2 Rolfs, P. H., "Mangos in Florida," Bul. 127, Fla. State Agrl. Exp. Station, 1915.
3 Chauveaud, G. L., "Sur la fecondation dans les cas de polyembryonie," Compt. Rend. 114. pp. 504-506, 1892.
4 "The Mangos of Cuba," Proc. Am. Pom. Society, 1915.
5 Letter to writer dated May 4, 1916.
6 "The Mangos of Cuba," Proc. Am. Pom. Society, 1915.

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*The fertility of pollen in a group is to be reckoned with in the work of breeding apples. In the cross-pollinizing of the winesap group in Maryland we have met with failure; but similar work with the same group in Utah was a positive success.*—C. P. Close.

## VEGETATIVE PROPAGATION OF TROPICAL FRUITS.

P. J. WESTER, *Philippine Islands.*

### INTRODUCTION.

To those familiar with the history of the temperate fruits it is common knowledge that many of the best varieties originated as chance seedlings that had grown up in a fence corner, the backyard or in the woodlot. Systematic breeding is still of such recent date that it is probably true that were the origin of the varieties of our cultivated temperate fruits traced, by far a very large majority most likely would be found to have merely "happened," so to speak. They owe their preservation, dissemination and present-day importance to the fact that some one who appreciated their value was familiar with some method of propagating them vegetatively, i. e. by the means of offsets, cuttings, grafting, etc.

The Concord grape is frequently quoted as a classical example. Then we have the Washington Navel orange, so extensively cultivated in California. More recent illustrations are the numerous superior pecan and avocado varieties, none of which are the result of breeding, but which were found from time to time as superior seedling trees in the field or orchard.

Excepting the banana and pineapple none of the tropical fruits has attained the importance nor has been subjected to the critical discrimination comparable to those of the Temperate Zone. In the Tropics there has been no insistent demand for superior fruits, with the natural consequence that no attempts have been made to perpetuate the better kinds except in a casual way. Partly this has been due to the indolence of the people inhabiting the Torrid Zone, but in large measure also it is unquestionably owing to the surprisingly good quality of so many wild or semi-cultivated tropical fruits. However, the constantly growing number of Caucasian settlers, and the spread of education among the native inhabitants in at least some tropical countries are gradually changing the indifference to the quality of the tropical fruits and creating a demand for superior varieties.

With their large numbers of seedling fruit trees and shrubs, in a certain sense, the Tropics may be considered one vast experimental field. As in the testing grounds of the plant breeder, among this great number of plants there are some that distinguish themselves among their fellows for productivity, early or late maturing habit, with fruit of better quality, approaching seedlessness, or possessing other desirable characteristics. But when we know that as a rule such features are not transmitted to the progeny it follows

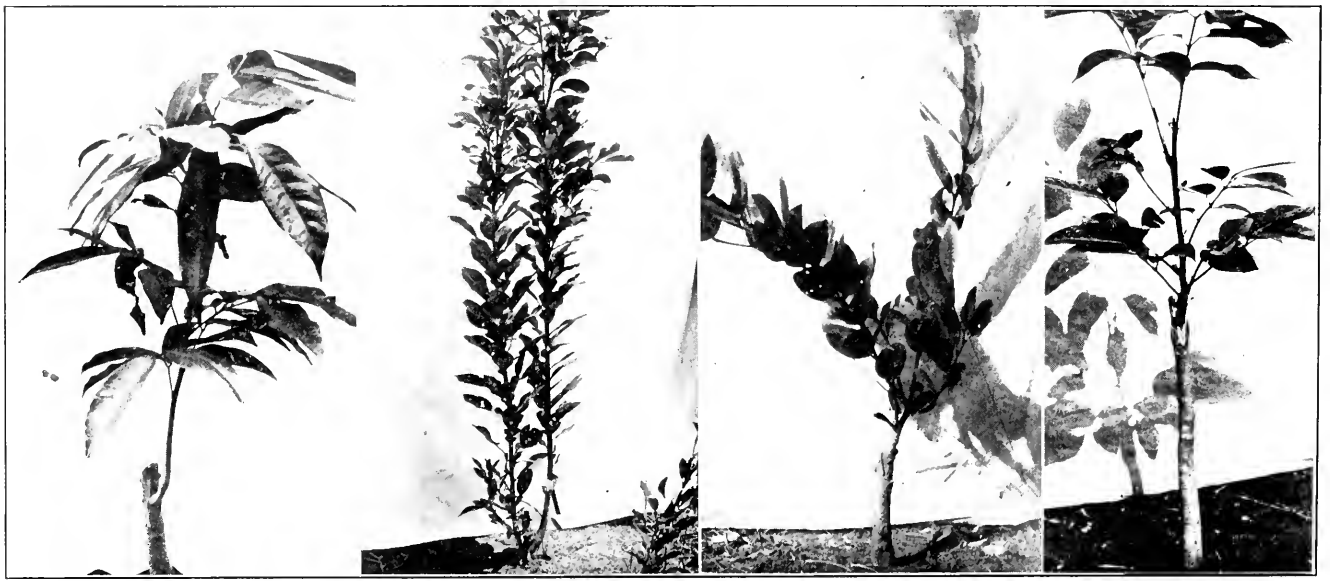

PLATE XXIII.— SHIELD BUDDED TROPICAL FRUITS.

Left to right — Litchi, Pomelo on Calamondin, Icaco, Pili. Lamao Experiment Station.

PLATE XXIV. SHIELD BUDDED TROPICAL FRUITS.

Left to right — Alpay on longan stock, Soncoya on soursop stock, Soncoya on custard apple stock, Bignay. Lamao Experiment Station.

that a seedless marang or lanzon, or an early or late season mangoical fruits was here brought together for study and experimental value unless such exceptional seedlings can be propagated vegetatively.

Several years' residence and study of the avocado and other tropical fruits in south Florida, coupled with experiments in grafting and budding, begun in 1904, convinced the writer of the great opportunities for improvement of the tropical fruits merely by the discovery of a practicable method of propagating the various species asexually. This work, confined to the avocado, mango, the more common Annonas, tamarind, guava, papaya and sapodilla, was conducted at the Subtropical Laboratory and Garden, Bureau of Plant Industry, United States Department of Agriculture, Miami, Florida.

In the Philippines, within the Tropics proper, with their large number of species of tropical fruits, these opportunities broadened to an unexpected degree, especially after the writer was charged with the direction of the Lamao Experiment Station of the Insular Bureau of Agriculture. A large number of species of tropical fruits were here brought together for study and experimental purposes, and during the past seven years especial attention has been devoted to experiment in tropical economics, including various methods in the vegetative propagation of fruits by cuttage, layerage and graftage. Particular attention has been devoted to shield-budding as being the simplest method of grafting devised.

Most exogenous plants are more or less readily propagated by marcottage during the rainy season, and all are easily propagated by inarching, though, of course, neither of these two methods can be considered anything but makeshifts until better methods shall have been devised, and are impracticable in the propagation of large numbers of plants. Layering may be resorted to in the case of a few bush fruits and grapes. Few fruits are successfully propagated from cuttings.

In all probability most species can be grafted if the right conditions obtain. Scions should then be selected from well-matured growths and the work carefully performed.

The fact that one species in a genus can be budded, in all probability indicates that others in the same genus can also be budded by following the directions for its congener as closely as possible. The experimental work in budding, etc., relative to many species is of such recent date that all conditions under which success is possible have not yet been determined, and in many species greater latitude, in the selection of budwood for instance, may doubtless be allowed than the directions hereinafter indicate. These directions indicate the conditions under which propagation has been success-

ful. In all species where petioled budwood is used, nonpetioled budwood will, of course, serve the purpose equally well.

In very rare instances, such as the species in the genus *Coffea,* in order that the grafted plant may be of normal habit it is necessary that the scions be taken from a vertical growth, for if the scion has been cut from a horizontal branch the resulting plant does not produce an upright stem, but assumes a dwarf, spreading or trailing habit.*

The seasons apparently exercise some influence relative to the facility with which unions form in some species, for instance the guava, and this may well be true of many other species. Therefore, it may be well to state that most of the experimental work in budding, upon which the directions are based, was conducted during the dry season, from the beginning of November to the end of May.

It has been contended by some that a tropical climate is to a certain extent inimical to the budding and grafting of certain plants. In the experience of the author there are no grounds for such a contention, the work with the same species in Florida and in the Philippines showing no difference.

While, as already stated, shield-budding is the least complicated of all the various modes of grafting, the following essential points must be observed in order that the work may be successful:

(1.) The stock plants must be in such condition that the bark separates readily from the wood, allowing the easy introduction of the bud.

(2.) The budding knife should be well adapted to the purpose, keen edged and kept clean of all impurities.

(3.) Proper scions should be employed. The selection of scions or budwood is perhaps the most difficult problem for the beginner. Buds from immature scions do not "take" as a rule, and the cutting of buds from old and hard material is difficult. Generally speaking, scions cut from the second and third growths or "flushes" from the end of the twig, six to eight millimeters in diameter, make good budwood, though in some plants, for instance those belonging to the *Annonaceae,* the last season's growth from which the leaves have shed is the most preferable. In species with both angled and round twigs, like the citrus fruits, the scions cut from the round growths are preferable. In thorny species, spineless scions, or budwood with small, weak spines should be selected.

As the experimental work in budding was extended to several species of tropical fruits that had hitherto been propagated from seed it was found that various modifications in the practice as generally employed became necessary in order that the operation be

*An interesting statement; and especially so, in view of Crandall's findings in relation to propagation by selected apple buds.—Bnl. 211. Ill. Exprt. Sta. 1918.—Secy.

successful, such as in the selection of scions. In most species the buds proper are sunk into the bark tissue, and if the growths are accidently broken off, new ones come forth if the right attention is given to the budded plant. The avocado is an exception to this rule, in that the buds are mostly superficial upon the bark and frequently grow hard and are shed in the course of a few months. Here rather tender or partly mature scions with well-developed buds should be selected, or a large percentage of the buds will fail to grow after they have taken, for such "blind" buds, as they are called, are incapable of producing any growth whatever. Again, petioled scions, i. e., budwood cut fresh as the budding proceeds, and the petioles trimmed off close to the wood, may be employed in a majority of species, while in others non-petioled scions have been found essential to success. This term (non-petioled scions or budwood) implies that the leaves should have dropped from the twigs selected for scions. If the leaves still adhere to a twig otherwise desirable as a scion the leaf blades should be trimmed off the twig while it is still attached to the tree two to three weeks in advance of the date when the budding is to be performed. The petioles then drop and the scions are in proper condition for budding after a well healed leaf-scar has formed.

(4.) The scions should not be allowed to dry out from exposure to the air and sun. It is well to keep the budwood protected from the dry atmosphere in a small tin box, or covered with moist cloth or paper, as the budding proceeds. Budwood that has been long in transit, and upon arrival appears dry and lifeless, may be revived by being wrapped in saturated sphagnum moss or cloth for six to ten hours if it is not too far gone.

(5.) Provided that the stock is of a suitable size the point of insertion of the bud is immaterial in most species, in others it is important that the bud be inserted in the stock at a point of about the same age, and where the bark is of the same appearance as that of the scion.

(6.) The bud should be cut so that there is no break or tear in the tissues.

(7.) The bud should be inserted immediately after it is cut and should be tied at once, preferably with waxed tape.

(8.) No water or impurities should be permitted to enter the point of insertion of the bud.

In attempting to bud a species regarding which the detailed requirements are not known, it is best to use non-petioled budwood of the same age and appearance as the stock at the point of insertion of the bud.

All directions hereinafter are based upon observations or experiments made by the writer or under his supervision except where so indicated and the experimental work has been conducted under the same conditions that would obtain in a nursery operated on commercial lines. Otherwise than where so stated it is understood that all species are propagated by inverted shield-budding, and that the scions as here described are used in this method of propagation.

Excepting the loquat which was made at Miami, Florida, published by the courtesy of Mr. David Fairchild, Bureau of Plant Industry, United States Department of Agriculture, all photographs have been made at the Lamao Experiment Station, Philippines, and are published by the courtesy of the Director of Agriculture, Manila. With the exception of the figures illustrating the scions, and the breadfruit, bignay, durian, bilimbi, cacao, pomelo, carambola, cleft grafted coffee and tamarind, which have appeared in various publications issued by the Insular Bureau of Agriculture, the plates have never appeared in print; those illustrating shield budding, the loquat excepted, are believed to be the first shief-budded plants illustrated of their respective species. *Inophyllum calophyllum* is, of course, not a fruit. It is shown as being probably the first shield-budded plant of the *Guttiferae*. The directions or "formulas" for each species have been published from time to time in the "Philippine Agricultural Review" and in "Plant Propagation in the Tropics," but are here brought together for the convenience of American fruit growers to which the aforesaid publications are not available.

## Brief Directions for the Vegetative Propagation of Tropical and Semi-Tropical Fruits.

Akee *(Blighia sapida)*. Use non-petioled, metallic blue-gray, mature budwood; cut the bud 4.5 to 5 centimeters long; age of stock at point of insertion of bud unimportant.

Alacao *(Palaquium philippense)*. Use non-petioled, metallic-blue, mature budwood; cut the bud 4.5 to 5 centimeters long; age of stock at point of insertion of bud unimportant.

Alpay *(Euphoria cinerea)*. Use non-petioled, light brown to greenish becoming rough, mature budwood; cut the bud 4 centimeters long; age of stock at point of insertion of bud unimportant. Congenial stock: Longan.

Anigli *(Annona senegalensis)*. Use non-petioled, well-matured budwood from which the green color has disappeared; cut the buds 4 to 5 centimeters long; age of stock at point of insertion of bud unimportant. Congenial stocks are Custardapple, soursop, sugar-apple and mamon.

PLATE XXV.— SHIELD BUDDED TROPICAL FRUITS.

Left to right — Robusta coffee, Tamarind, Paniala, Bananae. Lamao Experiment Station.

PLATE XXVI. SHIELD BUDDED TROPICAL FRUITS.

Left to right — Bilimbi, Catmon, Barobo, Carambola. Lamao Experiment Station, Philippine.

Annatto *(Bixa orellana)*. Use well-matured, greenish-brown petioled budwood; cut the bud 4 to 4.5 centimeters long; age of stock at the point of insertion unimportant.

Atemoya. (Hybrid cherimoya X sugarapple.) See Cherimoya. Congenial stocks are sugarapple, cherimoya, custardapple and some forms of the mamon.

Atibu *(Rubus pectinellus)*. Propagated by plantlets forming and rooting on the trailing plants.

Avocado *(Persea americana)*. Use tender to mature, but green, smooth, petioled budwood; cut the buds 3.5 to 4.5 centimeters long; age of stock at point of insertion of bud unimportant.

Bael *(Aegle marmelos)*. Use petioled, green or purplish, fairly mature, not old and hard, thornless budwood; cut the buds 3.5 to 4 centimeters long; age of stock at point of insertion of bud unimportant.

Banana *(Musa sapientum,* etc.). Readily propagated from the "suckers" that spring up from the root stock of the old plants.

Banauac *(Uvaria rufa)*. Use well-matured, dark-brown, non-petioled budwood from which the tomentum has disappeared; cut the bud 3.5 to 4.5 centimeters long; age of stock at point of insertion of bud unimportant.

Barobo *(Diplodiscus paniculatus)*. Use petioled, mature, brownish to grayish budwood; cut the buds 3 to 4 centimeters long; age of stock at point of insertion of bud unimportant.

Bignay *(Antidesma bunius)*. Use petioled, green, smooth, but fairly well matured budwood with brown-colored lenticels; cut the buds 3.5 to 4 centimeters long; age of stock at point of insertion of bud unimportant.

Bilimbi *(Averrhoa bilimbi)*. Use non-petioled, matured, brownish or grayish, still downy budwood; cut the buds 3.4 to 4.5 centimeters long; age of stock at point of insertion of bud unimportant.

Biriba *(Rollinia orthopetala)*. See Cherimoya. Congenial stocks are mamon, custardapple and soursop.

Breadfruit, seedless *(Artocarpus communis)*. Propagated by root cuttings 25 centimeters long, 1 to 6 centimeters in diameter, inserted in sand or sandy soil during the rainy season.

Cabuyao *(Citrus histrix)*. See orange. Congenial stocks are orange and pomelo, and probably other related species.

Cacao *(Theobroma cacao)*. Use non-petioled, matured, brownish or grayish budwood that has been of slow formation, of current or last year's growth; cut the buds 4 to 5 centimeters long; insert in stock at a point of approximately the same age and appearance as the scion.

Caimito* *(Chrysophyllum cainito).* Use well-matured, non-petioled budwood; cut the buds 3.5 to 4 centimeters long; insert the buds in stock of approximately the same appearance as the scion.

Calamondin *(Citrus mitis).* See orange. Congenial stocks are orange and pomelo, and probably other standard citrus stocks.

Calpi *(Citrus webberii).* See orange. Congenial stocks are orange, pomelo and calamondin.

Canei *(Citrus* histrix var; *boholensis).* See orange. Congenial stocks are orange, pomelo and probably other related species.

Carambola *(Averrhoa carambola).* Use petioled, fairly mature, smooth, purplish but not old and hard budwood; cut the buds 2.5 to 3 centimeters long; age of stock at point of insertion of the bud unimportant.

Carissa *(Carissa arduina).* Readily propagated by layering, by merely covering branches with soil and keeping moist.

Carob *(Ceratonia siliqua).* Grafting said to be in common use in Spain and Italy. Can probably be readily shield budded; fairly mature, petioled budwood is suggested as suitable.

Cashew *(Anacardium occidentale).* Use non-petioled, mature budwood which is turning grayish; cut the bud 4 to 4.5 centimeters long; insert the bud in stock at a point of approximately the same age and appearance as the scion.

Catmon *(Dillenia philippinensis).* Use fairly mature, dark green or purplish, smooth, petioled budwood; cut the buds 3 centimeters long; age of stock at point of insertion of bud unimportant.

Cefalus *(Sarcocephalus esculentus).* Make hardwood cuttings of well-matured growths 25 to 30 centimeters long and insert from two-thirds to three-fourths their length in sandy soil during the dry season.

Ceriman *(Monstera deliciosa).* Propagated by the division of the stems; each part should have not less than three "eyes," or buds.

Cherimoya *(Annona cherimolia).* Use well-matured, non-petioled budwood of the last season's growth from which the green color has disappeared; cut the buds 4 to 5 centimeters long; age of stock at point of insertion of bud unimportant. Congenial stocks are custardapple, mamon, sugarapple.

Cinnamon *(Cinnamonum zeylanicum).* Use well-matured but smooth and green petioled budwood; cut the buds 3.5 to 4 centimeters long; age of stock at the point of insertion of bud unimportant.

Citron *(Citrus medica).* See orange. Congenial stocks are orange, sour orange, pomelo, lime, rough lemon.

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*Likewise known as Star-apple.—Sec'y.

Coffee, Arabian, Robusta, Quillou, Congo, Liberian, Excelsa, etc. *(Coffea arabica, C. robusta, C. quillou, C. congensis, C. liberica, C. excelsa, etc.)*. Use well-matured, green to brownish or blackish, non-petioled scions; cut the buds 3.5 to 4 centimeters long; age and appearance of stock at the point of insertion unimportant. Readily cleft grafted. Then, cut scions 5 to 7.5 centimeters long, and insert in stock preferably not more than 2 centimeters in diameter, 10 centimeters above the ground. Seal all wounds with grafting wax. *In order to produce normal trees the scions should be made from vertical growths.* Liberian, Excelsa and related species are considered the best stock.

Cubili *(Cubilia blancoi)*. Use non-petioled, green and smooth to turning brown and rough, slender, fairly mature budwood; cut the buds 4 to 5.5 centimeters long; age of stock at point of insertion of bud unimportant.

Custardapple *(Annona reticulata)*. See Cherimoya. Congenial stocks are soursop, mamon, sugarapple.

Dalinsi *(Terminalia edulis)*. Use petioled, with tomentum disappearing to smooth, fairly mature, brownish or grayish-green budwood; cut the buds 3.5 to 4 centimeters long; age of stock at point of insertion unimportant.

Date *(Phoenix dactylifera)*. Propagated from the suckers growing at the base of the palm.

Duhat *(Eugenia jambolana)*. Use barely mature, green or reddish, smooth, petioled budwood; cut the buds 4 to 4.5 centimeters long; age of stock at point of insertion of bud unimportant.

Durian *(Durio zibethinus)*. Use non-petioled, fairly mature, but not old and hard budwood; cut the bud 2.5 to 3.5 centimeters long; age of stock at point of insertion of bud unimportant.

Feijoa *(Feijoa sellowiana)*. Said to be propagated by layering in California and France. Has been shield budded at Lamao Experiment Station.

Fig *(Ficus carica)*. Readily propagated by cuttings, 25 to 30 centimeters long, from well-ripened wood of last year's growth or older.

Genipa *(Genipa americana)*. Use mature, bluish-green, smooth, non-petioled budwood; cut the buds 4 to 4.5 centimeters long; age of stock at point of insertion of the bud unimportant.

Granadilla *(Passiflora quadrangularis)*. Propagated by cuttings, 25 to 30 centimeters long, from well-matured vines, inserted in sand or sandy soil.

Grape, Labrusca, Vinifera and hybrids *(Vitus labrusca, V. vinifera)*. Propagated by cuttings from well-ripened vines, 25 to 30 centimeters long, or by grafting.

Grape, Muscadine *(Vitis rotundifolia)*. Propagated by layering during the growing season, and by cuttings of well-ripened vines, 25 to 30 centimeters long, inserted in sandy soil during the dormant season, or by grafting.

Grapefruit. See Pomelo.

Guava *(Psidium guajava)*. Use mature, barely brown-colored, petioled budwood; cut the buds 2.5 to 3 centimeters long; age of stock at point of insertion of the bud unimportant. Perform work from November to May.

Guisaro *(Psidium molle)*. Use non-petioled, mature, gray to brownish budwood; cut the bud 3 to 4 centimeters long; age of stock at point of insertion of bud unimportant.

Hevi *(Spondias cytherea)*. Use non-petioled, slender, mature, but green and smooth budwood; cut large buds with ample woodshield, 4 to 4.5 centimeters long; insert the buds in the stock at a point approximately of the same age and appearance as the scion. Stout cuttings may be rooted.

Hondapara *(Dillenia indica)*. Use non-petioled, slender, fairly mature, green to brown, hairy budwood; cut the buds 3.5 to 4.5 centimeters long; age of stock at point of insertion of bud unimportant.

Iba *(Cicca disticha)*. Use non-petioled, fairly mature, green to turning brown, smooth, slender budwood; cut large buds with ample woodshield, 4 to 4.5 centimeters long; age of stock at point of insertion of the bud unimportant.

Icaco *(Chrysobalanus icaco)*. Use petioled, fairly mature, greenish-brown budwood with lenticels well developed; cut the bud 3 to 3.5 centimeters long; age of stock at point of insertion of bud unimportant.

Juani *(Mangifera odorata)*. See mango. Congenial stock: mango.

Jujube *(Zizyphus jujuba)*. Use mature, grayish, tomentose, petioled budwood; cut the buds 3.5 to 4 centimeters long; age of stock at point of insertion not important.

Katuri *(Garcinia venulosa)*. Use mature, smooth, green, non-petioled budwood; cut the buds 3.5 to 4 centimeters long; insert the buds in the stock at a point of approximately the same appearance as the scion or at most where streaked with gray.

Ketembilla *(Aberia gardnerii)*. Use petioled, preferably spineless, not too old budwood with tomentum still present; cut buds 3 to 3.5 centimeters long; age of stock at point of insertion of buds unimportant.

Kumquat *(Citrus japonica)*. See orange. Congenial stocks are sour orange, orange, and probably several other related species.

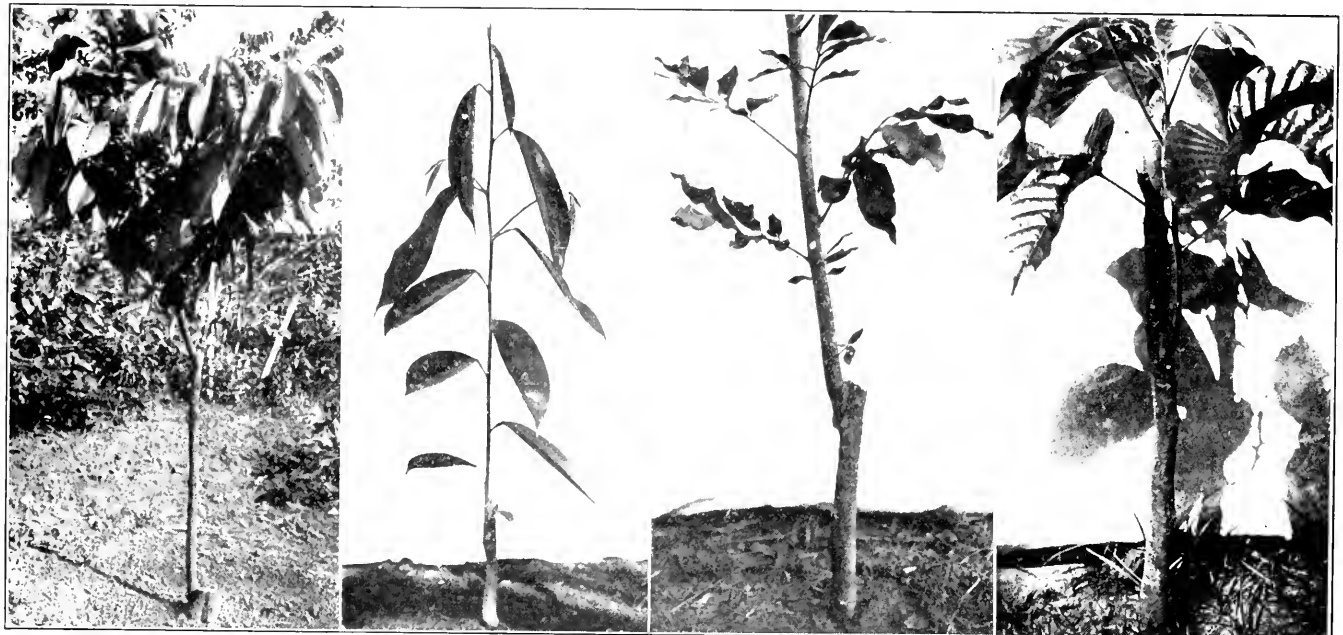

PLATE XXVII.— SHIELD BUDDED TROPICAL FRUITS.

Left to right — Mabolo, Durian, Longan on alpay stock, Santol. Lamao Experiment Station.

PLATE XXVIII.—SHIELD BUDDED TROPICAL FRUITS.

Left to right—Cacao, Phalsa, Guisaro, *Inophyllum calophyllum*. Lamao Experiment Station.

Lanzon *(Lansium domesticum)*. Propagated by cleft or side grafting. The scion should be well matured but not of old growth, 6 to 8 centimeters long, 7 to 10 millimeters in diameter and inserted in the stock 6 to 10 centimeters above ground when at that height it is 7 to 15 millimeters in diameter; cover all wounds with grafting wax. Shield budding has been done, but the percentage of successful buds has been small.

Lemon *(Citrus limonum)*. See orange. Congenial stocks are sour orange, orange, rough lemon, pomelo, calamondin.

Lime *(Citrus limetta)*. See orange. Congenial stocks are sour orange, orange, pomelo, calamondin and rough lemon.

Lipote *(Eugenia curranii)*. Use non-petioled, turning brown and rough, mature budwood; cut the bud 4 centimeters long; age of stock at point of insertion of bud unimportant.

Litchi *(Litchi chinensis)*. Use non-petioled, brown-gray, mature budwood; cut the bud 3.5 to 4 centimeters long; age of stock at point of insertion of bud unimportant.

Longan *(Euphoria longana)*. Use non-petioled, bluish-green to turning brown, mature budwood; cut the bud 4 to 4.5 centimeters long; age of stock at point of insertion of bud unimportant. Congenial stock: Alpay.

Loquat *(Eriobotrya japonica)*. Use mature, greenish to brownish, slender, petioled budwood; cut the buds 4.5 centimeters long; age of stock at the point of insertion of the bud unimportant.

Mabolo *(Diospyros discolor)*. Use petioled, fairly mature budwood with pubescence still adhering; cut the buds 4 centimeters long; insert buds in the stock at a point where it is green or becoming gray.

Malpi *(Malpighia glabra)*. Use petioled, light-gray to greenish, mature budwood; cut the buds 3.5 centimeters long; age of stock at point of insertion of bud unimportant.

Mandarin *(Citrus nobilis)*. See orange. Congenial stocks are sour orange, orange, pomelo, rough lemon, lime, calamondin.

Mango *(Mangifera indica)*. Use non-petioled, mature, smooth, green budwood from the first, second or third flush; cut the buds 4 to 4.5 centimeters long with ample woodshield; insert the buds in stock at a point approximately of the same age and appearance as the scion.

Mangosteen *(Garcinia mangostana)*. Use mature, green and smooth, non-petioled budwood; cut the buds 3.5 centimeters long; insert the buds in the stock at a point of the same appearance as the scion or at most where it is streaked with gray.

Matasano *(Casimiroa edulis)*. Use petioled, fairly mature, greenish budwood; cut the buds 3.5 centimeters long; age of stock at point of insertion of the bud unimportant.

Mombin *(Spondias purpurea)*. Readily propagated by cuttings, 50 to 75 centimeters long, from last year's growth or older, inserted into the ground about 30 centimeters in permanent position during the rainy season.

Mulberry *(Morus nigra)*. Propagated by cuttings from well-matured growths, 25 to 30 centimeters long, inserted in the soil. Readily shield budded; use well-ripened, petioled budwood; cut the buds 3 to 4 centimeters long; age of stock at point of insertion of the bud unimportant.

Nelli *(Phyllanthus emblica)*. Use mature, greenish-brown, petioled budwood; cut the buds 3.5 centimeters long; age of stock at point of insertion of the bud unimportant.

Orange *(Citrus aurantium)*. Use fairly to well-matured, petioled, green and smooth, preferably spineless and round budwood; cut the buds 2.5 to 4 centimeters long; age of stock at point of insertion of bud unimportant. Congenial stocks are sour orange, rough lemon, pomelo, lime, calamondin.

Palanau *(Rubus fraxinifolius)*. See Pilay.

Pangi *(Pangium edule)*. Use slender, fairly mature, turning from bright green to bronze-green, non-petioled budwood; cut the buds 4.5 to 5.5 centimeters long; age of stock at point of insertion of bud unimportant.

Paniala *(Flacourtia cataphracta)*. Use petioled, matured, greenish-gray to brown budwood; cut the buds 3.5 centimeters long; age of stock at point of insertion of bud unimportant.

Papaya *(Carica papaya)*. Propagated by cleft grafting and side grafting. Make grafts preferably not more than 10 centimeters above ground, in stocks preferably 20 to 30, not more than 50 centimeters high, or more than 2.5 centimeters in diameter at point of union; in the cleft graft, if there is any considerable hollow in the stock, make the cleft to one side of it; in the side graft make the incision entirely outside of the hollow; make scions from sprouts about 7 centimeters long of old papayas; trim off nearly all leaf blades, leaving the petioles. Perform work late in afternoon and keep plants shaded.

Pereskia *(Pereskia aculeata)*. Propagated by cuttings inserted preferably in sand or sandy soil during the dry season.

Phalsa *(Grewia asiatica)*. Use mature, brownish, petioled tomentose budwood; cut the buds 3.5 centimeters long; age of stock at point of insertion unimportant.

Pilay *(Rubus niveus)*. Propagated by division of the old plant and by hardwood cuttings of well-matured canes.

Pili *(Canarium ovatum)*. Use slender, mature, greenish-brown, fairly smooth budwood; cut the buds 4 to 5.5 centimeters long;

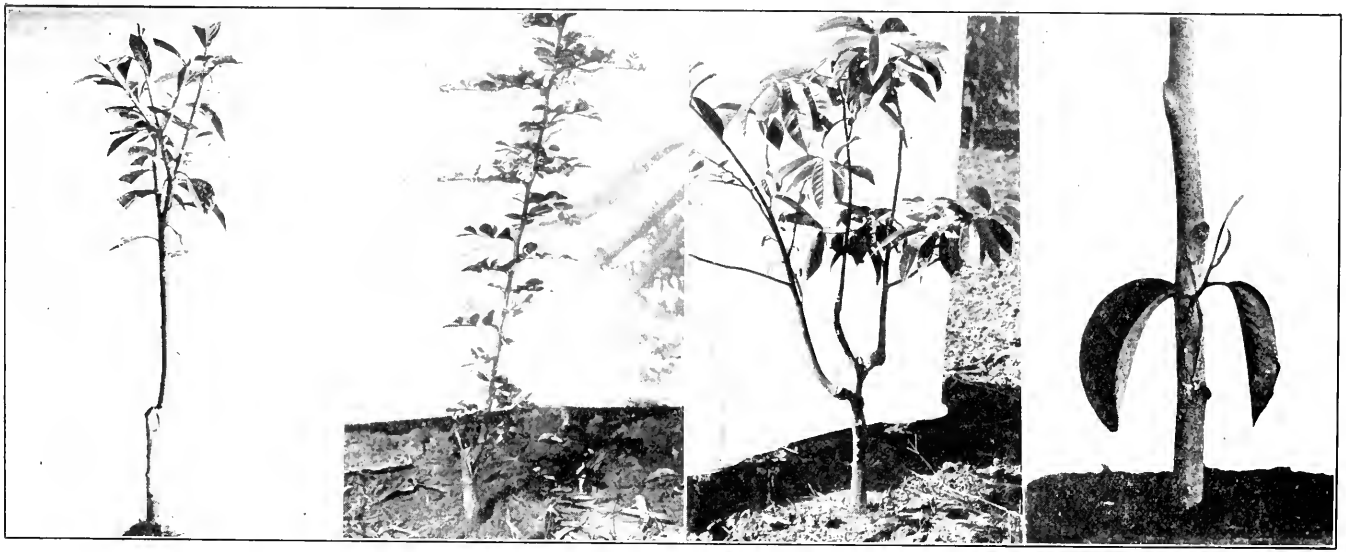

PLATE XXIX.— SHIELD BUDDED TROPICAL FRUITS.

Left to right — Loquat, Vilatti, Biriba on *Annona montana* stock, Caimito. Lamao Experiment Station.

PLATE XXX.— VEGETATIVELY PROPAGATED TROPICAL FRUIT.

Left to right Cleft grafted Robusta, side grafted Papaya, root cuttings of bread fruit, side grafted Lanzon. Lamao Experiment Station.

insert the buds in the stock at a point of approximately the same age and appearance as the scion.

Pineapple *(Ananas sativus)*. Propagated by slips, suckers, ratoons and crowns.

Pitanga *(Eugenia uniflora)*. Reported to be whip grafted in south Florida; under these circumstances it can probably be cleft or side grafted also.

Pomegranate *(Punica granatum)*. Readily propagated by cuttings made from well-ripened growths, 30 centimeters long, inserted in sandy soil.

Pomelo *(Citrus decumana)*. See orange. Congenial stocks are sour orange, orange, rough lemon, lime, calamondin.

Pulasan *(Nephelium mutabile)*. Use non-petioled, russet-colored, and somewhat rough, mature scions; cut the bud 4 to 5.5 centimeters long; age of stock at the point of insertion of the bud unimportant.

Ragini *(Rubus rosaefolius)*. See Pilay.

Rambutan *(Nephelium lappaceum)*. Use non-petioled, brown-gray mature budwood; cut the bud 4 to 4.5 centimeters long; age of stock at point of insertion of bud unimportant.

Rolfeia *(Rubus rolfei)*. Easily propagated by layering.

Santol *(Sandoricum koetjape)*. Use non-petioled, fairly mature, turning brownish, grayish and rough, rather slender budwood; cut buds 3.5 to 4 centimeters long; insert buds in stock at point of same age and appearance as the scion.

Sapodilla *(Achras sapota)*. Said to be budded or grafted in India and British West Indies; details of method not known.

Soncoya *(Annona purpurea)*. See Cherimoya. Congenial stocks are custardapple and soursop.

Sour Orange *(Citrus vulgaris)*. See orange. Congenial stocks are orange, pomelo, rough lemon and probably other related species.

Soursop *(Annona muricata)*. See Cherimoya. Congenial stocks are mamon, custardapple.

Strawberry *(Fragaria chiloensis)*. Propagated by division of the old plants, and by the plantlets on the runners.

Sugar-apple *(Annona squamosa.)* See Cherimoya. Congenial stocks are custardapple and soursop.

Tamisan *(Citrus longispina)*. See orange. Congenial stocks: pomelo and probably other standard citrus stocks.

Tamarind *(Tamarindus indica)*. Use petioled, well-matured, brownish or grayish budwood; cut the buds 3 centimeters long; age of stock at point of insertion of bud unimportant.

Tangelo. (Hybrid mandarin X pomelo.) See orange. Congenial stocks are sour orange, orange, pomelo, rough lemon, lime.

Tea *(Camellia thea)*. Side grafted in Java. Scions made from well-matured twigs.

Tibao *(Rubus elmeri)*. Readily progagated by layering.

Tizon *(Citrus nobilis* var. *papillaris)*. See orange. Congenial stocks are orange, calamondin, and probably other standard citrus stocks.

Tuna *(Opuntia tuna)*. Propagated by breaking off and planting the joints during the dry season.

Uvero *(Coccoloba uvifera)*. Preferably non-petioled, mature, but green and smooth to turning grayish, slender budwood; cut buds 3.5 to 4 centimeters long; age of stock at point of insertion of buds unimportant.

Vilatti *(Feronia elephantum)*. Use petioled, turning greenish or grayish, just mature, preferably spineless budwood; cut the buds 3 to 3.5 centimeters long; age of stock at point of insertion of bud unimportant.

Wampi *(Clausena lansium)*. Use barely mature, petioled budwood; cut the bud 4 to 5 centimeters long; age of stock at point of insertion of bud unimportant.

Yambo *(Eugenia jambos)*. Use greenish to brownish and roughish, well-matured budwood; cut the buds 3 centimeters long; age of stock at point of insertion unimportant.

Zapote *(Diospyros ebenaster)*. Use mature, but green and smooth, petioled budwood; cut the buds 3.5 centimeters long; insert the bud at a point where the stock is green or brown before it becomes rough.

## HOME FRUITS AS EDUCATORS OF PUBLIC TASTE.

M. G. KAINS, *Long Island, New York.*

The past five, and especially the last three, decades have seen more remarkable improvements in horticultural practises than did the previous five—notably in the development of modern tillage, fertilizing, cover cropping, spraying and rational pruning. These features have made the fruit-growing industry of today a highly specialized art. Perhaps the most significant development of all is the increased and steadily increasing public demand for fruit varieties of high quality. For this growth, particularly so far as apples are concerned, Oregon, Washington, Colorado and other western orchardists doubtless deserve considerable credit; first, because they boldly nailed their colors to high standards of excellence, both as to variety and to character of specimen, and second because they deliberately set about the education of the public with respect to such standards. In these two directions they have not only themselves benefited, but they have performed a service alike to the consuming public and to fruit growers in general. Fruit grow-

ers in other sections have been steadily falling into line and the markets of our larger cities are annually being more liberally supplied with high quality fruits.

Where did these western and other growers of choice fruit get their standards? Did they adopt the *caveat emptor* (let-the-buyer-beware) policy which so often tends to arouse the righteous ire of the long suffering and hoodwinked public? Not at all. Did they go to the growers of Ben Davis apple, Kieffer pear, Elberta peach, Lombard plum, Lady Thompson strawberry and other low quality varieties for their standards of flavor? No, indeed! Doubtless they are no more entitled to halos than are eastern growers for the honesty of their pack, because the cost of transportation prohibits their adoption of dishonest packing methods; they have been forced to pack honestly or go to the wall. But where *did* they get their standards of flavor? Certainly not in the big commercial orchards of the middle west and the east—orchards of Gano, York Imperial, Baldwin, Rhode Island Greening and others at best culinary varieties. No, they ignored these plantations and went to sources which for them held more vivid and desirable ideals—the fruit plantations of their boyhood.

Those fruit plantations were neither set out by specialists nor primarily for profit. Their main reasons for existence were that the family enjoyed good fruit and wanted a continuous succession and an abundant supply throughout the year. Though doubtless many of these plantations were larger than necessary to supply even the largest families of those days, the surplus was just so much to give away to less fortunate relatives and to neighbors or to sell in the local market.

One of the most pleasing customs of those good old days, one that deserves to be revived today, owed its charm to the choice fruit grown in the family plantation. When visitors dropped in for the afternoon or the evening the *au fait* thing was to have the company enjoy some home-grown fruit before departing. This was not served in the modern sense now too frequently employed to indicate that the social session is at an end, but in the whole-souled spirit of hospitality in the extending of which both host and hostess could take a keener pleasure in serving a home-grown product and feeling that the favorable comments upon it were more genuine than is possible when purchased food is provided. What would have happened if Ben Davis, Kieffer, Elberta or Lombard had been used instead of the choice varieties? Might not the guests have felt that as direct a hint was being given them as when in baronial times the cold shoulder of mutton was trotted out to apprise the guests that they had outlasted their welcome? But who would have planted or grown such inferior fruits with bore-bouncing intent? Would

it not have wasted valuable land and time and also indicated a lack of resourcefulness on the part of host and hostess?

Upon none of the members of the family or of the district in those days was the influence of choice fruit so profound as upon the boys. Setting aside mothers' testimonies as biased we may perhaps accept the popular view, that boys are voracious animals, but it is slanderous to accuse them of having undiscriminating taste, accepting all as grist that comes to their mills. If the confession of one of them be insisted upon he would be forced to admit that he could always find the choicest specimens of the choicest varieties not merely in his father's and his near and more or less dear relatives' plantations where he normally would be expected to be welcome by day, but in a very considerable range of territory and at hours when his elders had usually relegated their vigilance to less somnolent watchers, dogs, to be explicit, with which, however, he made it a point for obvious business reasons to be on terms of intimate friendliness.

The Ontario village in which my boyhood was spent is typical of hundreds from New England to Michigan and as far south as Maryland, if not of a much wider area. Practically every home had its garden and fruit plantation, which often consisted of an acre or more. Here I had unlimited free range in five fruit plantations, my father's, my grandfather's and those of three uncles, and a less restricted range in many neighbors' gardens. Each of these had been planted to meet the personal taste of the family and to furnish a liberal supply of fruit throughout the whole year. Often the last of the apples would be taken from storage when the first of the strawberries were gathered. Again, since the smallest of these plantations was more than an acre set in the interplanted plan popular in those days, the aggregate was a large list of varieties. Like many another boy of my day, while still in my teens I knew intimately fifty or more varieties of apples, twenty-five or thirty of pears, ten or fifteen each of peaches, grapes and plums, six or eight of cherries and a goodly list of bush fruits and strawberries. This knowledge was fostered, supplemented and extended by studying varieties at the county fair where many of the boys as well as their fathers made exhibits.

While a reasonable proportion of the boys in those days went direct from school into some branch of farming and planted orchards more or less like the ones I have described and while a few took up commercial fruit growing, the majority went into other lines of business; but among these last are many, the influence of whose boyhood led them later in life to take up fruit growing either for business or pleasure. So far as I have been able to discover they

have with remarkably few exceptions chosen the varieties with which they were familiar during boyhood.

In those boyhood plantations fruits of low quality were conspicious by their absence. Our fathers thought that what was not good enough for them was not good enough for other people. They turned deaf ears to the arguments that such varieties are robust, prolific, have fine color and that the lowering of quality will not be noticed by the public in general. They knew better perhaps than the present generation of commercial fruit growers that nothing so tends to develop an extensive demand as really fine fruit. For, to quote a favorite proverb, "The remembrance of quality lives long after the price has been forgotten." The man who eats a poor or indifferent fruit will not be tempted soon to eat or buy again, whereas the man who eats a good one wants another specimen—right away. Not until money making became the ruling passion in orcharding were low-quality fruits planted more extensively than for testing.

Though Ben Davis apple and Elberta peach must bear much responsibility for curbing public appetite for apples and peaches respectively, it seems safe to declare that no one fruit variety has played such havoc with public taste as has the Kieffer pear. The train loads of this whited sepulchre of a fruit that for the past twenty years or more have flooded the large city markets have led the public to believe that pears in general are inferior fruits, fit only for canning, if that. Even the Bartlett has had its skirts soiled by the commercialism that prompts California growers to gather it too green and ship it to eastern markets where its consequently flat flavor belies its fine color and thus begins what the Kieffer finishes, the suppression of the public appetite. Thus the rising generation has had little chance to learn the truth that the pear is one of our richest, most luscious and delectable of fruits.

To be sure the reaction against such sinister influences has set in; men who have learned that the public is willing to eat really fine pears have begun to risk the difficulties of pear culture and to plant the choicer varieties, especially those that reach the market after the California Bartlett season has passed. The rising generation may, therefore, fare better than the present one.

While this commercial growing of fine varieties speaks well for the prospective improvement of public taste, it is just as much to be desired that the family plantation should become as prominent as in days of yore. In such plantations should be at least some of the choice varieties too difficult to grow or too sparsely productive to be considered for commercial ventures. For they certainly minister to the aesthetic admiration of color, form, fragrance and flavor, to

say nothing of the pleasure of achievement in their production. But they exercise a still more subtle and important influence: they maintain and pass on to the rising generation high standards of excellencedtoward which commercial fruit ventures should strive

Before passing to our conclusion it seems necessary to criticise adversely much of the present-day literature and many of the fruit specialists of the agricultural colleges and experimental stations. The great majority of the writings on fruit growing within the past twenty-five or thirty years have too strongly emphasized the commercial phases and given too little heed to the stigmatized "amateur" features of fruit growing, as if these were of an inferior instead of a potentially superior order. Amateurs are frequently connoiseurs, but the specialists seem to have held the dollar so close to their eyes they could see little else. As a matter of fact, the great authorities on fruit growing—Coxe, Kenrick, Prince, Wilder, Hovey, Barry, Thomas, Manning, Lyon and the two Downings—were all amateurs, yet what does not the American public and especially the fruit grower owe them? They made fruit growing popular, not only in their day but for ours. They undertook and with their own private capital completed monumental works. Nowadays the government and the individual states pay their successors and supply the funds to solve modern fruit problems. Therefore, it behooves these successors to make broad instead of narrow specialists of themselves so they may sympathize with and encourage amateur as well as commercial fruit growing in their respective regions; for among the amateurs, probably far more than among the commercial fruit growers, are our authorities of the rising and future generations to be found. To determine the truth of this statement I suggest that my auditors examine the list of present-day investigators, teachers and writers on fruit growing to see how few are the sons of commercial, and how many of amateur fruit growers. The result I venture to say will be surprising.

Let me hasten to say my audience is mistaken if it has concluded from these remarks that I advocate a return to the hit-or-miss methods of former days. I most certainly do not. I am a firm advocate of every method that makes for better fruit and more of it. What I have striven to emphasize is the importance of replacing the now largely decrepit fruit plantations with new ones of the choicest varieties, to be handled according to the best modern methods. By the establishment of such plantations the standards of excellence will continue to rise or at least be maintained. Fruit growing should, and thereby can be made to minister perhaps as favorably as music, art and literature to the sensibilities of the family, the community and the nation. And finally, such environments as superior family fruit plantations afford seem to be the most favorable for the training of future fruit lovers and specialists among the rising generation. Thereby home fruits will naturally continue as in the past to be educators of public taste.

## THE SMALL ORCHARD—HOW TO MAKE IT PROFITABLE.

PAUL C. STARK, *Missouri.*

This subject is one in which I am keenly interested. I believe the possibilities for improvement and development are greater in the small orchard than in any other phase of fruit growing.

The splendid bulletins, books and other publications on the subject of orcharding have been of incalculable benefit to the orchard industry, but it seems to me that one very important part of horticultural development has been neglected, namely, the small orchard. For instance, at most of the horticultural society meetings I believe you will find that the program deals almost entirely with commercial orcharding and technical subjects which apply particularly to methods adapted to larger orchards. For instance, take this year's program of the American Pomological Society. Outside of the subject on which I am now speaking, all of the addreses are dealing with commercial orcharding or technical problems applying particularly to larger orchards. Of course, subjects applying to larger orchard interests should rightfully occupy the major portion of all programs of horticultural meetings, but I want to enter this plea: that in the future all meetings relating to horticulture should include at least a small part of the program that will directly appeal to the man with a small home orchard on his farm, or with a few trees in his back yard.

A vast majority of these small orchards are uncared for and produce only a small percentage of the fruit of which they are capable and the fruit that they produce is inferior in quality.

Many of the things that I will point out as connected with the small orchard are already so well known to the members of the Society that they are as simple as our A, B, C's. However, we must remember that over this great country of ours that the vast majority of farmers and other home owners who have a few trees or a small orchard have not been taught, or have not been told in a simple, easy-to-understand way the fundamental facts on which the raising of good fruit is based. It has not been many years since the methods of orcharding, which are being followed by successful orchardists today, were unknown to even many of the larger orchardists. It was only a few years ago that we could hear on every hand people who were skeptical about spraying; they thought it was some new fangled idea that was just a waste of time, or, possibly they thought it was some of the useless "book learning" which was being taught by the professors of the colleges and experimental stations. It is remarkable how quickly the farmer and fruit grower have completely changed in their attitude toward our colleges and

experiment stations. They used to consider it foolish, state and government extravagences. Today the vast majority, at least the vast majority of *successful* farmers and fruit growers, look on our government and state agricultural colleges and experiment stations as their guiding light—where they can go to get a "big brother" interest in their problems.

I believe that if we had at hand data showing the percentages of small home orchards that are properly cared for and producing good crops of fruit we would be astounded at the small percentage of these well-cared-for orchards.

It is almost impossible to speak of any subject these days without speaking of its influence on the world war. The reason for this is that everything we do or plan to do is either directly or indirectly affected by this great struggle in which our country is taking such a leading part, so when I speak of making the small orchard profitable, making it pay dividends, I am urging some thing which will have a definite beneficial effect on our activities toward winning this struggle for liberty. The young men of our country are now being trained into a vast army—there is hardly a family which has not some member or relative in our great military organization. Those of us who are not going to the front have our battles to fight for our country here at home. Every time we can get the owner of an uncared-for orchard to give the proper amount of attention to that orchard we are not only doing him a personal favor that will mean a good profit, but we are doing something to increase the amount of food produced. We are showing the owner how to answer the call of our government to produce more and better fruit.

Some of the direct results of the war on the fruit-growing conditions are the enormous number of European orchards which have been destroyed in this great struggle; those which have not been destroyed have been so neglected that the life of these orchards has been greatly lessened and the fruit produced of poorer quality. This means that the export trade of American fruits, after the war, will be vastly increased. We will have to feed Europe.

Another big field that is being opened to export apples is South America. We have hardly made an impression as far as quantity goes on the great possibilities of the South American market. American apples have a big reputation down in that country. Last year in Buenos Aires, Argentine, Delicious apples sold for $12.00 per barrel. It is not the question of price they will pay, but it is a question of whether or not they can get the fruit. As years go by we will have to ship more and more fruit to South America.

Here at home the amount of fruit consumed has greatly increased as the public has learned of the food and health-giving

values of good, fresh fruit. Our census figures tell of the great increase in our population in the last 20 years, yet in 1896 the census gave the apple production as 69,000,000 barrels. This has decreased, according to the last census, to 23,385,000. A considerable part of this decrease is accounted for by the fact that out in the central west thousands of acres of orchards of Ben Davis, which was so popular years ago, are dying out very rapidly owing to the short life of the Ben Davis tree and its susceptibility to canker and other similar diseases. In place of old Ben Davis the public has learned that it is far better to plant higher quality varieties, and particularly varieties which are sturdier and longer lived.

Some years ago there was a great deal of talk about the big overproduction, particularly when the large western orchards came into bearing. These predictions have proven entirely ungrounded, for today apples and other fruits are selling higher than they have for many years. It is hard to buy good fruit these days no matter how high a price you pay for it. On some of the fancy city fruit stands you can get high-grade apples, but in most of the towns of our country it is hard to get good, cheap, first-class fruit. Even in old New York State, which is famed for its apples, good fruit is scarce. I can well remember that when I was studying horticulture at Cornell, about the only apples on the market were second grade and unsprayed. Right there in the country where the Tompkins King apple originated we could hardly buy good apples. So it is throughout the country.

In view of the conditions that I have just outlined, it is necessary to produce a great deal more fruit both for our own use and for the greatly increased export trade that is developing.

The United States Government has appealed to the American people to produce more fruit. I am quoting from a letter written to us by Hon. D. F. Houston, Secretary of Agriculture—a man of whom Missouri is rightfully proud. Secretary Houston said in part:

"While the provision of adequate supplies of staple foods is, of course, a matter of first importance, the place of fruits in our dietary is now so generally recognized that no food program which did not include them could be regarded as adequate or satisfactory."

And again he said:

"It, of course, would be unfortunate if through concentration of effort on the production of quick-yielding staple food crops serious interruption in the normal planting of fruits should result."

I am sure that every far-seeing American will agree with Secretary Houston.

From another branch of our government, namely, the United States Food Administration, comes the advice to "use less wheat

and meat'' but ''use fruit generously.'' The American people are responding to this appeal but it means that more good fruit must be grown.

The public is just beginning to realize the great food and energy giving value of fruit. Bulletin No. 293 of the Texas Experiment Station gives a table showing the comparative number of heat or energy units in 10 cents worth of several kinds of fruit as compared with porterhouse steak. In the porterhouse steak we get 444 calories, while in apples there are 1,467 calories. In other words, for the same amount of money you would get three and one-half times as many calories in the apples as in the porterhouse steak.

Last spring the big campaign of the Department of Agriculture and allied interests, urging every one to grow a vegetable garden was highly successful. Nearly every one that owned a little piece of ground planted some sort of a garden. Some of the millionaire owners of big estates plowed up their lawns and planted vegetables, while the salaried or professional man put in a little garden in his back yard. Some of these gardens, of course, did not produce any great amount of food, but the campaign had one great value—that is, it taught a big lesson in thrift. It showed our people how much could be grown at home even on a small plot of soil. On the other hand, great numbers of these ''war gardens'' raised enough food to greatly cut down the cost of living. The success of this garden campaign leads me to believe that a similar campaign to urge the public to grow a fruit garden in connection with their vegetable garden would bring equally beneficial results. Aside from the actual food or money value of the fruit, that can be raised in a back yard, it is a great satisfaction and pleasure to be able to go out in your own yard and pick ripe, luscious peaches, golden and brilliant red apples, and a variety of all other kinds of fruit.

Aside from the fresh fruit a small back yard can furnish enough fruit for canning and preserving, to be used next winter. In the fruit garden, trees can be so planted that they will not take up a great deal of room and the room that they use can be selected, partially at least from what would otherwise be waste ground. Vegetables and small fruit bushes can be grown in between the tree rows for a number of years after planting, even if the entire back yard is planted to fruit. The same cultivation that is given to the vegetables will result in additional growth in the fruit trees.

The back yard orchard can be made to produce as fine quality fruit as the most up-to-date commercial orchard, and if the right varieties are selected trees will come into bearing young and will live long.

One of my neighbors, who is a doctor, gets his recreation from working in his vegetable and fruit garden. He has only a small

60 by 60 feet back yard and yet he produces almost $100 worth of fruit from it each year. For a number of years he got very little results from his trees, until one day I persuaded him to spray. He bought a small hand sprayer, which only cost a few dollars and with the help of his son he sprays his fruit each season. He is doing his "bit" to help increase American food production.

If we can persuade a great percentage of American people to do likewise—grow their own vegetables and their own fruit—it will go a long way toward helping to solve the high cost of living. When we try to explain to the average man just how to spray and care for his back yard orchard let us make it *simple*. The easier it is to understand the quicker we will persuade him of the advisability of planting and caring for his trees. Spraying is simple; there is nothing mysterious about pruning a fruit tree, nor about hoeing around the trees and applying manure, wood ashes or lime. The way to make the back yard orchard profitable is to show the owner just how easy and simple it is to grow good fruit, and that it *pays big* to give this little care and attention to his trees.

When I speak of the small orchard I am referring to two different classes: First, the back yard orchard which I have just mentioned, and second, the small farm orchard, ranging from one to three or four acres.

This last mentioned type of orchard has been planted at some time on almost all farms but in most cases it has been neglected or pulled up, because of lack of knowledge as to the way to care for the trees so as to produce good quality fruit.

The farmer has too often followed the line of least resistance; that is, buy a few trees, plant them out, and forget them. After a few years you could hear him talking about "fruit trees being poor investments," "waste of land to plant fruit," etc., yet that same farmer would not expect to plant his corn in the spring and then go away and come back in the fall to harvest a good crop. He would know that there wouldn't be any crop to harvest. But that is just the kind of treatment many have given their fruit trees.

The crops from these neglected farm orchards have been poor, knotty and wormy fruit. It is the kind of fruit that could not be eaten in safety in the dark. Last year I noticed some where an advertisement of some particular brand of fruit which the grower advertised "can be eaten in the dark." What the farmer, with his home orchard, needs is information presented in *simple form* to show him how he can grow more apples and less apple worms.

Notwithstanding the neglect that these farm orchards receive, I venture the assertion that if full data had been kept it would be shown that the ground planted in orchard netted more profit per

acre than any other part of the farm, even in spite of the neglect the trees had received. Think of the fresh fruit, the preserves and the great amount of canned fruit that is used on these farms. What if the farmer had to buy it at present-day prices of fruit?

The United States Chamber of Commerce reports show that the average returns from land devoted to fruit is $110 per acre; the average return from cereal or grain crops is $13.17 per acre. Think of the millions of fruit trees throughout this country that are at present neglected and without care. Consider the great increase in the *total production of fruit* if the owners of these trees can be shown how profitable it will be to prune, spray, and care for these fruit trees. A letter that we wrote to the Secretary of Agriculture last May, outlines the main point that I have in mind, and I am quoting paragraphs from that letter:

"Encouragement and concise, practical information is needed not only by many commercial orchardists, who have not adopted up-to-date methods of orchard care, but also by the farmer with his home orchard of several acres. These moderate-size home orchards individually may not amount to a great deal, but taken as a whole they will produce an enormous quantity of food for the nation, if properly cared for.

"Very few of them are receiving any care whatever, and the resulting crops are a very small percentage of what can be grown from these orchards. The orchards that are now in bearing should be put on an efficient producing basis and the United States Department of Agriculture is, of course, a factor that can accomplish more along these lines than any other influence. The farmers should be shown, by brief, easy-to-understand instructions, how they can turn their orchards into great food producers of first-class fruit. Presented to the farmer and orchardist as a matter of national *duty* they will undoubtedly adopt methods of pruning, spraying and cultivation that they have been very slow to adopt up to the present time.

"Demonstrate to the farmer that with proper methods of care his orchard will pay and pay him well, and at the same time show him that he will be doing a duty to his country, and your Department will get a hearty response, and results such as have heretofore been impossible. But to accomplish results I believe it will require a *national campaign* that will reach practically every *farmer-fruit grower* in the United States.

"The United States Department of Agriculture can and will, I am sure, accomplish excellent results from such a nation-wide campaign. On the other hand, much quicker and more complete results can be accomplished by securing the co-operation and influence of

all other horticultural interests that are working toward greater efficiency in fruit production. The experiment stations, agricultural colleges, horticultural societies, horticultural and agricultural publications, nurserymen, trained orchardists, etc., can all do great good by working along these same lines."

With the present high prices of fruit the farmers will be forced to grow their own fruit, for I do not believe they will pay these high prices. With a little additional care and trouble, he can not only grow enough good clean, high-quality fruit, for his own use, but he can have enough left over to sell locally and pay a good profit from the orchard. There is always a big demand on local markets if you have good fruit to offer. Near my home town I know of a man who had a neglected orchard from which he received little or no returns for many years. A neighbor of his who had learned something about caring for trees—pruning, spraying, etc.—talked with the owner of this orchard and persuaded him to lease it to him. The first winter the orchard was given a thorough and quite severe pruning so as to open up the heads and cut off the surplus wood growth. Then the orchard was given thorough spraying. The first summer after this pruning the crop, of course, was light, although it paid fairly good returns. However, the next year the trees came up smiling and produced a crop of *fine* clean apples that sold for a big profit. This orchard ever since has been bearing and making good money for the owner. He has turned a liability into an asset, which is the most valuable part of his farm.

Around every farm there is more or less waste land which will never be used for farm crops, whereas it can be used to good advantage for fruit trees. Of course, we are not suggesting that these pieces of waste land or "slacker" land be planted to trees and then continued to be treated as waste land. As soon as a tree is put in these waste spaces it must be considered a valuable piece of the farm and treated as such—sprayed, pruned and cared for. A row of Montmorency cherry trees along the farm driveway not only adds beauty but it will produce a wealth of fruit that will pay bigger returns than several times that amount of land in farm crops. Where these trees are planted it might otherwise be considered as waste land.

In this talk I have not gone into the details of just how to prune a tree, spraying and other orchard operations, but I have confined myself to an attempt to show the big opportunity that is offered to vastly increase the amount of first-class fruit and that by doing so, the American people will be responding to the appeal of their government to produce more food.

To summarize, let us bring out the following points:

First. Let us urge the people to plant and grow back yard fruit gardens along with their vegetable gardens.

Second. Let every farm have its own home orchard for home consumption and sell the surplus on the local markets.

Third. Show the farmer how to renovate his neglected orchard and make it the best paying part of his farm.

In dealing with all the above problems show the owners just how simple it is to produce first-class fruit instead of wormy culls. I hope that the American Pomological Society will take a leading part in this very important work for the American people.

## COMMERCIAL CHERRY CULTURE.

L. R. Taft, *Michigan.*

Although the cherry has long been grown in family orchards and for supplying local markets, it is only during the last fifty years that it has become of large commercial importance. In fact, the number of trees in commercial orchards is probably ten times as large as it was twenty-five years ago.

In Michigan a cherry orchard containing three hundred trees was seldom found before 1870, while now there are many orchards with 5,000 to 15,000 trees.

### Cherry Statistics.

The latest figures available are those of the 1910 census, from which we learn that only seven states had more than one million cherry trees at that time. The number of trees and the number of bushels of fruit with the value of the crop for the year 1909 are shown in the following table:

Cherry Statistics From 1910 Census.

| State. | Number Trees. | Crop for 1909, Bushels. | Value. |
|---|---|---|---|
| Illinois | 1,082,888 | 287,376 | $453,478.00 |
| Indiana | 1,067,701 | 363,999 | 508,516.00 |
| Iowa | 1,138,116 | 260,432 | 455,029.00 |
| Michigan | 1,300,763 | 338,945 | 590,829.00 |
| New York | 1,016,968 | 271,593 | 544,508.00 |
| Ohio | 1,486,599 | 338,644 | 657,406.00 |
| Pennsylvania | 1,355,282 | 475,093 | 909,975.00 |

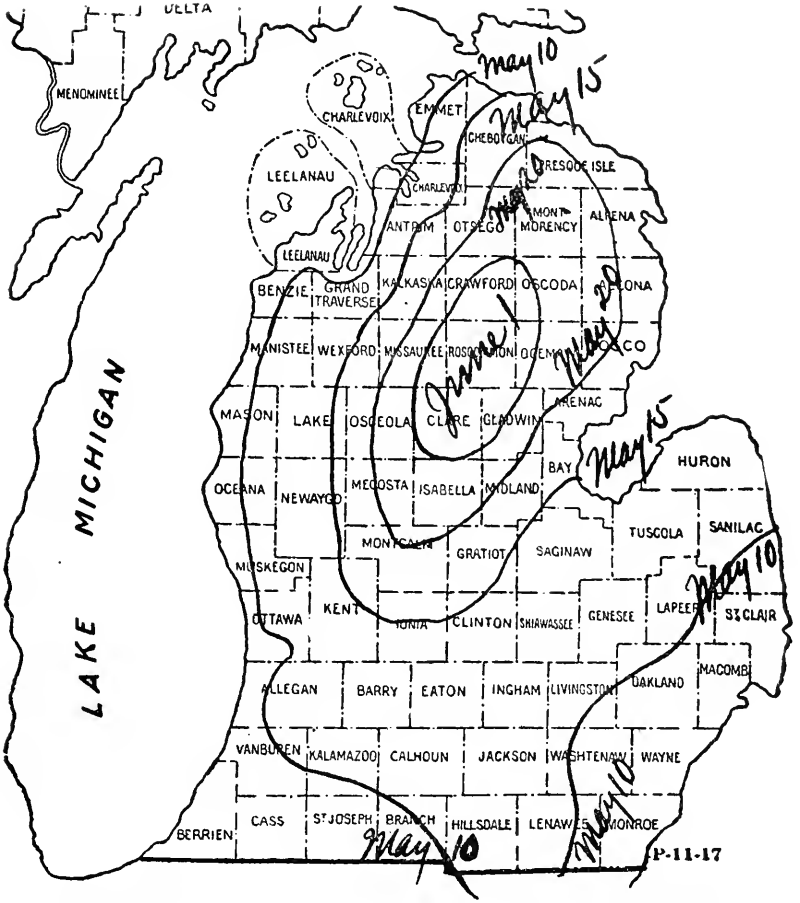


Chart exhibiting the boundaries of the "Michigan Fruit Belt." See page 140

It is probable that in the above states from ninety-five to ninety-eight per cent. of this fruit consisted of sour red cherries. At the time the census was taken nearly one-half of the trees growing in Michigan had not reached a bearing age, while now they have not only come into bearing but an additional million or more trees have been planted. In 1910 Wisconsin had less than a half million trees, but between 1910 and 1915 many large commercial orchards were planted.

In New York and Michigan there are many commercial sweet cherry orchards but the acreage is certainly less than ten per cent. of the sour cherry orchards. It is in California, Washington and Oregon that we find the sweet cherry commonly grown on a com-

mercial scale. In 1910 the numbers was as follows: California, 822,367 trees; Washington, 570,105 trees; Oregon, 539,226 trees. It may be of interest to note that the value of the sweet cherry crop in California in 1909 was $951,624.00, or nearly two dollars for each bearing tree, while the returns from the sour cherries ranged from about fifty cents to one dollar per tree in the different states.

## Michigan "Fruit Belt."

Michigan is one of the states which in recent years has come rapidly to the front in the production of red sour cherries. From the fact that the trees blossom early in the season, and hence are likely to be destroyed by late spring frosts, what is known as the "Fruit Belt" in Michigan seems particularly adapted for the production of this crop. The term "Fruit Belt" is applied to a strip of land from ten to twenty miles in width along the west side of the state from the Indiana line nearly to the Straits of Mackinaw. Mr. D. A. Seeley, the director of the State Weather Service, has prepared a chart showing the average date of the last killing frost for the past twenty-five years. The southern boundary of Michigan corresponds very closely to the line between the states of Massachusetts and Connecticut, or about forty-two degrees north latitude. Traverse City, in the upper part of the lower peninsula, is in about the same latitude as Ottawa and Montreal and the upper boundary of Vermont.

The chart referred to shows that the isothermal line indicating where the latest spring frost has occurred on May tenth as an average during the last twenty-five years starts in northern Indiana and follows up the west side of the state of Michigan almost parallel with and about fifteen to twenty-miles from the shore of Lake Michigan. In other words, the danger from a late frost in the spring is no greater in the vicinity of Traverse City and Charlevoix than it is in northern Indiana. In the northern part of Michigan there is a heavy snow fall which remains on the ground until April and, as a rule, the trees do not blossom until two or three weeks later than in the southern part of the state.

This freedom from injury by spring frosts is due to the tempering effect of the water of Lake Michigan over which the prevailing winds pass during most of the winter and spring months. Not only do these winds prevent sudden drops in temperature but the waters warm up slowly and when there are warm periods, as frequently occurs in April and May, the air passing over the lake is cooled, thus retarding the development of the fruit buds.

Another chart has been prepared showing the date of the first killing frost in the fall. The isothermal line for October tenth follows almost exactly the same course as the one showing where the latest spring frost occurs on May tenth.

The broad and deep waters of Lake Michigan seldom freeze over and then only in the occasional long continued cold periods. Winds which leave the Wisconsin shore at a temperature of thirty to forty degrees below zero, in the passage of the seventy to ninety miles over the waters of Lake Michigan which are at a temperature of perhaps thirty-five degrees above zero, become so warmed that the thermometers stand at but little below zero, five below being seldom reached at Benton Harbor and South Haven, while ten to fifteen below are generally the minimum figures for the northern lake shore, even though it may be thirty or forty degrees below zero in the north-central counties of Michigan.

While the northwestern portion of Michigan seems to be especially adapted to the growing of the cherry, and also of the apple and plum for that matter, there are other areas along the northern and northeastern border of the state where these fruits thrive. While the Grand Traverse region, or that section of the state about Grand Traverse Bay, has the reputation of growing larger and better cherries, and securing more regular crops than any other part of Michigan, there are hundreds of orchards of from ten to forty acres, scattered all through the state, that are proving very profitable, provided proper attention has been given to the selection of the location, the character of the soil and the drainage, and the trees are given the right kind of care.

### Location and Soil for Cherries.

One of the first requirements is that the land chosen for the orchard is somewhat elevated above the fields immediately surrounding it, and that it is slightly sloping or rolling. This not only allows the surface water to drain off, but it favors air drainage and lessens the danger of frosts in the spring. Also, there is less injury from fungous diseases than when the orchard is located in a hollow where air currents are restricted.

The cherry thrives upon quite a variety of soils, but it is best not to have the land very light or very heavy. A stiff clay soil is not only difficult to work but, especially if the subsoil is blue clay or hardpan, it will be poorly drained and there is no other fruit for which good drainage is as necessary as for the cherry. Sand soils and light sandy loams are generally lacking in plant food and, although the trees may do fairly well if there is an open clay subsoil near the surface, a moderately heavy sandy-loam or a light clay-loam soil will generally grow the best trees and produce more and larger fruit. A fair amount of humus is desirable and, al-

though if the soil is in good condition the orchard may follow any of the grain or hoed crops, it is particularly desirable to have either a clover or alfalfa sod to turn under. The land should be plowed and thoroughly fitted before planting the trees.

### Selection of Trees and Stocks.

Ordinarily a medium-size, stocky, two-year tree is used. However, we prefer a first-class one-year tree, eleven-sixteenth inch and upward and four feet high, if they can be obtained. These will be branched, with a short, stocky trunk, and it will be possible to start the head at the height of twenty inches or less, as preferred by some. The very fact that they have reached this size in one season indicates that they are strong and vigorous, while if trees two and three years old are used they may have been weak and puny as yearlings and never show much vitality. With proper care these trees can be planted so as to secure a perfect stand and they will grow into a uniform, healthy orchard. The roots on two-year trees are of course one year older, and having become hard and woody they do not callus and form new roots nearly as freely as those of one-year trees.

As a rule, it is much easier to train the trees with low heads if one year old than when they are two or three years, since the averae nurseryman appears to think that he must cut off the branches from a foot or more of the trunk each year and we have seen nursery trees where it was three or four feet to the first branches, from which it is practically impossible to grow trees with low heads. A cherry tree should never have a trunk more than two feet long. Not only will it be more difficult to prune, spray and harvest the fruit from such trees, but with high heads the danger from injury by sun-scald and the winter will be greatly increased, and the sap will pass much less freely than in a short trunk, which is generally sound and healthy. It costs at least twice as much to harvest the fruit from trees where most of the branches are more than six feet from the ground, than when a majority are less than six feet.

Generally, all sour cherries are grown on Mahaleb stocks, and nurserymen prefer to use it for sweet cherries since the Mazzard stock suffers more from leaf spot and is more difficult to work. The Mazzard seems to grow a larger tree and we prefer sweet cherry trees on Mazzard stocks if they are to be planted on light soil or on ridges where the snow is likely to blow off.

### Commercial Varieties of Sour Cherries.

About the only sour cherries used in commercial orchards are the Early Richmond, Montmorency and English Morello. The Richmond is the first to ripen, beginning about the first of July in cen-

tral Michigan. It is a vigorous growing, spreading tree and begins to bear at three years. The fruit is of medium size, but the pulp is rather soft and hence it will not hang on the tree as long or ship as well as the other varieties mentioned. It is a rather light but bright red and is borne on short stems. Montmorency cherries ripen about ten days after the Richmond and will often hang on the trees in good condition for shipping for two weeks. The fruit is considerably larger and is brighter in color, with a firmer pulp. Some of the commercial orchards are planted entirely with this variety. The trees are especially vigorous, but are more compact and upright in growth than the Richmond. Up to the fourth year they will not bear quite as much as the Richmond, but later on they excel. It is not only a better shipping cherry than the Richmond but it is also preferred for domestic and commercial canning purposes. The English Morello cherry has a skin that is nearly black when ripe, and the juice is dark red. The fruit is a little larger and more elongated than the Montmorency, and the fruit stem is two inches or more in length. In season it comes about ten days later than the Montmorency, and may be picked over a period of two weeks. It keeps and ships well but is not liked as well as the Montmorency for canning. The trees will bear the second year if allowed to do so and each year after that will produce profusely. The trees are rather slender both in the nursery and the orchard, and have wiry, drooping branches. As a rule, they are not one-half the size of the other varieties, due partly to overbearing while young, but the tendency to a dwarf habit is increased by the attack of the cherry leaf-spot to whch it is very subject. Although naturally one of the hardiest varieties, the trees from the above causes are generally short lived.

### Leading Sweet Varieties.

The favorite sweet varieties are Schmidt and Windsor. They are strong, upright growing varieties, becoming spreading later on. Under proper conditions these varieties may be called hardy in western and northwestern Michigan, and if the climatic and other conditions are favorable will produce large crops of fruit, which will sell for two to four times as much as the sour varieties. However, it is only under the most favorable surroundings that we would recommend the planting of the sweet cherries. Of the varieties mentioned the Windsor is quite subject to the attack of the brown rot and the fruit often cracks badly. While very little fruit is produced until the trees are six years old, the amount increases and after they are ten or twelve years old they may bear more than the sour varieties. Both of these sorts have black fruit as do

the Bing and Lambert, recent introductions from the Pacific Coast. These seem promising except that the Lambert is very likely to crack if wet weather follows a dry period at the time of ripening. Black Tartarian and Knight are also used for home use and local market.

Of the red sweet cherries, Napoleon (*Royal Ann* of the West) is about the only good commercial sort. (*Governor*) Wood and Yellow Spanish are fine varieties but do not ship well. As a consequence, they do not bring more than two-thirds as much as the black sorts.

Among the new sorts a variety called *Nelson,* but which is probably some old sort which has not been recognized, is being largely planted about Traverse City. It resembles the Elkhorn, but it excels that variety in productiveness. The trees are hardy, and the fruit is very large and keeps well both on and off the trees. The color is a dark brownish black, and as it is quite free from brown rot and cracking it is coming rapidly into favor.

### Planting and Pruning Sour Cherries.

If thoroughly ripened trees can be secured we prefer fall planting, but when it has been necessary to strip them, or, when they have lost their leaves from leaf spot, we prefer to plant in the spring. Plant so that the bud will be covered about two inches, or a little deeper in sandy soil, filling the holes with loam and packing it firmly about the roots. It is a good plan to cut off the ends of the roots and remove all injured ones.

In pruning the tops we would select five or six strong branches, the lowest one about eighteen inches above ground, and preferably on the southwest side, and the others should be distributed at different heights and on the different sides of the trunk for a foot or more. After removing the remaining branches, we sometimes head back those that are to form the head of the tree if they are more than fifteen inches long, and may head back the leading shoot, or cut it out entirely. It is a mistake to head back the branches in a newly planted cherry tree to short spurs, since the buds near the trunk are much weaker than those near the ends of the branches.

While sour cherry trees are generally planted twenty by twenty feet, we prefer to give them more room, at least one way, and find that twenty by twenty-four or twenty-five feet more satisfactory, as at twenty by twenty feet the trees if on good soil will begin to crowd in ten or twelve years, making it difficult to cultivate and spray the orchard, while the trees will soon lose their lower branches, and the upper ones will try to grow into the sunshine and it becomes very expensive to pick the fruit. Another plan is to set the trees

twenty by thirty-two or thirty-six feet and then use other trees as fillers, thus making the trees twenty by sixteen or eighteen feet. Sweet cherries are set twenty-five by twenty-five feet, or sometimes twenty by thirty or thirty-two feet.

### The Cropping and Cultivating of Cherry Orchards.

Cherry orchards are generally used for growing some hoed crops for the first three to five years. Our largest orchards are located near canning factories, and tomatoes, string beans and sweet corn are favorite crops. Potatoes and particularly melons, cucumbers and squashes are likewise favorite crops for young orchards in some districts. Unless the soil is well enriched it is often better to give the orchard clean culture up to the middle of July and then sow some cover crop. This is almost always practiced after the trees begin to bear. In a fairly rich soil, barley, oats or buckwheat may be sown in July. They will help to ripen the trees, they will hold the snow and leaves and then serve as a mulch to hold the moisture in the spring, making the early working of the orchard of less importance than when the ground is bare, or when rye and vetch have been used for the cover crop. A mixture of about twenty pounds each of winter vetch, rye and oats makes an excellent cover crop on soil that lacks humus or plant food, but if allowed to develop in the spring it will dry out the soil and check the growth of the trees. When the trees are small if a strip four or five feet wide on each side of the row is seeded to barley or oats, this can be worked early in the season and the vetch and rye can be allowed to grow until in blossom, when they can be turned under and furnish a large amount of nitrogen, as well as humus, without robbing the trees.

A light top dressing of manure is often helpful to trees that are not doing well, both old and young. Acid phosphate is also helpful and muriate of potash and nitrate of soda may also be used when the old prices prevail.

### The Pruning of Bearing Orchards.

Some cherry growers do no pruning whatever, while others head back and thin out the heads so severely that the trees never recover from it. When pruned just enough to control the form of the tree, preventing it from spreading too much on the one hand and from running up too high on the other, and when thinned out so that the branches are not crowded and the leaves have the needed amount of sunshine and air, the trees will produce more and better fruit and will retain a better form and live longer than when either of the extremes mentioned is followed.

### Cherry Insects and Diseases.

Profitable results cannot be obtained from cherries unless the trees are sprayed to control the insects and fungous diseases. The foliage is attacked by the pear slug and the red cherry beetles, which can be held in check by arsenicals. The Forbes scale and the European fruit scale attack both sweet and sour sorts, while the San Jose scale often does much harm to sweet cherries. All of them yield to winter sprays of lime-sulphur solution and Scalecide.

The larvae of the plum curculio and the cherry fruit flies are often found in the fruit, but these also can be controlled by means of arsenicals. There are several cherry aphids which injure the foliage quite seriously in some seasons, but tobacco dust or Blackleaf 40 will hold them in check.

While some or all of these insects are often found in an orchard, ordinarily they do less harm than a fungous disease commonly called leaf spot, or shothole fungus. It is most common in wet weather and sometimes appears early in June, while in other years it does not develop until July or August. Occasionally there are two or three attacks in the season. It attacks the leaves in small circular spots, which turn brown and drop out, thus suggesting one of the common names. If the season is very wet, all of the leaves except at the tip of the branches may suddenly turn yellow and drop, giving rise to the name "yellowleaf."

In wet seasons, also, sweet cherries are very subject to the attack of the brown rot, which may destroy the entire crop. It also may do much harm to the sour varieties.

### Spraying and Dusting of Cherry Trees.

For all of these fungous diseases we have effective remedies in Bordeaux mixture, or a diluted spray of lime-sulphur solution. Although not as lasting in its effects as Bordeaux mixture, if used at the rate of one part of the commercial solution to forty parts of water upon sour varieties and one to fifty upon sweet cherries, it will be equally effectual with Bordeaux mixture if one or perhaps two additional applications are made.

In ordinary spraying practice it is possible to combine the insecticides and fungicides and thus lessen the labor of making the applications. When scale insects or brown rot have been troublesome we would make a dormant application, but this is seldom necessary with sour varieties. Just before the blossoms open the trees should be sprayed with lime-sulphur solution (one to forty or fifty) with the addition of one pound of arsenate of lead powder, or two pounds of the paste, to fifty gallons. The amount of arsenate should be increased fifty per cent. if the red cherry beetle is troublesome. If the season is cold and wet and the blossoms have not

opened when ten days have elapsed after the application was made, it should be repeated to guard the foliage from the attack of the leaf spot, and the blossoms from brown rot during the blossoming period. The arsenical may be omitted if the curculio and leaf-eating insects are not troublesome.

As soon as the fruit has set, the treatment should be renewed using the same formula, and after about two weeks another application should be given. This will generally suffice except perhaps for the English Morello, which should be sprayed with lime-sulphur early in July if the season is likely to be a late one. While we have given somewhat definite directions for the spraying periods it must be understood that they will vary with the season, and that we should so modify our practice as to keep the foliage and fruit covered with spray material up to the time the crop is ready for harvest. Care should be taken not to combine arsenate of lead with lime-sulphur solution when to be used within a month of the ripening of the fruit.

For large orchards a good power sprayer is a necessity, and if the water supply is convenient it will be possible for two men, with a boy to drive the team, to spray in a thorough manner 1,000 or more trees six or eight years old in one day; of the larger sizes five hundred or six hundred can be sprayed, using modern spraying guns.

The dusting of orchards has been under trial for several years. The finely ground commercial dust mixture, if applied with a modern dusting machine, while the trees are wet with rain or dew, gives good results against the chewing insects, and is quite satisfactory against the fungous diseases. The addition of tobacco dust makes it a specific against the cherry aphids.

Dusting has several advantages over the liquid treatment. It can be applied more rapidly and the load to be hauled is lighter. On the other hand, the effect of the dust is less lasting than the liquid, and at the present price of arsenate of lead the material will cost considerably more than the liquid spray. With young trees the saving in labor will be very slight, if any. If we consider that the dust sprays must be repeated every ten days, while the effect of the liquid sprays will last two to three weeks it will be seen that the cost of dusting is likely to exceed that of liquid sprays. There is more danger of burning the foliage with the liquid, and if both are used properly there will be little difference in the efficiency of the two methods.

### Harvesting Cherries.

In harvesting the crop three methods are used: (1) the stems are pulled off with the fruit, (2) shears with blunt blades are used

to cut the stems about in the middle, the process being known as "clipping," and (3) the cherries are "pulled," leaving the stems attached to the fruit spurs. Clipping is the common practice about Traverse City. It is about as rapid as when the cherries are picked with the stems on and has the advantage of doing less injury to the fruit buds. Some of the canning factories consent to have the fruit "pulled" when they are able to use it the same day. It is also commonly practiced in the home orchard.

Nearly all of the fruit sent to local markets, or shipped by rail or boat is packed in strawberry crates holding sixteen one-quart Hallock boxes, by Michigan growers. When taken to the canning factories either Jumbo Climax baskets, or flats holding about forty pounds are used. In New York State the common package is the Climax basket.

### Marketing the Cherry Crop.

Aside from a large amount of fruit that is taken by the growers directly to local markets with trucks or wagons, many thousand cases are shipped by boat to Chicago, Milwaukee and other cities on the lakes. There are also large shipments made by express to dealers in the many cities scattered through Michigan and the neighboring states, as well as direct to the consumers. A large portion of the crop from some sections is shipped by express, or boat, to commission men, who generally turn it over to retailers. The success of this method depends, of course, upon the honesty and business ability of the commission men. It certainly gives good results in some cases.

From Traverse City and other points where there are many extensive orchards, the bulk of the fruit is shipped not in carload but in trainload lots, under refrigeration, the amount sometimes reaching fifteen to twenty cars in a single day. At some places the shipping and sale of the fruit is handled through co-operative shipping associations, while at others the crop in the various orchards is contracted for in advance by the so-called "buyers," either at a definite price, or an agreement is made to pay the market price for the day. On their part, these men may have contracts to supply canning factories, or some of the large pie bakers in Chicago, who place the fruit in cold storage, to be thawed out and used as needed for cherry pies. Other buyers have arrangements with commission men to handle the crop at the selling end and divide the profits.

This method of handling the crop simplifies the work of the grower since in most cases he merely packs the fruit in the cases and leaves it in the shade near the roadside where it is picked up

and taken to town by five-ton automobile trucks sent out by the fruit buyers. The next day the grower receives a check for his shipment.

### CHERRIES FOR CANNING FACTORIES.

The growth of the cherry industry in Michigan has been stimulated by the erection of a large number of canning factories, some of which make a contract with the grower to take the crop at a fixed price for a series of years. In some cases the contracts are made before the orchard is planted, while in others the sale may be for a single season, or perhaps for a few cases. This year the price for sour cherries delivered to the factories went up to five cents per pound, but more commonly it is only three and one-half or four cents. Some of the factories have a capacity for handling one million pounds of cherries in a season and plan to double the capacity when the orchards are in full bearing. This year the Michigan crop did not average much over one-half of a full crop and the output of the factories was comparatively small, the largest factory only using about 600,000 pounds, while a half dozen others handled from 300,000 to 500,000 pounds.

Although complete statistics are not yet at hand, it is probable that at least 5,000,000 pounds of cherries were used by the Michigan canning factories. The stimulus given to home canning by the Food Conservation Campaign undoubtedly resulted in an equal amount being put up by the housewives.

### TRANSPORTATION FACILITIES.

In locating a commercial cherry orchard too much pains cannot be taken to secure convenient and direct transportation facilities. By locating in a community where cherries are extensively grown, it is not only possible to secure better service with reduced rates on carload shipments, but where a large quantity of fruit is on the market buyers are almost sure to congregate and through competition better prices can be secured.

Michigan is particularly favored in this way, since it has four trunk lines running north and south through the state tapping the leading cherry-growing centers, with six or eight other roads running diagonally which take the fruit in direct line to Grand Rapids, Detroit, Chicago and other points. Although the amount of cherries shipped by boat is considerably less than by freight and express, Michigan is especially blessed by having no less than thirty deep-water ports upon Lakes Michigan and Huron with daily service to Chicago, Milwaukee, Manitowoc, Kewaunee, Menominee, St. Ignace, Detroit, Toledo, Cleveland and Buffalo. The fruit is carried with-

out the shaking and jarring inseparable from railroad service; while for the comparatively short distances the cool breezes of the lakes are even better than refrigeration.

### Why Not Grow Cherries in New England?

Although it appears that there is a limited demand for sweet cherries in the markets of Massachusetts and the other New England states, we are told that sour cherries are not wanted. In 1910 the census shows only 20,000 cherry trees in Massachusetts. To those who are familiar with the delightful flavor of properly canned red, sour cherries it would certainly appear that the culture for which this region is noted has unquestionably been neglected along this line. While it seldom pays to attempt to cultivate the public taste it would seem that the rule might be an exception in the case of the sour cherry. A demand could certainly be built up as the orchards increase in productiveness and there can be no question but that the climate and soil are well adapted to the production of this fruit. The acreage of sweet cherries might also be very profitably increased.

## SWEET CHERRY CULTURE.

A. J. Rogers, Jr., *Michigan.*

As grown in the Middle West, the culture of sweet cherries is attended with many difficulties. Of all the fruit trees the sweet cherry is probably the hardest to raise and one is never sure of the fruit until it is harvested. Certainly under *average* conditions, the sour cherry is the more profitable of the two. The sour cherry bears earlier; it is not so apt to winter kill; it bears regular annual crops; produces a greater quantity of fruit to the tree and in the last few years, at least, it has sold in the sixteen-quart crate for about fifty cents less than the sweet cherry. On the other hand there is a certain fascination for me, at least, in growing the sweet cherry; that does not come with any other fruit. There is nothing more beautiful than a finely grown sweet cherry orchard full of its perfect fruit. And of all the fruits when harvested and packed for market, nothing gives greater satisfaction than a perfectly packed ten-pound flat of sweet cherries. In the packing house, it is my custom to open up nearly every finished flat, to show off the finished product to the packers. This tends to make keen rivalry among them to produce the best pack. The sweet cherry is profitable only to the grower who not only loves the fruit and trees but also has fortunately or wisely selected a suitable site. This tree is more sensitive than any other fruit tree to the soil, exposure, and elevation. The grower

also, must be capable of caring for them in the most scientific way and must philosophically calculate his profits for an average of years rather than one year's harvest.

## HARVESTING.

Probably the greatest loss in growing the sweet cherry is the damage done by the cracking of the fruit. Some years there is little or no cracking, while other years there may be an entire failure due to it. Some varieties are more susceptible to it than others. The Lambert, Windsor, Napoleon, and Rockport may be almost a total loss, when Schmidt or Bing may not crack at all. Usually there is more cracking on a small tree than on a larger one. Moreover, there is apt to be more trouble in years of a comparatively light crop than in years of a heavy one. The weather conditions which produce the most cracking are a drought the fore part of the season, followed by rains either just before harvest or during harvest. Two years ago we had such a condition. There had been very dry weather during July. All of my then bearing varieties had been harvested except the Windsor. The day I planned to pick this it started to rain. It hardly stopped for four nights and four days. After the first day, the cherries started to crack and before they could be picked even in a cracked condition, they became mouldy and were a total loss. A drought during the growth of the cherry seems to "set" the skin—so to speak—and the sudden sap pressure caused by rains brings about the cracking. Foggy or cloudy weather does not cause sufficient turgidity to crack the fruit, but a real soaking rain following a drought will do so. On the other hand, in years when the rainfall has been comparatively uniform throughout the growing season, no cracking has resulted by a rain at harvest time. In a small way, I have tried artificial watering of a few trees during a drought in the forepart of the season, and the results indicate that it would pay to install an irrigation plant for the whole sweet cherry orchard as insurance against cracking. The Lambert cherry, which is perhaps the most profitable one grown in the West, but which cannot be grown profitably here because of its cracking, may perhaps under irrigation have an important place in our list of commercial varieties.

In harvesting the sweet cherry, it is important to pick the fruit at just the proper time to be able to pack it in the "flat" or fancy grade. If marketed in quarts entirely this is not so important. The fancy fruit should show a fully developed color and size for the variety, but be practically as firm as a green cherry. An immature cherry, or one that is somewhat soft, should not be used in the fancy grade. In order to obtain the right degree of maturity

it is frequently necessary to pick a tree several times. The extra cost of picking is negligible compared to the value of the product obtained. When pickers can "make wages" or better, by picking the cherries the way they should be picked, they are paid by the pound, otherwise they are paid by the hour. A fancy sweet cherry must have its stem on, otherwise it may decay before reaching the consumer. Some growers clip the cherries with shears, which is an operation just as fast or perhaps a little faster than picking by hand, but since the sharp cut on the stem may pierce the skin of another cherry when pressed together firmly in the flat, it is better to hand-pick the fruit with all the stem on.

## Packing.

There is probably two hundred per cent more profit in packing the fruit in the so-called ten-pound California flat, than in the sixteen-quart crate. On the other hand there is a good demand for the sixteen-quart pack and it has its advantage in the marketing of second grade fruit. Every cherry which goes into the flat must be perfect. Several of my neighbors who have tried packing in flats have given it up because the flats reached the market in a semi-decayed condition. They made their mistake, however, in not recognizing the necessity of packing only cherries without blemish of any kind and in the proper degree of maturity. When once a perfect pack is made, however, the fruit ships almost any distance by express without damage. I have shipped flats successfully to Southern Texas and as far west as Nevada without refrigeration, and have shipped flats commercially to New York City for the past three years.

The flat is about eighteen inches long, nine inches wide, and two and one-fourth inches deep, inside measurements. The grade in the flat is based on the size of the cherry, all other conditions being the same. They may go eleven, ten, or nine and rarely eight across the width of the box. Unless there is an unusual demand and the size of the cherry is exceptionally small, I pack the cherries, which go more than ten, in the sixteen-quart crates. Since the market will usually pay fifty cents more a flat for the grade going nine across than the smaller ones, every effort is made to make the cherry as large as possible through cultivation, pruning, etc. It would be a very difficult proposition to thin green cherries, but I believe in some years it would pay. All the operations which reduce the percentage of culls and increase the size of the fruit are very paying indeed.

### Operation of Packing the Flat.

The flat is packed in the following manner: It is placed face down on a slightly tilted surface, the bottom being nailed on when the packing is completed. Starting at one end the cherries are placed in rows with the stems up and the flat side of the cherry against the bottom or what really later is the top of the flat. A little experience is necessary to get the lines of cherries straight and at right angles to each other. When the first layer is placed, a second layer is carefully put into the grooves and spaces of the first layer. If this is done properly the stems cannot be seen when the flat is opened for inspection. After this second layer is packed the rest are put in more or less irregularly, care being taken to have the edges and corners quite firm and even. With the proper amount in the flat, the cover is nailed on. This is one of the most important operations of all and requires a good deal of care and experience. It is necessary to have as many cherries in the flat as possible to give the proper bulge to the pack and to take up the slight shrinkage which takes place before reaching the consumer; but it is equally imperative not to get so many in as to crush the fruit. If all the cherries were carefully placed in layers, as, for instance, boxed apples are, the pack would be too tight or too slack.

A good packer can pack a flat of cherries in about thirty minutes, providing the cherries are graded beforehand. Inexperienced packers are first taught to sort and grade the fruit, and pack the quarts, before starting in on the flats. When they begin packing it does not take them long to produce a perfect flat, but it takes a good deal of experience to develop speed in the operation. The packers and sorters are paid by the hour because the excellence of the pack would be undoubtedly decreased by piece work.

### Marketing.

The demand for sweet cherries in my experience has always greatly exceeded the supply. This is particularly true for the later varieties which have no competition from other sections of the country. A part of my crop is sold locally to "summer people," who ship the flats to friends all over the country. There is a large local demand, too, for the second grade cherries sold in the quarts. Most of my sweet cherries go direct to retail grocers in Milwaukee, Chicago, Detroit, Cleveland and Cincinnati and to a wholesale dealer of fancy fruits in New York City.

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*Sweet cherry trees are not so long lived on Mahalet as on Mazzard stocks, but the sour varieties should be propagated on Mahaleb.* —L. R. Taft.

## CHERRY CULTURE IN WISCONSIN.

FREDERIC CRANEFIELD, *Wisconsin.*

The sour cherry has been cultivated, or at least been growing in Wisconsin for about three hundred years. The Jesuits who traversed the Mississippi valley region early in the seventeenth century came by the way of Lake Superior, touching at Madaline Island, where they founded a mission. The French trappers who came to this spot over one hundred years later found cherry trees growing plentifully in groups and thickets about the site of the Jesuit camp. The "Mission" cherry, resembling the Montmorency, is now plentiful both on Madaline Island and on the mainland opposite. The sour cherry has been cultivated for home use in southern Wisconsin as long as any other fruit tree, about eighty-five or ninety years. Some of the first nursery-grown cherry trees planted in Wisconsin were brought by boat from Buffalo to Manitowac in 1828.

Cherry growing on a commercial basis has been developed almost wholly within the past fifteen years. Up to 1900 in round figures there were probably no cherry orchards in the state of over ten acres and the marketing of home-grown cherries consisted largely of the surplus from farm orchards, sold in bulk from baskets and pails.

In 1893 the late Prof. E. S. Goff, in company with A. L. Hatch, bought wild land in southern Door County for the purpose of developing a nursery and a fruit farm. A look at the map shows that Door County is almost surrounded by water, Lake Michigan on one side and Green Bay on the other.

The soil about Sturgeon Bay and along the east shore of Green Bay is a light gravely clay loam, barely covering in some places the Niagara limestone beneath and rarely exceeding two feet in depth. Goff and Hatch planted apples and plums, European and Japan varieties, and but few cherries, but after a few years the cherry began to assert itself. The apples thrived and in a measure the plums, but the small cherry orchard proved to be the money-maker, for here the cherry thrives exceedingly. The rather thin soil promoted early bearing, the water influence fended off late spring and early fall frosts, thus insuring a set of fruit when often the crop would be an entire failure fifty or even a hundred miles south or west. The lengthening of the growing season tended to the maturity of fruit buds and wood, so essential to profitable cherry growing.

Although the first cherry orchard in Door County or at least the first of commercial importance was planted in 1893, it was nearly twenty years before the people of the peninsula realized that the soil and climate appeared to have been designed especially for the cherry and before the planting was really begun in earnest.

To make the story short, there are now over 500,000 cherry trees in Door County, equivalent to 5,000 acres. With less than one-fourth of these in bearing, the shipments in 1917 amounted to two hundred and fifty car loads, of five hundred cases each and in addition eighty car loads were absorbed by a local cannery.

Next to Door County, Bayfield has the largest acreage of cherries, amounting to about three hundred acres. The soil here closely resembles that of Door County, but is more sandy. Several large orchards have been planted in Crawford County, as well as lesser plantings in other parts of the state. Eight thousand acres in commercial cherry orchards is a conservative estimate for the state, although the census and Department of Agriculture figures show several times this amount. Orchards are of all sizes, from the one-acre home orchard up to the monster six hundred and twenty-acre orchard of the Co-operative Orchard Company of Sturgeon Bay. Many orchards owned by stock companies range from eighty to two hundred acres each.

The sour cherry, and it should be said that no other can be successfully grown in Wisconsin, demands thorough soil and air drainage. The character of the soil seems to be of slight importance, if drainage requirements are met, for while the light soils of northern Wisconsin produce early-bearing trees the trees grown on the loamy soil of Crawford County ridges produce even more abundantly, if not so young, as those of Door County and Bayfield. The writer believes that this holds true of all tree fruits, and that too much emphasis has been laid on soil requirements and too little on the essential factors of soil and air drainage. Of the best commercial cherry orchards in the state some are on light soils, scarcely a foot in depth, and others on rich clay loam underlaid with twenty to sixty feet of clay.

Two varieties are grown, Early Richmond and Montmorency, to the exclusion of all others. English Morello was planted somewhat extensively in the Bayfield region, but they have almost without exception disappeared. The tree is not sufficiently hardy to withstand Wisconsin climate. One-year trees are favored by a few planters, but most of the trees planted are two years from the bud. No cherry trees are propagated in Wisconsin, and probably ninety per cent. of all the stock so far planted came from southern Indiana.

The trees are planted twenty by twenty feet, and after about twelve years the tops form a bower. Thorough clean cultivation is the rule, not only in young orchards but in the older ones as well. For the first three or four years catch crops are grown, potatoes and beans being most favored. In the older orchards cultivation is

begun early in the spring and continued until July first to fifteenth, when a cover crop, usually buckwheat, is sown. The buckwheat is allowed to mature a crop of grain without apparent detriment to the orchards, and the stubble serves admirably to prevent washing as well as to hold snow. The favorite tool for cultivating is the spring tooth harrow, rigged with twelve-foot eveners. With this tool thorough cultivation can be carried to within eight or ten inches of the tree trunks, leaving but little for hand work. For the first spring cultivation many of the best growers use a light triple gang plow, cutting an eight inch furrow.

Successful growers give more thought and attention to the pruning than to any other phase of the work. While the general principles of open, low-branched trees is always followed no rules are laid down, but each tree is carefully studied so as to leave the right amount of wood for a maximum load and not too much. A careful distribution of the branches to avoid splitting under heavy loads and above all opening the tree so as to admit light and air with the consequent bearing of fruit on the inside branches is sought. Skillfully pruned Wisconsin cherry trees bear fruit from "center to circumference."

In addition to the cultivation and pruning, spraying is a part of the gospel of every progressive Wisconsin cherry grower. Three applications of Bordeaux three-three-fifty, and arsenate of lead, are considered essential, the first after the petals fall, the second two weeks later and the third after the fruit is harvested.

The very rapid development of cherry growing, the planting of several thousand acres of orchards within a short period, lead to fears concerning harvesting, but this problem, like others that seemed incapable of solution, is being worked out readily and easily. Neighboring cities and towns furnish most of the pickers. Women and girls who would scorn an opportunity to pick strawberries, bending over in the hot sun all day, gladly go cherry picking. From the remarkably low-headed trees over one-half the fruit can be picked without ladders, with pickers working most of the time in the shade. Cherry picking in Wisconsin is recognized as a genteel business. In addition to the local pickers, various organizations, such as the Boy Scouts, Camp Fire Girls and orphan homes, send large delegations to the cherry centers, each group under competent leadership. Barracks and camps are provided by the growers. One large orchard company this year employed a large group of Indians from a distant reservation as pickers, and with great success.

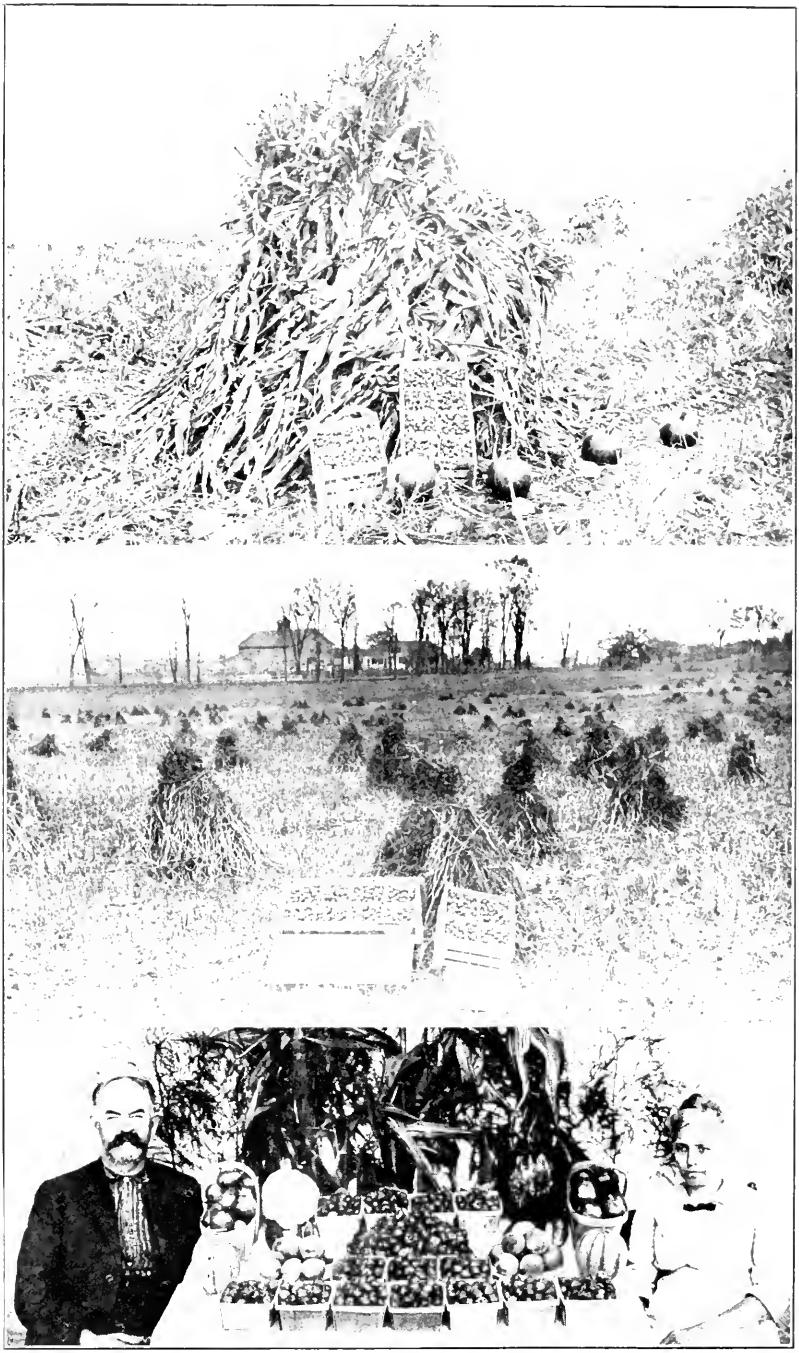
The fruit, except that sent to canneries, is marketed in standard quart boxes, sixteen to the crate. There was no trouble this year in securing a market. Shipments were made to Tulsa, Oklahoma, Omaha, and several carloads to Cleveland, Ohio. Minne-

VIEWS OF EVALINE ORCHARD, CHARLEVOIX, MICH.

TAFT'S CHERRY.

Plate XXXI.— Legends from top to bottom.

1. Sour Cherry, "Montmorency." Head round, compact; leaves thick and slightly roughened. Trees six years old.
2. Sour Cherry, "Richmond." Head open and spreading; leaves of medium size and rather thin. Trees six years old.
3. Sour Cherry, "English Morello." Head small and open; branches willowy; leaves dark green. Trees six years old.
4. Sweet Cherry, "Schmidt." Branches strong, upright becoming spreading; leaves large. Trees six years old.



Everbearing Strawberries and Their seasonal fruit associates, accompanied by Mr. and Mrs. Farmer.

apolis annually absorbs a large part of the crop, and this year Chicago took several large shipments. Chicago usually draws its late cherries from Michigan, and the fact that Wisconsin cherries were sought by Chicago buyers this year can be accounted for only on the basis of superior quality of the Wisconsin product. This in turn may be traced to the canneries which absorb at a good price fruit not in the best condition for long-distance shipments.

The raising of sour cherries in Wisconsin, like fruit growing of any kind anywhere, has proved profitable, when well done. The best orchards have yielded phenomenal profits, while the average for all cherry-growing districts in the state have been highly satisfactory. Four-year-old trees yield four to six quarts per tree, six-year-old trees sixteen to thirty-two quarts, and ten-year-old trees thirty-two to forty-eight quarts per tree.

In conclusion it may be said that the growing of sour cherries is a well established industry in Wisconsin. It is not a mushroom growth that will perish over night; it is firmly and well established on sound principles; it is not overdone. We have 5,000 acres or more of cherries and we expect to plant many, many more, for we have one hundred and ten million of people, they all love cherry pie, and we of Wisconsin are going to see to it that everybody has at least one slice, so far as we can possibly do it.

## ONE HUNDRED YEARS OF STRAWBERRY GROWING IN NORTH AMERICA.

S. W. FLETCHER.

It is appropriate that this brief historical sketch should be presented here. Boston was the birthplace of commercial strawberry growing on this continent. Here originated the Hovey, the first native variety of marked value. The Massachusetts Horticultural Society was the first organization to foster the cultivation of this fruit by means of annual strawberry exhibitions, beginning in 1848. The first strawberry festival was held at Belmont, Mass., in 1858. The market gardeners near this city have been among the most skillful cultivators of the strawberry since 1817, when commercial production began in Middlesex County.

There was practically no interest in the garden culture of the strawberry for over a century after the settlements at Plymouth and Jamestown. The hillsides and meadows abounded with wild berries; in 1643 Roger Williams wrote, "I have many times seen as many as would fill a good ship within a few miles compass. The Indians bruise them in a mortar and mix them with meal and make strawberry bread." As fact as the forests were cut down, straw-

berries sprang up in the clearings. This native supply was the chief dependence of the housewives of Boston, New York and Philadelphia, until after 1800. The berries were peddled through the streets of Boston in pottles, which were small cone-shaped baskets holding about a pint, packed into square hampers holding fifty or sixty pottles.

Strawberry growing in home gardens began about 1700 with plants that had been brought from the fields. About 1750 the Hautbois, Redwood, and Chillian berries began to appear in American gardens. The first named variety to appear here, the Early Hudson, was listed in 1791. The strawberry growing of that period, however, was mostly a diversion of country gentlemen who could afford to employ the services of private gardeners; most people still secured their supply from the fields.

Commercial strawberry growing began about 1812 in the vicinity of the four largest cities, Boston, New York, Philadelphia and Baltimore. At that time Boston was a city of less than 50,000. The varieties grown in New England then were chiefly the Redwood, which was the wild strawberry of England, *Fragaria vesca*, and Early Virginia, or Large Early Scarlet, which was an improved form of the native *Fragaria virgininia*. These two varieties supplied the Boston market until the introduction of the Hovey in 1836. The industry was necessarily confined to within a few miles of the city since the market wagon was the sole means of transportation; there were no railroads then. A man who picked two hundred baskets a day was considered a large grower. The prices received were quite attractive; in 1832 strawberries were quoted on the Faneuil Hall Market at fifty to seventy-five cents a quart.

*Origin and Influence of the Hovey.*— The origination of the Hovey strawberry, in 1834, by C. M. Hovey of Boston, was a turning point in North American horticulture. Although the United States had cut loose from Great Britain politically, she was still tied to the apron strings of the mother country horticulturally. Until this time our fruit growers had been content to grow European varieties, most of which were failures here; and had slavishly copied Old World methods of culture, with disastrous results in many cases. It was natural that this important work should have been done at Boston. This city was the center of progressive horticulture in North America. In 1829 a group of enthusiastic amateurs had organized The Massachusetts Horticultural Society, which now has an unbroken and notable history of nearly a century. This pioneer society, together with the strong Pennsylvania Horticultural Society organized in Philadelphia in 1834, made possible the organization of the American Pomological Society in 1849. It also made possible the publication of The

Magazine of Horticulture, edited by C. M. Hovey for forty years, our most valuable single repository of hortieulture.

Hovey first exhibited his seedling before the Massachusetts Horticultural Society in 1838. It so far surpassed any other variety in attractiveness and size that it created a furore. Plants sold for $5.00 a dozen. It beeame the dominant variety in home gardens but failed as a commercial variety except in the vicinity of Boston, because it was tender and required high culture. The chief value of the Hovey was in the impetus that it gave to plant breeding. Fired by the success of Hovey, men all over the country began to make crosses and to raise seedlings, so that the list of meritorious varieties increased rapidly.

*The Pollination Discussion.*— We are indebted to the Hovey, also, for directing attention to the pollination question. For years there had been numerous complaints of "barren plants," and "blasted" blossoms. These were mostly pistillate plants. The fact of the separation of the sexes in the Hautbois strawberry had been pointed out in France by Duchesne, in 1760, and in England by Keens, in 1817; but there was no attempt to apply these observations to the pistillate varieties commonly grown in America, such as the early Hudson, Hudson's Bay, and Methven Scarlet, until 1834. In that year Nicholas Longworth of Cincinnati called attention to the discovery of one of his neighbors, a German gardener named Abergust, "That there were what he called male and female plants," and to the advantages of mixing the two. The Hovey proved to be a pistillate variety and there ensued a hot discussion as to whether or not it would be benefitted by being planted near another variety as a pollinizer. Longworth stood out boldly against Hovey, A. J. Downing, Thomas Meehan, Lindley, and practically every other prominent American and English horticulturist, all of whom contended that the pistillate condition was merely the result of poor culture, or degeneracy. The "Strawberry War," as it was called, was waged between 1842 and 1848. It was one of the most unique and bitterly contested controversies in American horticulture. In the end Longworth won his main point; but one of his minor contentions — that hermaphropdite varieties can not be as productive as pistillate sorts, perished with the introduction of the Wilson.

The discussion of "Longworth's theory" was one of the high points in North American strawberry growing. It not only gave greater certainty to the cultivation of pistillate sorts but also resulted in a general questioning of methods which prepared the way for the remarkable extension of commercial planting that followed the introduction of the Wilson.

The close of this period, in 1854, found commercial strawberry culture well established in the vicinity of Boston, New York, Philadelphia, Baltimore, and Cincinnati; but only a meager beginning had been made. The public supply was mostly from the fields. It is probable that the total quantity of cultivated fruit marketed in 1854 did not exceed 40,000 bushels, and the total area under cultivation was scarcely 1400 acres, which is less than one-fourth of the present acreage in Sussex County, Delaware.

*The Sway of the Wilson.*— The most important date in American strawberry growing is that of the introduction of the Wilson, in 1854. This variety was raised by James Wilson, an unassuming Scotch gardener near Albany, New York. So rapidly did the merits of the Wilson become known that by 1861 it had practically supplanted all other varieties for market culture. The Wilson is unique among varieties in the complete ascendency that it gained, and held practically undisputed for a quarter of a century. This immediate and continued popularity was due to the fact that it was dependable. It produced large crops of attractive fruit even under neglect and was an excellent shipper. In short, it simplified the culture of the strawberry, which hitherto had been a most precarious crop except to the initiated. Even its best friends, however, had to admit that the Wilson was sour. Henry Ward Beecher called it "the wickedest berry that was ever indulged with liberty." C. M. Hovey remarked, "Wilson's Albany has fruited with us this year in fine condition and has come fully up to our expectations as one of the sourest, most dirty colored, and most disagreeable flavored of all recently introduced sorts — an excellent sort to make vinegar of." To this damning indictment his neighbors in the Massachusetts Horticultural Society loyally gave assent, voting unanimously, "The Wilson's Albany is unfit for general cultivation," and Marshall P. Wilder declared he would have as soon eat a turnip as a Wilson strawberry. But the Wilson refused to be suppressed.

Not until about 1876, when there had begun to be complaint that the Wilson was "running out," did a variety arise that really challenged its popularity. This was the Crescent. The chief claim for the Crescent was that it thrived with a minimum of effort. It was frankly introduced as the "lazy man's berry," especially designed for members of the "No Sweat Club," and fully merited this enticing description. The Sharpless, introduced in 1877, was the other member of the great triumvirate of North American varieties which dominated the market from 1858 until 1895. Fully ninety per cent of all the strawberries grown during these forty years were the great three, with minor plantings of Charles Downing, Cumberland Triumph and Miner's Proflic. After

1895 they were gradually superseded by Haverland, Gandy, Bubach and the more numerous varieties of today.

*Boom Days.*—The introduction of the Wilson ushered in the boom period of American strawberry growing. The "strawberry fever," as it was called, swept the country between 1858 and 1870 and reached its climax about 1865. Strawberries commonly sold in eastern cities for thirty to forty cents a quart and profits of $1,000 an acre were secured occasionally. In 1861 the editor of *The Genesee Farmer* visited Bloomington, Illinois, and found Wilson strawberries selling for fifteen cents a quart and corn for eight cents a bushel. The inevitable reaction came about 1870. In many places prices declined to three or four cents a quart and hundreds of carloads were dumped into the Hudson River and Boston harbor. The business soon steadied down to moderate prices and fair profits, except for a local recurrence of the strawberry fever in Florida from 1880 to 1892, when net profits of $3,000 an acre were reported from Bradford County, and profits of $700 an acre were quite common.

One of the factors that led to the remarkable expansion of strawberry growing at that time was the improvement in transportation facilities. Immediately after the Civil War railroads began to push across the country. They replaced the market wagon as well as the stage coach and extended the radius of territory that could produce the strawberry supply of a city from a driving distance of a few hours to a rail distance of many hundred miles. By 1862 New York and Boston received strawberries from as far west as Cincinnati. Then began the competition from the South that became such a pressing problem to northern growers. Berries from the Chesapeake Bay region and from Charleston, North Carolina, began to reach northern markets in appreciable quantities by boat in 1858. In 1881 the Massachusetts Horticultural Society found it necessary to hold a special meeting to consider the question, "How shall southern competition in the small fruit market be met?" Not being able to legislate their competitors out of business, northern growers wisely concluded to accept the inevitable and largely abandoned the cultivation of extra early varieties which competed with southern berries.

*Advent of Refrigerator Cars.*—The first successful demonstration of the use of the refrigerator car for shipping berries to distant markets, in 1887, marked another important epoch in the strawberry industry. Between 1870 and 1885 the losses from long-distance shipments in ventilator cars were very heavy and resulted in a sharp decrease in planting, especially in the South. The experiments of Parker Earle, of Cobden, Illinois, between 1868 and 1885,

ultimately led to successful refrigerator car service. More than one-half of the strawberries marketed in North America today are raised so far from market that they require refrigeration. Without refrigerator cars the great strawberry industry of the southern states, comprising two-thirds of the 15,000 cars shipped the past season, would be impossible. Parker Earle is foremost of those whose skill and patience made possible the strawberry industry of today. He died at Los Angeles, California, February 12, 1917.

*Comparisons of Yields, Size, Season.*—The progress in strawberry growing within a century may be further emphasized by means of certain comparisons. It is humiliating to report that there has been only a very slight increase in the average yield per acre. The average for the United States is now 1,700 quarts an acre. In Arkansas, one of our largest shipping states, the yield is only 1,122 quarts an acre. This is scarcely higher than the average yield seventy-five years ago. In Massachusetts the average yield is 2,730 quarts. The possible or maximum yield, however, has greatly increased. In 1823 a Maryland grower reported a yield "So great that a single acre would produce the mammoth quantity of eighty bushels." Feeling that this statement "might be considered by some as bordering upon the marvelous" he called in "several gentlemen of high respectability" to vouch for his assertions. In 1867 Marshall P. Wilder told the incredulous fruit growers of Missouri that he "disliked to make large statements, but it is no uncommon thing to produce 4,000 quarts per acre in the vicinity of Boston." The yield of J. M. Smith, of Green Bay, Wisconsin, long stood as the record under field conditions; he produced 14,284 quarts of Wilsons per acre. Exceptional yields under intensive market garden culture were obtained by John Knox, of Pittsurgh. In 1860 he stated, "Some varieties the past season yielded as high as 600 bushels (19,200 quarts) per acre." Between 1863 and 1871 he sold many hundreds of bushels of Jucunda annually for $16 a bushel. It was reported that T. C. Kevitt, of Athenia, New Jersey, picked 27,000 quarts from an acre of Glen Mary in 1901. The Trebla, one of the seedlings of Albert F. Etter, of Ettersburgh, California, recently has been reported as yielding at the rate of 40,000 quarts per acre in California. Undoubtedly we are far from the limit in this respect and our average yield of 1,700 quarts is very low.

There has been but little change in the size of commercial berries for fifty years, chiefly because very large berries are not desired—they do not ship well. The possibilities of the strawberry in the attribute of size, were it practical to enlarge it, have not been sounded. In 1869 Seth Boyden, a strawberry breeder of New Jer-

sey, predicted that in a few years strawberries would be produced "as large as pineapples." Specimens of his Great American, grown in 1878, measured fourteen and one-half inches in circumference and weighed three ounces. The present record holder was a specimen of the St. Louis, raised by A. T. Goldsborough, of Washington, D. C., in 1904; it measured three and one-third inches by three and eleven-sixteenth inches and weighed three and three-quarter ounces. These mammoth berries are interesting but not profitable. Nobody wants a strawberry that has to be carried in cotton batting and must be sliced before it can be eaten. As Marshall P. Wilder once remarked, "We already have strawberries sufficiently large to fill any mouth of decent dimensions."

There has been a marked extension of the strawberry season. In 1840 the strawberry season in northern cities was barely five weeks; June and strawberries came together. The first extension came about 1850 with the marketing of early berries from New Jersey. Soon after, Delaware entered the field, then the Chesapeake Bay region, about 1870; Florida in 1880, and the Gulf states a little later. Now, in any large city strawberries can be bought any month of the year and are abundant for at least six months. There are fewer berries on eastern markets in October and November than at any other time, but limited quantities come from California and occasionally from Mexico. The latest shipments from Colorado in September and from southern California in October and November, together with the small quantity of fruit from ever-bearing varieties, meet the first arrivals from Florida. The strawberry now rivals the orange, banana and apple in the period that it can be obtained in the market in a fresh condition. The demand for strawberries out of their normal season, that is, other than early spring, is increasing somewhat but it cannot be expected that there will be a heavy demand in late summer and early fall, when so many other fruits are available, or in early winter when prices are very high. The bulk of the sales will continue to be from March until July. Those interesting novelties, the ever-bearers, will be valued almost exclusively for home use, occasionally for commercial culture on a very limited scale.

*The Great Names in Strawberry Growing.*—It would be ungrateful to close this sketch without paying tribute to the men whose initiative has made possible the strawberry industry of today. We are under obligations most of all to these five men: to C. M. Hovey, of Boston, the nestor of American plant breeding; to Nicholas Longworth, of Cincinnati, who directed attention to the pollination question; to James Wilson, of Albany, New York, for the variety that marked the beginning of modern commercial strawberry growing; to

John Knox, of Pittsburgh, who was the most skillful grower under intensive market garden culture that this country has produced; and to Parker Earle, of Cobden, Illinois, for the development of the refrigerator car. Of the many other cultivators, breeders and propagators who have contributed largely to the advancement of the industry, I shall mention only one—Matthew Crawford, of Cuyahoga Falls, Ohio. He, alone, of all the great names in strawberry culture, is still with us.

Thus, within a century, the strawberry has developed from a wilding to one of our most important and highly improved fruits. Sixty years ago there were less than 1,500 acres under commercial culture in North America, now there are over 150,000 acres, with an annual output valued at over $20,000,000. House-to-house peddling has been succeeded by co-operative selling associations. Then the industry was confined to a fringe of market gardens around the larger cities; now it has largely withdrawn to districts remote from the markets sought. Then strawberries were carried in wagons to markets which were rarely over twenty-five miles distant; now they are shipped in refrigerator cars from California to Boston and from Louisiana to Alaska. The strawberry season has been extended from five weeks to twelve months. The number of varieties has increased from eighty to eighteen hundred. It is a remarkable history. The rise of no other fruit has been more rapid and none gives more promise for the future.

### ARE FALL OR EVER-BEARING STRAWBERRIES A SUCCESS?

L. J. Farmer, *New York.*

With us fall or ever-bearing strawberries are a decided success. I like to call them fall-bearing strawberries because the name more thoroughly distinguishes them from the spring bearing kinds.

This idea of gathering and eating fresh strawberries from some time in early June until November 1st sounds good to the average person and especially so to the person who prefers strawberries to any other fruit. The dream may be realized, provided the proper care and attention be given to this new race of plants. I wish to say, however, that my information leads me to believe that the fall-bearing strawberry is distinctly a northern or cold weather proposition. They do not succeed so generally throughout the South.

Fall-bearing strawberries may be divided into two groups: those which pay principally for the fall crop and those adapted for both the fall and spring crops.

The most prominent of the varieties that seem to be adapted for fall fruiting only is the Francis. Under right conditions the

Francis will bear an enormous crop of extra-large berries in the fall, from August to hard freezing weather, but, when fruited in the spring, it sets so many specimens that the berries are small, irregular, knotted and practically worthless. The Francis is a very glossy and attractive berry, and, when it succeeds, it is the most profitable of all the new race of strawberries for the fall crop. The plants are very small and weak when young, but stood out during the second season's growth and make large plants, but are always shallow-rooted and will not stand the drouth like some varieties.

Next in value for the fall crop is the Americus, and because it succeeds with so many more people, the Americus is possibly the most profitable variety that has yet been thoroughly tested for growing for the fall crop alone. It is not quite as large as the Francis nor as attractive, but the plants are deep rooters and withstand all changes. It will stand lots of wet weather, the foliage remaining healthy, and no drouth can kill the plants. The fields of Americus seem to improve and become more productive after several years. It is the finest flavored strawberry that I have ever tasted. The berries of the spring crop are larger than those of the fall crop but the plants are not so productive in the spring as some other varieties.

The Progressive is another variety adapted for a fall crop. In most sections of the country the Progressive is in great favor, but never has distinguished itself with us in Oswego County, New York. The fruits are similar in size, shape and color to the Senator Dunlap, being a seedling of that variety, but have not the bright glossy color or the fine flavor of the Dunlap. The fruit is so dark in color that it soon gets too black in the market and it is also a poor shipper. The Progressive can be recommended for home use in many sections of the United States. It succeeds over a wider range of territory than almost any other variety of these berries. Except in a few isolated localities where, on account of elevation and local conditions, the environments are favorable, the Progressive is the only variety that seems to do anything south of the Mason and Dixon line. The Progressive is the earliest strawberry to ripen in the spring that I have ever fruited, and is, therefore, of some value in this respect, but, after the second picking, the berries are so small that no one will buy them.

The Minnesota 1017, a new variety, has fruited with us the past fall for the first time, and gives great promise as a distinct fall fruiter. It produces more berries to the same space of row than any variety we fruited the past season. I have not tested it for its spring fruiting qualities.

All plants of these varieties which are intended for fall fruiting mainly should be set very early in the spring on very rich, well-cultivated soil, and forced to a big growth by July 1st. Then, if

allowed to fruit, they will bear big crops for the balance of the growing season.

The most popular fall-bearing strawberry, and the one grown most largely for market, is the Superb. While the Superb will, under right conditions, produce an enormous crop in the fall, it is as a dual purpose variety that it has the greatest value. If the Superb were grown for the spring crop alone it is doubtful if there is any other variety now before the public which would bring to the grower so much clean money to the acre. If the runners are kept clipped as they start, or if some are allowed to root and afterwards severed from the parent plant, the Superb plants will produce a good crop of the finest-colored fruits throughout the autumn of the first year, and no matter how large the fall crop it does not seem in the least to affect the chances for the spring crop. The June crop of Superb surpasses almost everything we have ever seen in quantity. The Superb plant is usually a vigorous runner maker during the first year and if these are allowed to root and form a wide matted row the berries, while large and fine in appearance, will not be produced in great numbers except on a few plants, which for some reason or other fail to make runners.

I have noticed that all varieties of fall-bearing strawberries do not produce much fruit on plants which make an excessive number of runners the first year they are set out. The plants of the Superb are the healthiest of all the varieties of this new race of strawberries. They are abundantly able to produce the three crops of fruit in two years if well tended. It is with regret that I have to admit that the Superb lacks real character to its flavor, although we consider it better flavored than Productive or Progressive.

The variety known as "Autumn" will produce quite a crop of fruit in the fall of the first year, under certain conditions, but it is as the parent of other varieties, and as a spring fruiter, that the Autumn is most distinguished. The spring crop is enormous, and, while the berries are not large, they are produced in such quantities and they are so firm, deep red and fine for canning, that many people call for them. The berries can be easily picked and leave the hull on the vines.

The Productive, like Autumn, is a pistillate, and valuable only as a spring fruiter. It produces many berries in the fall, but they are small, unattractive and too light in color to be valuable for market. The spring crop, however, is simply beyond comprehension in enormous yield, but the flavor is lacking and they do not create a demand for more strawberries. The Productive, like other pistillate strawberries, is unaffected by spring frosts, and will often bear a most profitable crop when other kinds of spring fruiting strawberries are a failure.

Americus is valuable as a spring fruiter, as well as a fall fruiter, because of its fine appearance and wonderful flavor. If you are looking for the strawberry that will surpass everything else in flavor the Americus is the variety to grow. The Progressive is valuable as a spring fruiter only to furnish the first berries of the season. The spring crop is better in flavor, with us, than the fall crop.

The growing of these berries for the fall crop only is a high-class horticultural pursuit, and offers great opportunities to the careful, painstaking grower. Under right conditions, with the ideal soil and the proper variety to fit that soil, I believe as many dollars can be secured from an acre of fall-bearing strawberries as from any other high-class crop that can be grown outdoors.

The average strawberry grower will doubtless do best to confine himself to the practice of growing them for the dual purpose of fall and spring fruiting. If the plants are set out and cared for with the idea of producing the spring crop only there will be a lot of berries produced in the fall, and these can be secured without much effort. When the plants produce in the fall, it does not seem in the least to affect them for fruiting the following spring. Whatever fruit is secured in the fall is so much clear gain and, in most cases, it will be quite considerable, even if the runners are all allowed to grow.

It has been mentioned that fall-bearing strawberries are more productive than other kinds. This is true. They blossom more and, therefore, produce more, even in the spring season, than other varieties, but, of course, must be well fertilized and cared for. It would seem that they are so inclined to run to fruit that they are not able to produce in the regular season all the fruit they would like to, so "boil over" and produce the fall crop. Inclining to fruit as they do more than to foliage, they blossom and produce ripe fruit in the spring in advance of other varieties of strawberries. By proper manipulation of the blossoms, one can have strawberries any day from the time they ripen in early summer until the coldest freezing weather of late fall.

One valuable point with fall-bearing strawberries is that they fruit in the fall of the first year that they are set out, most varieties on the young runner plants as well as on the parent plants. This characteristic enables people in cold climates to have strawberries where the winters are too severe to winter the plants in the open, and also in sections where spring frosts occur so late as to destroy the spring crop. The fall or ever-bearing strawberries blossom continuously throughout the growing season, and as it only takes about three to four weeks from the blossom to the ripe berry there is hardly a locality where these varieties cannot be made to fruit the

first season they are set out. It is well known by most strawberry growers that frosts destroy strawberries only when in full bloom; after the berries are set frosts do not destroy them. Ordinary frosts of early autumn seem to benefit fall-fruiting strawberries by thinning the number of blossoms and thereby making the fruit larger. It is only when hard freezes come, hard enough to freeze the soil for a depth of an inch or more, that fall strawberries are injured. The flavor of fall strawberries, however, is superior when there is much warm weather and sunshine. In November the berries lack both flavor and fine appearance. I, therefore, advise that the plants be encouraged to fruit only in August, September and the forepart of October.

In marketing fall strawberries we find that the people must be educated to use them. There are still some people who think that there is "no such a thing." We find that they sell best where best known. Private families who have had them before, hotels, restaurants and other places where they can be taken in fresh every day, prove the best customers. Most varieties will not stand shipment well in hot weather, or in wet and muggy weather. The Superb is the best shipper of the well-known kinds, with Americus second in value and Francis third. With a brief test, the new Minnesota 1017 seems to be the best shipper of them all.

A brief history of the fall-bearing strawberry may be of some interest. In the fall of 1898 Samuel Cooper, of western New York, found a plant of the old Bismarck strawberry which, with its eleven young runner plants, was bearing strawberries. This was in the month of November. The original plant and its eleven runners were transferred to the family garden and continued to fruit in the fall from year to year. Mr. Cooper sent me some fruit the following autumn, and these were the first fall-bearing strawberries that I ever saw. The plants were increased by runners and division as fast as possible, and distributed quite generally over the United States. The variety was never a success commercially, but it was necessary to have this variety, which was named the Pan American, to produce more and better kinds of these new berries. A peculiarity of the Pan American is that it will revert to the spring-fruiting habit and not produce much, if any fruit in the fall, if excessively fertilized with nitrogenous manures and highly cultivated, while its seedlings are not inclined to revert permanently if overenriched. Mr. Cooper raised the Autumn from seeds of the Pan American, and by crossing Autumn with Pan American and other kinds he produced numerous new varieties, such as Productive, Superb, Ideal and Peerless. The last two seem to be of the same type as Superb.

In February, 1905, Mr. Harlow Rockhill, of Iowa, who has had much experience in breeding plants, sowed seeds of a cross of Pan American and Louis Gautier, a French variety of strawberry, in boxes in the kitchen window of his farm home. These came up, were transplanted in boxes, and in the spring were put out in the garden. Among these seedlings were the Francis and the Americus. It seems almost incredible that strawberries can be produced from the seeds as quickly as tomatoes, but such is the fact. Later on, numerous other varieties were produced by Mr. Rockhill, the most famous of which is Progressive. The horticulturist at the Minnesota Experiment Station has made numerous crosses, and seedling No. 1017 is one of the results.

There is no one variety of fall-bearing strawberry which has all the desirable qualities of a perfect strawberry. In this respect they are just like other strawberries. All varieties have one or more weak points. The only thing to do is to experiment and select the variety which best fits your purpose.

Fall-bearing strawberries are now past the experimental stage. With most growers the novelty has worn off. They are now on their true merits. In the future we expect to see varieties originated and introduced that will surpass the best that we now have. Numerous letters from people in different sections of the United States show that many new varieties are springing up. Most of these will prove of no particular value over those already in cultivation. Some will prove to be only second crops of regular summer-bearing varieties. Whatever its future, the fall-bearing strawberry deserves a place, and will occupy a place, in the horticultural world.

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*Have been studying the strawberry for seventy-five years and am satisfied that if you place a definite order for a berry and plant, the intelligent and persistent breeder can get it for you within that period; and if for an apple Crandall would probably have it in detail within a century.*—J. R. REASONER.

## THE COMMERCIAL PRODUCTION OF THE BLUEBERRY.

J. H. GOURLEY, *New Hampshire.*

The writer has been interested in the blueberry crop of New Hampshire for the past few years largely from the standpoint of an amateur and lays no claim to any professional study of the technical points involved in their propagation or soil requirements. We have had notable contributions along these lines in recent years, especially by Mr. F. V. Coville, of the Bureau of Plant Industry, and while we are attempting to do something along this line at the present time, the work is new and I do not wish to report upon it. But anyone living in New England, especially in Maine, New Hampshire or Massachusetts cannot escape becoming interested in this our greatest natural fruit, which grows in the wild so profusely throughout these states. Perhaps many of us scarcely realize that the blueberry is a great commercial crop in many places because we have grown so used to seeing it that this very familiarity has dulled our realization of its importance. The wording of the subject of this paper may, however, be just a little misleading, for from it we might expect that the blueberry was produced under the direction or guidanee of man, whereas the very opposite of this is true.

There are no commercial plantations, to my knowledge, of sufficient size to be a factor in the crop which is marketed, and, despite the hopes which we may cherish in the possibilities of improvement of this fruit, the writer cannot see in the future any considerable portion of the blueberry crop coming from artificial plantations. I believe, however, that the work on improvement and production under cultural conditions should be encouraged and the great progress recently made should be grasped by others and thus extend the usefulness of this newcomer in our pomological world, for without doubt the returns that can be secured will justify an extension of the industry, especially when improved sorts are available. The blueberry has been considered a rather plebeian fruit by many, one that we could scarcely class with the other small fruits, but recent prices and trend of thought bid fair to change this feeling and we may look for this plebeian fruit to edge its way into "society."

Without going into the botanical classification of this fruit or particularly into the methods of propagation which have been worked out by various horticulturists and botanists, I will devote the short space of time which I have to the commercial aspect of this crop.

## GEOGRAPHICAL DISTRIBUTION.

In New England the blueberry is quite cosmopolitan, being found in many places where it has no commercial importance, but the centers of greatest production are fairly well defined. Maine probably leads all others in the bushels of this crop which are harvested and find their way into the market. The area of greatest production has been described several times, especially in bulletins from the Maine Experiment Station. Woods* reports that "the blueberry barrens of Washington County, which comprise some two hundred and fifty thousand acres of unforested wild land in the eastern part of the state, extend roughly from Cherryfield in the west to Machias in the east." In that region the berries begin to ripen about the end of July, but the main season lasts from the tenth of August until mid-September. The industry extends into Hancock County also, where it is of considerable importance. Perhaps the best berries which reach the Boston market are from this section. Elsewhere in the state large quantities are grown but are distributed in broken areas through pastures and waste land.

The first berries that reach the Boston market from Maine come from the southern part of the state; these are followed by shipments from the south-central section, Rockland, Rockport, Sedgwick, Sargentville, Brooksville and surrounding territory up as far as Buckport. Some also are shipped from Surry, but a large majority there are picked for the canning factories. The berries shipped from the section just mentioned are usually good and a great many are fancy in flavor, color and pack. The berries from these sections are shipped to Boston by boat, the rate being forty-five cents for a single crate and twenty-eight cents per crate when shipped in quantity. Waldoboro, Warren and Thomaston also start shipping about the same time, but berries from these points are shipped by express and are not received in as good condition as those sent by boat. Also I am told the quality is not so good as the other Maine berries. The Washington County berries rarely go to Boston as canning factories in that section handle them. What few berries go to Boston from that section are reported to be of very poor quality, since they are raked rather than picked by hand and contain small sticks and leaves, and there is no effective way of winnowing out all the dirt collected in the raking process.

In a recent statement by the Bureau of Inspections of Maine it is stated that the total number of cases (two dozen cans to a case) of blueberries packed in the United States in 1914 was 151,636, while the total number of cases packed in Maine in the same year

*Me. Agr. Exper. Sta., Bul. 244.

was 116,001, or about seventy-seven per cent.—more than three-fourths of the entire production of canned blueberries in the United States!

Before Maine is through shipping Nova Scotia begins sending berries, which come entirely by boat. In the main the Nova Scotia berries are good, while a great many are fancy. Yarmouth and nearby points send the fanciest stock. Large shipments come from the region from Pubnico south to Barrington, but the stock is not so well packed and quality not so high.

New Brunswick is usually the last point to start shipping and the berries are usually ordinary to poor. They come from Petitcodiac, Penobsquis and Youngs Cove, but in recent years few come from that section as they are shipped mostly to Quebec and Montreal.

In the State of Vermont there is practically no commercial blueberry business, a few bushels are picked in certain localities and disposed of locally; the best area is perhaps near the central part of the state.

In New Hampshire the blueberry areas are not so concentrated as in Maine but are found pretty generally throughout the state. In many places our hills are covered with the low blueberry mingled more or less with the half-high and high-bush types, but more than two-thirds of our crop is gathered from the first species. The low-bush blueberries are found mostly on fine sandy, peaty soils or high lands, although they are quite cosmopolitan, and occur from sea level to the tops of the lower mountains. In many instances, the sides and rounded tops of hills in the southern and central parts of the state are covered with practically a pure stand of low-bush berries; on other hills they occur in open spaces between clumps of the ground juniper and native spiraeas. The high and intermediate bush types are also found on high land but are more common on lower areas and on soils containing more moisture.

The town of Lyndeboro, Hillsboro County, ships more blueberries than does any other town in the state. These are harvested almost entirely from the low-bush plants, although it is common to find clumps of the half-high and occasionally a high-bush plant in the pastures. Other heavy producers are Fitzwilliam, Epsom, New Durham, Alton Bay, Troy and Greenfield.

In Massachusetts the earliest berries come from the Cape section—Sagamore, Sandwich and Onset. The berries are usually large, fairly well packed but dark colored, commanding good prices. At about the same time the berries from Ashburnham, Ashby, West Fitchburg and Westminister begin ripening. This section lies just south of the Lyndeboro section in New Hampshire and is the largest shipping center in Massachusetts.

Rhode Island ships a few berries from a section about Providence, picked largely from the high-bush plants. Connecticut ships few or none; what are harvested are consumed locally.

Most of the berries coming from Pennsylvania into the Boston market are from Hazelton and McAdoo. The general region in Pennsylvania extends from Scranton to Pottsville in the anthracite coal region. It is estimated that they ship more fresh berries than any other state by several times. The Polanders pick them on the mountains, usually delivering them to a dealer at eight cents a quart and he in turn packs them and ships them, receiving from ten to twelve cents a quart. There are many carloads a day (probably fifty cars) shipped from that region in the height of the season. They go to the eastern cities largely. The term huckleberry is used there generally, but they are in fact mostly true blueberries. In the coal regions the mountains are accidently burned over periodically, which furnishes the proper conditions for the blueberry to flourish, and since the families of the miners furnish the necessary labor for putting the crop on the market it makes this section the most conspicuous in the state.

Some New Jersey berries reach the Boston market, but they are not considered to be of good quality, although they are of good size. North Carolina formerly shipped berries into this market but in recent years they have been diverted to the markets in New York, Philadelphia, Baltimore and Washington, also to Syracuse, Buffalo, Schenectady, Harrisburg, Pittsburgh, Chester, Pennsylvania, and Wilmington, Delaware. There is a large producing section in the southern section of the state extending from Wilmington to Fayetteville and Sanford.

Michigan ships her berries mostly to Chicago and other middle western cities. They are usually shipped in a twenty-four-quart crate. Other eastern states also produce blueberries in a more or less commercial way.

## Production.

It would, indeed, be difficult to estimate the quantity of blueberries which are produced in the United States or to arrive at any estimate of the value of the crop for it has not been possible to get accurate figures for any individual state. However, it is safe to say that the value of the industry is several millions of dollars.

Mr. Coville reports on a field plantation in Indiana of two and one-half acres which has yielded in a good season from 2,248 quarts to 2,360 quarts an acre or giving a net profit of nearly one hundred and fifty dollars an acre. In Maine they estimate that an acre yields about sixty bushels or 1,920 quarts and value the land at about fifty dollars an acre.

The blueberry canning industry in Maine is valued at two millions of dollars, a figure which makes us realize its importance as a wild fruit. In my own state I could find no figures to indicate the size of the industry and last year through the kindness of the express company I secured a statement of the shipments on the railroad since there are none or practically none shipped by freight. This report showed a total of 9,866 bushels or 315,712 quarts, valued at approximately $37,885. Certainly quite this many are harvested and consumed in the state without being transported by the railroad, and I doubt if more than ten per cent. of the blueberries are ever picked. I would estimate that the blueberry crop which is harvested in a normal year was as great as that of all other small fruits combined. Any good pasture should yield fifty bushels to the acre but the stand of plants is usually not solid but is intercepted by rocks and barren areas and hence the figures usually given for a pasture are much lower than this. In one section the owner of a blueberry pasture of approximately two hundred acres kindly furnished me with the yields and returns from this pasture for fifteen consecutive years—1901 to 1916, inclusive. There is a considerable portion of this area which has few or no berries on it and approximately one-third is burned over each year, so the actual area harvested each year is perhaps not over one hundred acres and some seasons not that, but it is rated in the neighborhood as a two hundred-acre pasture. The yield varied from nearly 22,000 quarts to about 3,000 quarts a season. The average price per quart for the fifteen years was twelve cents. The gross receipts ranged from nearly $2,300 to little more than $300 in a poor season or an average of $1,137.65 for the fifteen years. After deducting expense of marketing, which is approximately four cents a quart—one cent for hauling, one cent for commission, one cent for handling, and one cent for express, it left an average of $828,93 returns. But the custom in this section is to give the pickers two-thirds of the berries picked. So the owner pro rates out to each picker two-thirds of the net receipts which in this case left an average annual net to the grower of $276.08. This is a small amount for the land involved but it should be remembered that otherwise such land gives no return and that there is practically no expense involved in caring for the crop.

Another grower in the same section furnished the returns on a fifteen-acre pasture for eight years, beginning in 1907 and extending through 1915 with the omission of 1910 when the records were not available. Here again one-third is burned over annually, which leaves about ten acres actually harvested in any one year. The yield here averages 1,788 quarts for the pasture each year and returns a gross income of $215.78. Still another pasture of eight acres, part of which is pretty well covered with low-bush berries,

yielded 2,880 quarts, or a little over eleven crates per acre, and averaged twelve cents per quart, giving a total return of $354.03, or a net return of $243.87. Another pasture of twenty acres returned the owner from $500.00 to $700.00 annually. Thus it can be seen that the profits from wild blueberry land vary enormously and the opportunities for improving the industry are great and more attention and support should be given it than has heretofore been done.

It would be difficult to arrive at the number of crates of blueberries handled in the Boston market each season, but from what information is at my disposal I would estimate that there are somewhere around 60,000 bushels in a normal year or a valuation of from $175,000 to $200,000!

Through the kindness of Professor Hutt, I have the quantity of blueberries and huckleberries shipped on the Clinton branch of the W. & W. Railroad and on the A. & Y. road in the state of North Carolina. Nineteen thousand eight hundred and twenty-two thirty-two-quart crates were shipped by express and 5,114 thirty-two-quart crates by freight or a total of about 25,000 crates this year.

Occasionally we learn of an individual who has no other income than what he receives from his blueberry pastures, but usually in my own state it is a side line of more or less importance.

## Picking Privileges.

In many sections there are no restrictions on the pastures and the public is at liberty to pick the crop. As one large landholder once told me, "It is like going fishing; free to everyone." In other places a set price is put on the pasture for the season and this is quite nominal. In other places the owner allows any who wish to pick and charges them two cents per quart for all they gather. Again he pays them six cents to eight cents a box for picking them, whereas others have them picked on the shares, allowing the pickers two-thirds of all they gather. In some places the owner charges twenty-five cents a day for each person who picks and they can take all they can harvest. It is the usual custom in the larger districts to provide shacks or tents for the pickers and they remain there throughout the season and many of them earn good wages. So the harvesting of the crop is in no sense standardized but varies with localities.

## Picking.

The number of quarts an individual can pick per day varies with the individual, the ripeness of the berries, stand of plants, whether picked by hand or with rakes, whether low or high-bush

plants and on other factors. When picking by hand it is customary to harvest about a bushel a day, while with rakes they can gather about three times this amount and some report still larger amounts. All sorts of receptacles are used in picking, but the most common are kettles and pails or sometimes baskets.

### Burning Over.

It is the usual practice to burn over the low bush pastures about once in three years. This is commonly done in the late fall or early spring when the ground is full of moisture in order to keep the fire in bounds and to prevent the roots from being injured. The best crop is obtained the second year after burning. This is about the only culture which they receive and is comparable to the pruning of some other small fruits since the best berries occur on the new vigorous shoots.

## COMMERCIAL PECAN CULTURE—A NEW INDUSTRY.

J. M. Patterson, *Georgia.*

On the third creative day, God said:

"Let the earth bring forth grass—the herb yielding seed, and the fruit tree yielding fruit, after his kind, whose seed is in itself upon the earth; and it was so."—Genesis 1, 12.

On the sixth day of creation—after He had created man in His Own image—God said to man:

"Behold I have given you every herb bearing seed, which is upon the face of all the earth, and every tree in which is the fruit of a tree yielding seed. To you it shall be for meat."—Genesis 1, 29.

In this act of creation and in these divine words of dedication is to be found the magna charta of pomology.

After the creation of the fish of the sea, the fowls of the air, the cattle and the beasts of the earth, God made them all subservient to man.

He gave man dominion over them, but He did not designate them *as meat for man,* but the herbs and the fruits of the trees He labeled as *meat,* or, according to our modern interpretation, food.

Primitive man lived in harmony with this creative program, and all down through the years the uncivilized and savage races have looked largely to the nuts of the forest for their food. Apes and monkeys—thought by some to be man's nearest kin-folks—have always fed on herbs and on tree fruits. As the human race multiplied and game also multiplied, man brought from the forest for his food supply not only nuts but birds and game. And the fur-

PLATE XXXIII. PECAN ORCHARD, NINE YEARS OF AGE, ON THE PATTERSON PROPERTIES
(Photo. U. S. D. A.)

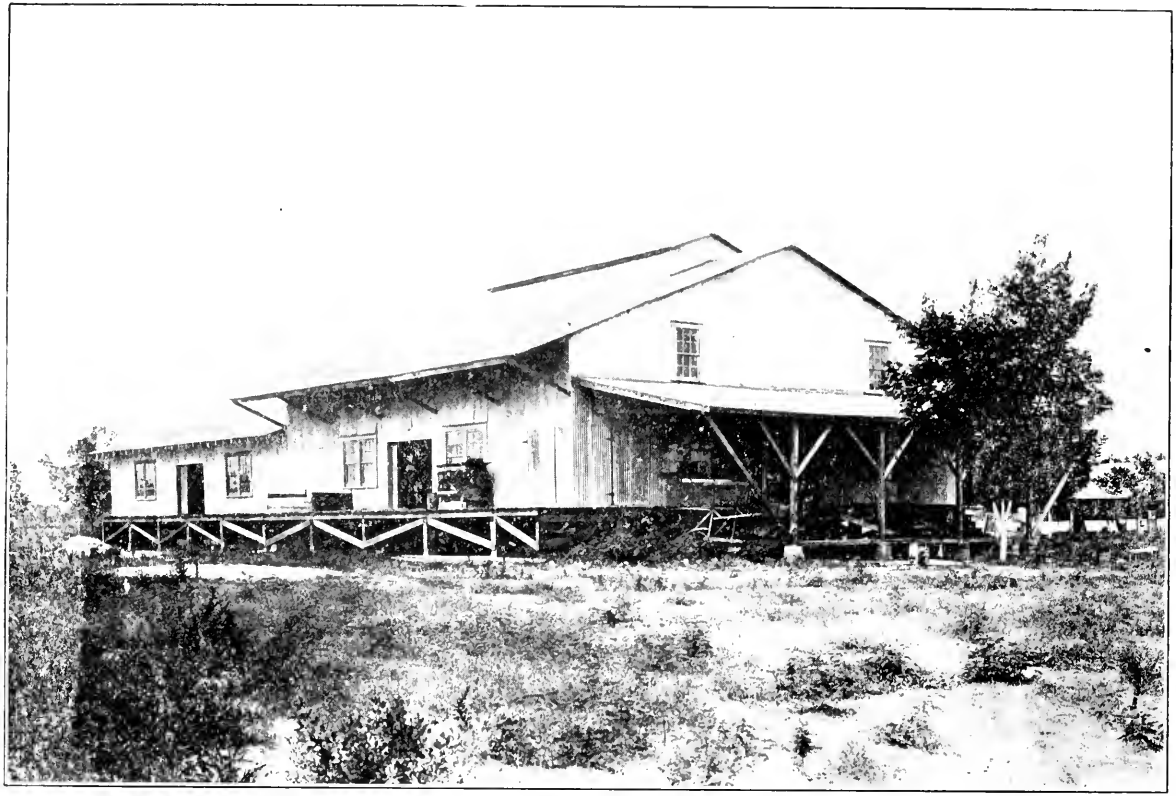

PLATE XXXIV. — PECAN WAREHOUSE AND DRYING PLANT ON THE PATTERSON PROPERTIES.
(Photo U. S. D. A.)

ther development of peoples into civilized and well-ordered communities brought agriculture and with it the raising of cattle and swine as sources of food.

Doubtless the use of flesh as meat has become a custom of the human race, because of the shortage of the fruits of trees; and the shortage of the fruits in turn is traceable to the fact that the propagation of nut and fruit trees is a slow process and the easiest and quickest source of meat supply became almost universally adopted. So far as we know only the peasants of southern France among the so-called civilized peoples of the world today find in nuts a chief article of daily diet.

Nevertheless, the fruits of the trees are today as valuable as a food as they were when God labeled these fruits "meat." It is within recent times that nut trees have been planted as orchards and cultivated in the United States. Nuts formerly were associated only with the sentimental side of country life. Nuts to our forefathers only suggested "nutting" season and "brown October woods" and the old open hearth and family fireside. In this country the Persian walnut, the pecan and the almond are today the leading orchard trees of the nut-producing species.

## Historical.

The pecan and the black walnut are native species. Great forest of wild pecan trees are found in the Gulf States and in bottom lands adjacent to the Mississippi River and its tributaries as far north as southern Indiana and Illinois. But the wild or seedling pecan is usually so small and often so difficult to crack that these pecan forests until recent years have often been slaughtered by the woodman's axe. The nuts until recent years had little commercial value, selling in the market for only a few cents per pound. Nevertheless the seedling pecan is the real beginning of the present commercial pecan industry.

The nut cracker which made the delicious kernels of the wild pecan available is to be credited with the second step in the establishment of the pecan industry. The inventor of the first practical nut-cracker should be crowned as the father of the pecan industry. When the kernels of the seedling pecan became accessible a few observing and discriminating men began to observe that here and there a wild tree produced a pecan of exceptional merit as to size and quality of kernel and as to thinness of shell and, therefore, ease of cracking. These men began to name these trees whose fruit was exceptional. Thus originated the *named* varieties. Then it was soon discovered that while the nuts from these excep-

tional trees would not reproduce themselves true to variety, it was possible in a comparatively easy and satisfactory way to bud or graft the pecan and thus the nut trees bearing fruit of exceptional merit could be perpetuated. This aroused interest in the pecan as an orchard commodity.

Then came on the scene developing companies, more commonly called pecan promotion companies. These companies acquired and planted large tracts of land and sold them under development contracts in small units. Incidentally permit me to say that it was the late John Craig, of Cornell University, who first conceived the great pecan orchard proposition, and when the history of the pecan industry is finally written the name of John Craig will appear as the man who first had the vision of a great cultivated pecan industry and whose money and directing hand went into the establishment of the first commercial pecan orchard.

Of the pecan industry, Professor Craig, in one of the last papers he was permitted to prepare, said: "Although it is generally understood that the pecan is essentially a southern tree, it is worth emphasizing the fact that its northern range carries it to southern Indiana and that in the valleys of the Wabash and its tributaries there have been and are now being discovered varieties of a size, quality and productiveness which will make them successful rivals of the cultivated types now established in the South. * * * and thus it appears that, what in my estimation is the King of Nut Fruits, has a very considerable range of distribution."

But to return to the pecan promoter. It was largely due to the wise and conscientious guidance of Professor Craig that the first commercial pecan orchard ever planted has already proven itself an unquestioned success. The pecan industry has prospered and grown apace both in spite of the pecan promoter and because of him. This is not a paradoxial statement, as it may seem. There were promoters and promoters. The first promotion company appeared to make a success of pecan orchards as a purely promotion proposition. This success immediately attracted imitators. Imitation is invariably a by-product of success. The young industry was immediately overstocked with promoters and promotion companies. Some of these promoters had more imagination than judgment, more ready pens than ready money, more initiative than intelligence and more hope than honor. The wrecks of some of these promotions stand today as a warning signal saying to any and every prospective promoter stop, look, listen!

Fortunately for the pecan industry some men of honest and tenacious purpose were among the first in the business and to these men in the final analysis is due the present prosperous and prom-

ising status of the industry. The honest promoter has demonstrated that a large commercial pecan orchard can be a success. The first commercial orchard ever planted has produced, in pounds of nuts per tree, more than double the yield of any privately owned orchard, of the same age, whose yield we have been able to ascertain. That the pecan can be produced successfully in large commercial orchards has been amply demonstrated and herein lies a great hope of the building up of the industry.

Such in brief is the evolution of the pecan industry, and all this has transpired in the past score of years and chiefly in the past decade. It is, therefore, a new industry. The production of the cultivated or orchard pecan as compared with Persian walnut or almond, or as compared with the production of wild or seedling pecans, is as yet very small, but thousands upon thousands of acres of pecan orchards are in the making and each successive year from today will witness a vastly increased productive acreage, and what the ultimate production of the planted acreage may be I have not the temerity even to venture a guess. But that there are already planted a sufficient acreage of pecans to produce more pounds of nuts annually than any other species of nuts now produced in the United States, after these orchards reach the age of fruitfulness natural to the pecan tree, there can be no doubt.

Pecans are native in twelve states and have been planted in fourteen other states. And while today the cultivated pecan is an established industry only in the southland, there seems little question that our friends of the Northern Nut Growers' Association are making substantial headway in discovering and developing varieties of pecans that will ultimately bring into the pecan area many for the eastern and northern states. To these pioneers in the Northern Nut Growers' Association the southern pecan growers extend a hearty welcome and wish them speedy and unqualified success. Mr. C. A. Reed, nut culturist of the Department of Agriculture, in an official communication submitted by Secretary Houston to the Congress, as late as January, 1917, said: "The one species of nut which now promises soon to surpass in importance any other is the pecan."

## The Future of the Pecan Industry.

We might predict a brilliant future for this young industry on the fact that the pecan is a native nut. Other nuts, barring the black walnut,* are not indigenous. Neither did our pilgrim fathers find peaches and apples and cherries† waiting their arrival. But

*White walnut, beechnut, hazel nut, pine nuts, hickory nuts, chestnuts.

†Is not the parallel slightly overdrawn—are there not "wild" pecans in the south; "wild" apples and "wild" cherries in the north?—Sec'y.

when the first settlers reached the southland the giant pecan tree was there to bid them welcome and pour into their laps bountiful crops of nutritive nuts. Or I might foretell the vast expansion of the pecan industry because the pecan is practically non-perishable and will ship without refrigeration and keep indefinitely in cold storage. It is a fruit that is capable of being supplied, by proper storage, every month of the year, and also capable of being preserved from year to year and thus prevent a surplus this year and a shortage next year. I might base my argument for the vast expansion of the industry upon the fact that the pecan is readily digestible, direct from the hand of nature without cooking, when eaten in reasonable quantities and at appropriate times and properly masticated. Or upon the fact that the pecan is a delicious dessert nut, although compelled in all candor to admit that a man might just as well eat a porterhouse steak for dessert as to stuff himself with pecans after a hearty meal. I might argue for a great industry from the fact that the pecan is sanitary, nature delivering it in hermetically sealed packages and thus eliminating the expenses of an artificially sterile package. I might argue that the industry is destined to grow as a source of supply for confectioners and bakers. I might show the phenomenal increase in the consumption of pecan kernels. However, to none of these facts will I attribute my faith in the imminent and permanent growth of the pecan industry.

## Nut Eaters.

I predict the development of a great industry for fundamental reasons: Of these *the first* is that the Creator decreed that the fruit of the tree should be meat for man; *the second* is that we are a nut-eating rather than a nut-producing country. As a general principle it will hardly be controverted that our country (any country) should produce to the limit of its possibilities all the requirements of its complex civilization. The country that produces enough for home consumption and a surplus for export will always have an advantageous balance sheet. Especially is this principle applicable to foodstuffs.

To illustrate: The successful farmer is the one who raises all the grains and fruits and meats and vegetables he consumes on his own farms and has a surplus of some agricultural product to sell. The South today is not so prosperous as the North and West because the South has raised cotton to the exclusion of foodstuffs. It has raised cotton to get money to buy flour, meat and hay and when these any other farm and household necessities have been bought the cotton money has been used. Some people in the South today, who smart

under the penalty of failing to raise at home life's necessities, declare that the South would be better off today if it had never raised a bale of cotton, and that cotton raising should be discontinued. This is going to the other extreme. Every section of a country should produce as its money crop that to which its soil and climate are best adapted and then in addition should diversify sufficiently to raise all the foods the homes require. The South is today learning the lesson of diversified farming and is preparing, or, as they say in the South, "fixin' " to *board at home*.

What is true of a family or a state or a section is true of the nation. Our country, which boasts that with sufficient men and proper cultivation it could feed the world, ought to begin to feed itself. We boast that we are a credit nation—the balance of trade is in our favor. However, in the item of nuts we are a debtor nation. We consume each year more nuts than we produce. The only nuts we export are peanuts, and for the purposes of this discussion we do not consider the peanut as a nut and, as a matter of fact, we import as many peanuts as we export.

In the year ending June, 1916 (the last available statistics), we imported nuts to the value of $21,160,491. We produced about 25,000,000 pounds of Persian walnuts and imported 36,858,934 pounds. We produced about 7,000,000 pounds of almonds and imported 16,596,921 pounds. Of filberts we produced practically none and imported about 11,000,000 pounds. We imported over 14,000,000 pounds of Brazil and cream nuts and over 118,000,000 pounds of coconuts. We produced 25 to 30 million pounds of pecans and exported none. In other words, we are nut eaters to a far greater extent than we are nut raisers.

The production of nuts in the United States, therefore, should be immensely increased in order that the balance sheet as to nuts should be in our favor. The pecan is the logical nut to turn the balance of trade in nuts in our favor, because of all the great commercial nuts it is the one native nut. We, therefore, believe that the pecan is the natural and logical nut to supply the large and growing domestic demand for nuts and to fill the immense gap between production and consumption of nuts in the United States.

## Food Value.

*The third* is the fact that the pecan has exceptional food value:

Although history abounds in the story of famines, yet in our generation we have never thought that hunger would again show its grim visage to the inhabitants of the civilized world. Neither did we think that the earth would ever again be immersed in the

blood of civilized Christian people. We thought that war, famine and pestilence, that trinity of evils, were outlawed forever.

But now we know that if there is to be a world peace it must be bought with the blood of untold millions of men and we know too that if famine is to be averted our own land of the free and home of the brave must provide the food for the millions that are fighting to "make the world safe for democracy."

Seven years ago a famous European student of history prophesied that "the next great war would not be won by fighting but by famine." The world is in the midst of that great war today and the final issue of the horrible conflict seems to rest, not upon men and munitions, but upon food. Whether the issue of this world war will be determined by the aeroplane, the submarine or the land forces, or political revolution, or what not, one thing is certain; the side whose food supply is first exhausted during the continuance of the war is defeated. And one more thing is certain; the food problem will be a world problem after the dreadful war is concluded. In fact the war has only accentuated and hastened the food problem which before August 14, 1914, was already assuming large proportions.

Food production and food conservation (together with bond buying) are today the chief duties of the non-combatant citizens of the United States. In ordinary seasons and in normal times the earth is abundantly able to feed untold millions above and beyond its present population. It has been said that intensive farming methods would enable the United States of America to produce enough of food for nearly all the people of the world. Theoretically this doubtless is true. But the stubborn fact remains that there is not a densely populated country in the world that in normal times produces a sufficient supply of both cereals and meats to supply its own citizens. Some sparsely settled countries produce a surplus of both grains and meats. Others produce a surplus of grains and still others a surplus of meats. The United States today is a large exporter of both meats and grains. In the year ending June 30, 1916, we exported 444,053,325 pounds of beef. During the same year we exported wheat and wheat flour to the volume of 243,117,025 bushels. All of which argues that while we have a surplus other nations have a deficiency. The truth is that the meat and cereal supply is a world problem and that in normal times the consumption is outgrowing the production and that in times like the present when millions of men are withdrawn from agricultural pursuits the food problem becomes acute.

Scientists tell us that for human sustenance three principles of food are essential: protein, fats and carbohydrates. Of these the

second or fats are the most vital, and the one principle without which man cannot live and work.

Man can *exist* with very little of the fats, but if he *has the fats* he not only can *exist* but *live* and make *himself* a *force* in the world. Fats are the chief source of heat and energy. The chief sources of food fats are cereals, meats and nuts. And when it comes to food fuels, or calories, nuts are quite in the limelight. Every known American nut, with the possible exception of the chestnut, contains a larger per cent. of food fuels, or calories, than any known cereal or meat. As between cereals and meats the latter produce more food fuel per pound than the former, and as between the different kinds of nuts, while they are all (with the exception of the chestnut) high in fats, the pecan is the top-notcher. Therefore, let us compare pecans and meats as to the per cent, of fat per pound.

Smoked bacon comes nearest the pecan in its percentage of fats, and yet one pound of pecans contains as many calories as one and one-third pounds of bacon. One pound of pecans contains as many calories as two and one-fifth pounds of smoked ham, as many as three and one-fifth pounds of porterhouse steak, over four times as many calories as a pound of mutton, and nearly five times as many calories as a pound of chicken.

Dr. Graham Lusk, in a recent article on "What to Eat in Time of War," says: "The soldier must get 4,000 calories daily." Now if the soldier were given a diet of pecans he would need only one and one-tenth pounds of pecans a day, whereas he would need, if fed on

| | | |
|---|---|---|
| Bacon | 1.5 | pounds per day; |
| Smoked ham | 2.45 | pounds per day; |
| Porterhouse steak | 4.1 | pounds per day; |
| Mutton | 4.89 | pounds per day; |
| Chicken | 5.35 | pounds per day. |

Who can doubt that if there were enough pecans in the world today to relieve, in even a measure, the demand for meat, that Uncle Sam and his Allies would feel much more comfortable over the food situation.

As land becomes scarce (which is the same thing as saying, as people multiply) every foot of ground will have to be used in the most economic manner. One average acre of land will produce many times (more than 25 times) as much food in the form of cereals as it will produce in the form of beef. Therefore, the demand for bread will drive the cattle from the ranges and produce, as it is already producing, a shortage of meats. The raising of meat for food is a monstrous economic waste.

Now substitute the pecan orchard for the stock pasture and see how the figures will prove out. It takes two acres of average land two years to produce a steer that will dress six hundred pounds. This steer would produce in calories about 681,000. Two acres of pecans producing an average of twenty pounds to the tree on twenty trees to the acre would in those two years produce eight hundred pounds of pecans or 2,906,400, or over four times as many calories as the same land devoted to raising steers. Our argument is not to show that pecan orchards should be substituted for stock farms, but to show that for every four acres taken from stock raising and given over to the raising of grains, one acre of pecans will supply the lost food fuels.

Nuts are also a prolific source of protein. The chief function of proteins in the human diet is to repair the tissues of the body. For the repair of waste, proteins are essential. It is conceded that the proteins from meat, milk, and eggs are better repairers than the proteins from vegetables, but not so of nuts.

Dr. Kellogg, of Battle Creek, Mich., said in a recent paper on the importance of nuts as a food: "Taking the protein of the human body for a standard, it is found that the proteins which are found in cereals, green and root vegetables, legumes and most other vegetable products are incomplete. They are lacking in certain elements which are absolutely essential to the building of healthy human blood and tissues. Careful chemical analysis, however, has shown in recent years that the proteins of nuts, or at least some of them, are complete proteins. Nuts, in fact, furnish proteins of such a fine quality that they are capable of complementing other foodstuffs. Their proteins supply the elements necessary to render complete the proteins of cereals and other vegetable foods." Our conclusion then is that meats as a source of heat and energy and body repair can be supplemented by nuts without impairment but rather to the enhancement of the vigor of the human race.

Does any man, who interprets the signs of the times, with even an ordinary degree of intelligence, doubt that the world has arrived at the point where some substitute or supplement to the available supply of food, especially foods chiefly productive of heat and energy (calories) and to the repair of the wasted tissues of the human body (protein) is a crying need? Indeed are we not forced to believe with Dr. Kellogg when he says: "So it is quite possible that the time may come when the people of this country, like those of some other countries and like our primitive ancestors who lived wholly upon the products of the forests, and our modern relatives, the orang-utan, the chimpanzee and the gorilla, must depend entirely upon the products of the vegetable kingdom for their sustenance."

And shall we not agree with Dr. Kellogg farther when he says: "It is important then to know that, if such a time comes it would be possible so to arrange the bill of fare that the race may lose nothing of vigor or energy because of the restriction in diet. (As a matter of fact, there is good reason to believe that if man had never acquired his present omnivorous habits and had adhered to his original vegetative regimen, he might have escaped a very large proportion of the multitudinous ills which have greatly impaired his efficiency and are even threatening extinction of the race.) In view of these facts it is most interesting to know that in nuts, the most neglected of all well-known food products, we find the assurance of an ample and complete food supply for all future time, even though necessity should compel the total abandonment of all our present forms of animal industry."

My argument, therefore, is that the nut orchards in general, and the pecan orchards in particular will have increasing recognition as an available source of food, and that in the face of the ever widening chasm between the supply and demand for fats, this source of supply should be cultivated and developed with all possible vigor.

My prophecy for the rapid upbuilding of the pecan industry is, therefore, based first of all upon the Creator's decree that the fruit of the trees shall be to man for meat; second, that the American people are following that decree as fast and as far as the supply of nuts will permit, being today more of a nut-consuming than a nut-producing country, and, lastly, that the exceptional food value of pecans point to the pecan as the logical supplement, if not substitute, for meats.

## Problems.

The young industry has many problems to solve. Problems of varieties, problems of soil fertility and soil management, problems of culture and many kindred problems. Then there are the problems of *diseases* and *insect pests.*

The pecan is not immune to disease, nor is it free from insect pests.

Prof. H. A. Gossard, of Wooster, Ohio, recently read a most interesting paper on the theme: "Has any standard fruit industry as few diseases and insect enemies as the pecan?" Dr. Gossard in this very able and exhaustive paper detailed the diseases and insect pests affecting the apple, the peach, the pear, the plum, cherry and apricot, as compared with the pecan, and his conclusion was as follows: "The pecan compares favorably with all of them." We have no doubt that as time goes on and pecan orchards multiply,

the number of diseases and insect pests may increase, but we have hope and believe that the pecan will remain among the more immune orchard trees.

Again there are problems of standardization and marketing. These latter problems affect alike the producer and consumer. The consumer desires and demands standardized foods at the lowest cost consistent with a reasonable profit to the producer. The problem of establishing grades for pecans and also of establishing a co-operative marketing agency are already receiving the earnest attention of the pecan growers, through the National Nut Growers' Association. We fully realize that established grades and standards scrupulously observed and co-operation among growers in marketing are essential to the success of any fruit industry. We are, therefore, endeavoring to profit by the experience of the citrus growers, the apple growers and the walnut and almond growers, and are planning for a local association in each pecan-producing district and to bring all these together in a common marketing agency, similar to the California Almond Growers' Exchange and the Walnut Growers' Association. Some progress has been made in this direction.

If you will pardon a somewhat personal reference, it may interest you to know that I represent nonresident pecan orchard owners totaling about 5,000 acres of orchards. Several years ago we organized the Paper Shell Pecan Growers' Association of Putney, Georgia. So far as I am informed this was the first pecan growers' association ever organized. We have a modern warehouse, completely equipped with machinery for separating nuts from hulls and other refuse matter, and separating the nuts into different sizes. Also an artificial curing, or drying, plant which, without the slightest impairment of the quality of the nut, enables us to ship pecans within 24 hours after they come from the orchard. This association is serving as a model for associations in other pecan-producing centers. We not only grade and market the nuts, but care for the orchards and gather the crop, thus solving the vexatious problems of nonresident ownership of orchards.

The National Nut Growers' Association has recently taken active steps to organize an association* in each pecan center and these will all be brought together in a co-operative marketing agency. These and other problems, to which we are alive, and doubtless many problems of which we are as yet unaware, are ours to solve. But we face whatever problems we shall be called upon to solve as an honest, healthy man faces the work of a new-born day, strong in the confidence that he shall win.

*Local branch exchange.

## High Prices of Pecans.

If you object that the price of pecans will preclude their general use, my answer is twofold. First.—As compared with meats from a food point of view, pecans are reasonable in price at from 75 cents to $1.00 per pound. One pound of pecans from a purely food viewpoint as compared with

1 lb. of bacon at 50c. per lb. is worth.....$ .66;
1 lb. of smoked ham at 35c. per lb. is worth..... .77;
1 lb. of porterhouse steak at 45c. per lb. is worth.. 1.43;
1 lb. of mutton at 40c. per lb. is worth..... 1.60;
1 lb. of chicken at 40c. per lb. is worth..... 2.00.

From the viewpoint of its food value as compared with meats, pecans at prevailing prices are not high. Second.—Whenever the supply exceeds the demand at present prices, the demand will be easily stimulated. The pecan has never been given general publicity. It is doubtful is ten per cent. of the people of the United States have ever seen a cultivated pecan. When the industry needs publication the production of nuts will justify publicity. The demand created by a publicity campaign will instantly multiply many fold.

The pecan is as near to being a self-seller as any article of food that has ever come on the market. Once a pecan eater always a pecan eater. Every pecan eater is a booster.

There is an old saying that the way to a man's purse is through his stomach. We rely on that adage. It is astonishing how pecans loosen up the purse strings. The best is none too good for the American people. The American hog will drink muddy water in preference to White Rock of Waukesha, but not the American people.

Who would eat sheep nose apples when they can get Winesap or Delicious? The pecan is the quality nut. A man who does not like pecans should be examined for his sanity. Comparisons are odious. However, I proclaim the cultivated pecan as the *super-nut*. They are to nuts what Sterling is to silver; eighteen karats is to pure gold; the Grimes, to apples; and the Late Crawford, to peaches. Note, therefore, that pecan culturists are not attempting to transmute base metal into gold.

The American people like the best and the best is none too good for them. Also the Frenchman and the Englishman and even the German, after they are done with this horrible war, will delight to sit down by their firesides and crack a few Schley, or Delmas, or Alley, or Stuart pecans, in place of cracking the other fellow's head, while they relate to their women folks and their children (if they have any children left) their experiences in the world's

greatest war. The demand for these pecans is destined to parallel at least the demand for the sister nuts, the walnut and almond; and our market is the world.

The fame of the cultivated pecan shall cross the seas and our brothers on the other side will join in peans of praise to the King of Nuts.

When that time shall have arrived (and although I am not a young man, I expect to live to see that day) then the pioneer pecan growers shall have their just reward and they shall then be rated not as freaks or adventurous spirits in the realm of horticulture but as world benefactors and producers of one of the great staple foods of the world.

Permit me in conclusion to say that I am proud to have been one of the pioneer commercial pecan orchard promoters and doubly proud to have been given the privilege and honor of reading this pioneer paper on this new industry before the American Pomological Society.

## NOTES ON NUT-BEARING CONIFEROUS TREES.

DR. ROBERT T. MORRIS, *New York.*

Nuts as a group of seeds become of increasing interest with the world's increased demand for food supplies. Nuts containing stored-up food in readiness for the new plant are particularly rich in elements which man himself desires for his table. Nitrogen and fat constitute the larger part of some kinds of nuts; members of the Juglans family for example. Starchy nuts, on the other hand, like those of the chestnut, are valuable in a range through which we commonly now put the potato—through a somewhat larger range in fact. In some parts of the world people depend upon nuts very much as other people depend upon the potato. Different kinds of nuts will gradually be extended over the field of nourishment for human beings when the need arises. It will not be a matter of new food supply so much as it will mean the extension of a food supply already appreciated locally. Among nut-bearing trees already furnishing staple foods for different peoples the cocoa palms probably stand first, pine trees next in order, and after that would come the coarser species of chestnuts, caltrops, walnuts, peanuts, and almonds, in fact a very long list covering many hundreds of species and varieties. In the pine tree group alone there are something over thirty species furnishing nuts as an important food supply for different peoples.

This evening I exhibit some eighteen different kinds of pine nuts ranging in size from those of the Bunya Bunya pine to those of the Jeffrey bull pine. The first are as large as Persian walnuts,

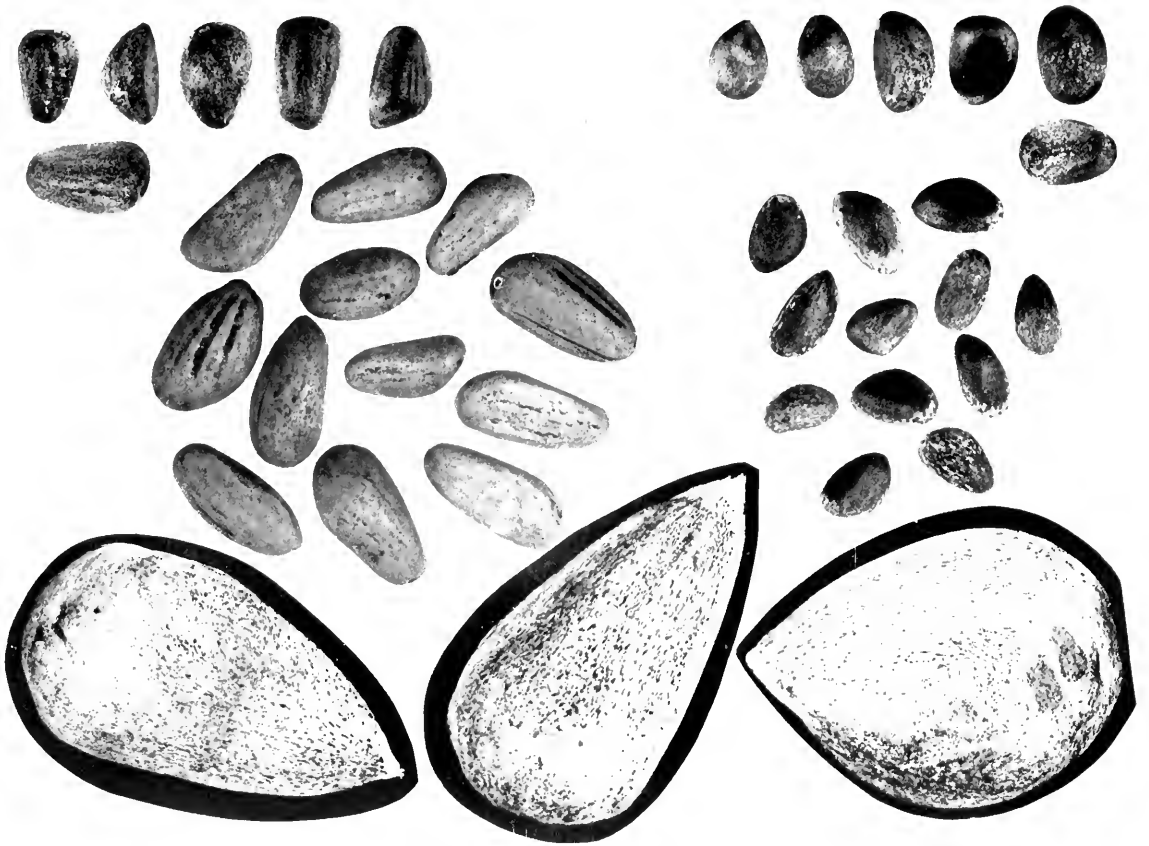

PLATE XXXV.—VARIOUS EDIBLE NUTS. NAT. SIZE.

Upper left cluster — *Pinus Koraiensis,* Korean nut pine.
Upper right cluster — *Pinus edulis,* Pinyon.
Middle left cluster — *Pinus pinea.*
Middle right cluster — *Pinus jeffreyi.*
Lower three — *Auracaria bidwellii,* Bunya Bunya.

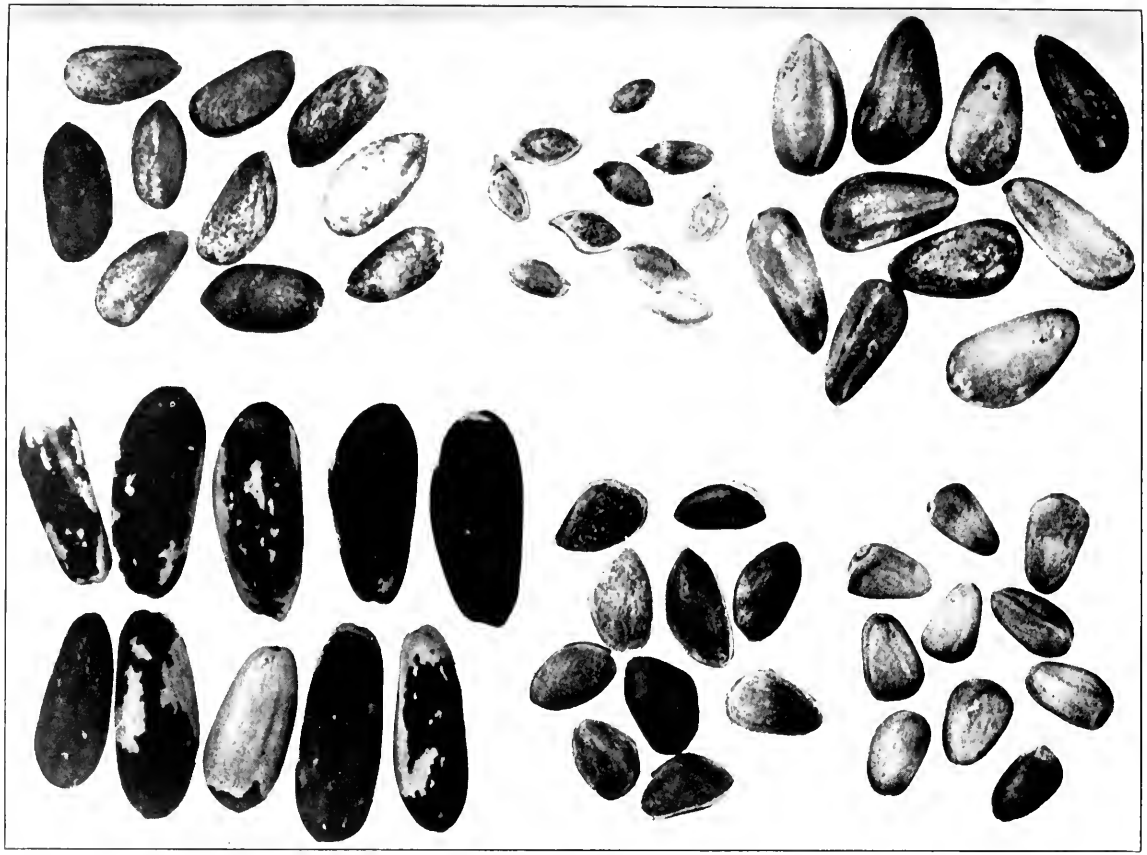

PLATE XXXVI. — VARIOUS PINE NUTS. NAT. SIZE.

Upper left — Pinus monophylla.
Upper center — Pinus excelsa.
Upper right — Pinus torreyana.
Lower left — Pinus sabinana.
Lower center — Pinus lambertiana.
Lower right — Pinus cembra.

while the latter are not larger than large grains of buckwheat. Pine nuts range in quality from the starchy group of *Araucaria* nuts to several species of the highly nitrogenous and agreeably flavored piñons. The large, coarser kinds are seldom eaten raw, but are roasted or boiled.

The British government has reserved one New Zealand forest thirty miles in length and twelve miles in width in which natives may gather nuts but are not allowed to cut the trees. In Chili there are large pine forests which have been the basis of Indian warfare since the earliest days of history. In some of the mountain regions of the northeastern Orient pine nuts form one of the principal winter storage foods.

Some of the thinner shelled small pine nuts are eaten shell and all. In other cases the smaller pine nuts are hulled like buckwheat or they are pounded up with a little water and subjected to pressure. The creamy emulsion which results is then evaporated down to a point where it may be kept for a long while. No doubt in time this process will be extended to the seeds of a much larger group of pine trees, and the solid residue will be used like oil cake for stock and for fowls. We all remember when cotton seed was left to rot in piles upon the ground, but ways were found for making use of all that is not required for planting purposes. In the same way the smaller pine seeds of kinds which are not too resinous in flavor will undoubtedly be used in time. Many of the medium-sized pine nuts like the Italian stone pine and the Swiss stone pine are cracked by cheap hand labor and the meats find their way to the market under the name of "pignolias."

Pine trees which furnish food supply are rather different from our apple and pear trees in the respect that they do not so readily adapt themselves to varying conditions of soil and temperature. Of eight or ten nut pines which are highly valuable in our western mountain region and on the Pacific slope none, so far as I know, grow very thriftily on the Atlantic seaboard. The Korean nut pine, on the other hand, from the mountains of the northern and eastern Orient grows thriftily and bears heavily in eastern North America on level ground. Much experimenting needs to be done in order to make available different nut-bearing pine trees for new fields of culture.

Some of the nut-bearing pines have value in other directions. Our magnificient sugar pine, one of the finest of timber trees, yields not only delicious nuts, but the Indians collect masses of sugary dried residue from its juice in addition to the sweet and delicious nuts. The lace-bark pine in addition to its timber and fruit yields a juice which is important in the arts as lacquer. Our longleaf pine

of the South, valuable for timber and turpentine, furnishes an abundance of seeds which as yet are used only in a limited way by the Indians. The largest group of pines furnishing food includes the *Araucarias* of South America and Australia, but we do not know as yet to what extent the *Araucaria* pines may be introduced into North America and Europe. The *Araucaria imbricata* is semi-hardy as far north as Stamford, Connecticut, to my knowledge, and this species grows thriftily in the Kew Gardens in England.

One feature of attractiveness associated with the idea of the cultivation of pine trees for food purposes includes the old Greek ideal of the combination of beauty and utility. At all times of the year pine trees please the eye and make a bright and lively feature in the landscape of the North when other trees are fast asleep. They may be used incidentally for beautifying the roadsides and for furnishing windbreaks for other orchards; furthermore, with the increasing cost of labor, nut trees of all kinds will come more and more into use because of the lessened cost of production in comparison with the annual crops, and the pine tree group will require still less cultivation than is demanded by the valuable walnuts, almonds and hazels. Because of various economic features it is not improbable that North American farmers one thousand years from the present time will include nut-bearing pine trees among their standard crops.

If members of the American Pomological Society wish to experiment with nut-bearing pine trees they may obtain seeds from almost any seed dealers, but Mr. Thomas J. Lane, of Dresher, Pennsylvania, is making a feature of finding collectors in all parts of the world who will furnish seeds of the pine tree group. When planting these seeds we must make provision for giving partial shade to the little trees for the first two years. Pine trees grow rather slowly for the first two years, but they make up for lost time later. At first they require careful weeding in addition to semi-shade. Shading is easily enough managed by driving short stakes along the rows and then arranging lattice work with laths, or the stakes may simply carry long strips of cheesecloth or other cheap material during the summertime.

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*The nut bearing fruit-trees and shrubs include, in order, cacao, pine, chestnut, almond, walnut, and two hundred others.*—Robt. T. Morris.

*We should keep in mind that the construction of a blossom is not a vegetative function.*—Ray H. Roberts.

## FRUIT GROWING IN NOVA SCOTIA.

W. S. BLAIR, *Nova Scotia.*

The principal fruit districts of Nova Scotia are confined to the counties of Kings, Annapolis and Hants, and comprise those areas in these counties lying between the north and south mountain range, generally known as the Annapolis Valley. This section is about one hundred miles long, extending from Windsor, Hants County, in the east, to Digby, Digby County, in the west. This fruit area varies in width from six to twelve miles. The Dominion Atlantic Railway runs through the center of the valley and the many fruit houses are situated along this line.

Apples are the principal fruit grown, although plums, cherries and pears are also considerably grown. Peaches are grown to a limited extent only. Kings County is the largest apple-producing county, and, according to the 1910 census, had 17,670 acres in orchard, followed by Annapolis with 8,652 acres and Hants with 3,874 acres, over 30,000 acres in the three counties. Considerable of this orchard area is yet not bearing. With a full crop it is estimated that 2,000,000 barrels of apples annually should be produced. The bulk of the crop until the present year has been exported to Great Britain. The number of barrels exported and otherwise disposed of during the past five years is as follows:

| *Year.* | *Exported.* | *Otherwise Sold.* | *Total.* |
|---|---|---|---|
| 1912 | 776,636 | 209,876 | 986,512 |
| 1913 | 513,201 | 131,309 | 644,510 |
| 1914 | 745,299 | 228,032 | 973,331 |
| 1915 | 415,033 | 177,379 | 592,412 |
| 1916 | 415,708 | 199,548 | 615,256 |
| | | | 3,812,021 |

The 1917 crop is estimated at 600,000 barrels, the bulk of which is being shipped to Ontario and Quebec, netting the growers good prices. Fortunately for the Nova Scotia apple grower there has been a small crop of apples in Ontario this year, giving him a much-needed market for his crop.

There are in all one hundred and thirty apple warehouses throughout the fruit section. Forty of these warehouses are owned by companies which have affiliated, forming the United Fruit Companies of Nova Scotia, Limited, made up of some 1,500 members. Through this organization approximately one-quarter of the 1916 fruit crop of the Valley was handled, the balance being handled by the various shipping companies or the growers themselves. The advent of the United Fruit Companies of Nova Scotia has made it possible for the growers to obtain their fertilizers and spraying

materials at the lowest possible rate. This company handled 5,340 pounds of Black Leaf 40, fourteen tons Bluestone, two hundred and fifty cans of tanglefoot, twenty-two tons arsenate of lime and fifty-two tons arsenate of lead. About 5,000 tons of fertilizers were handled co-operatively, as well as flour, feeds and seeds.

Nova Scotia, as you all know, has a maritime situation, and in the fruit-growing part of Nova Scotia particularly the temperature seldom goes below zero except for an occasional day or two. The summers too are not very hot, so that no extreme heat is felt except for short periods during July and August. There is much humidity in the air, which favors fungus development, particularly the apple scab, which can be kept in check only by repeated and thorough spraying. Lime-sulphur is used most extensively for the control of this trouble. Insect pests, such as the bud-moth, canker worm and codling moth, are controlled by arsenate of lead or arsenate of lime, and a new pest called the green apple bug is kept in check by nicotine sulphate.

Power outfits are used extensively by growers in their spraying operations, and much more spraying than formerly is being done, yet, with the ever-increasing orchard insect pests and fungous diseases, much more thorough work than formerly is necessary to obtain good fruit. At present probably thirty-five per cent. of the fruit grown is number one, thirty-five per cent. number two and thirty per cent. number three. Unsettled conditions obtaining as a result of the war, which has made it necessary for orchardists to pay attention to the growing of farm crops, and a shortage of labor, has made it impossible for growers to give the attention to their orchards that they otherwise would have given, and, as a consequence, the grade of fruit is not as high as it should be.

Nova Scotia fruit growers have not been large stock raisers and consequently they have depended pretty largely upon commercial fertilizers to keep up their orchards. With fertilizing materials advancing in price, and the necessity for essential food products increasing, the orchards of necessity are not getting the fertilizers they should have for best results. The shortage of labor and increase of farm crops also make it impossible for the fruit grower to give the cultivation his orchards should have, and this necessarily contributes to the production of a low grade of fruit.

The average bearing orchard is valued at five hundred dollars per acre, and allowing interest on this valuation and the price of the barrel it is estimated that it costs about one dollar and seventy-five cents per barrel to land the crop at car; barrel, thirty-five cents; care, picking and barreling, seventy cents; interest on investment, seventy cents. This estimate is based on a medium crop, and if the crop is large the interest charged per barrel would of course be proportionately less, and the expenses connected with the

care would also be less. It would seem that, on the average, two dollars per barrel is the cost of producing apples in Nova Scotia.

The Dominion Department of Agriculture, through the Experimental Station located at Kentville, Kings County, Nova Scotia, has, during the past five years, been conducting extensive experiments at three orchards, one in each of the three fruit-growing counties, to assist growers in finding out the best and most economical spray to use and method of application. Growers generally were not satisfied with the Bordeaux mixture, and lime-sulphur pretty largely took its place for scab control. Bordeaux was satisfactory as a fungicide, but much foliage injury resulted from its use. Now growers are becoming dissatisfied with lime-sulphur, owing to foliage injury and a feeling that much of the heavy drop of fruit which has occurred during the past two seasons is due to injury from this spray. So far our experiments would seem to show that lime-sulphur arsenate in moderate applications will give practically perfect control of scab and much less foliage injury than Bordeaux arsenate. The standard strength, 1.008, has been found to be satisfactory. A weaker strength, 1.007, has also given good results, but it would appear that a weaker lime sulphur than this is not desirable.

In order to combat the green apple bug it is necessary to use nicotine sulphate in the spray just before and after blossom, with considerable force, and it has been found that where lime sulphur is used at the standard strength of 1.008 in a drive spray that foliage and fruit are liable to be injured. By reducing the strength of lime-sulphur this injury can be overcome somewhat, but less perfect scab control is likely to result.

There has been a noticeable reduction in fruit yields during the past three years, and this low yield has resulted from many contributing sources. The bud moth in many cases has been a big factor. The green apple bug has undoubtedly been responsible for much of the lessened yield. Lack of cultivation and necessary fertilizers also have had a bearing upon low yields of the past season. A short blossoming period with much dull weather has been responsible for the poor set of fruit in many cases.

The fruit crop is almost entirely packed in barrels. The box package, while used to some extent, is not favored by the packing houses. The Dominion Department of Agriculture insists that the fruit be packed according to grade, and some thirteen apple inspectors are engaged during the shipping season to see that all fruit comes up to the standard.

The standard varieties of apples grown in Nova Scotia are the Gravenstein, Ribston, Blenheim, Tompkins King, Northern Spy, Stark and Ben Davis.

## STATUS OF DUSTING IN ORCHARD PROTECTION.

DR. DONALD REDDICK, *New York.*

It is a generally recognized fact that control of insect pests and plant diseases, has come to be a limiting factor in successful commercial fruit production in practically all the older horticultural sections. The necessity of applying protective materials to fruit trees is very generally recognized, and the labor and materials employed in making such treatments constitute an important item in cost of production under present-day conditions. The development of this practice may be traced through several generations and is of interest in approaching the subject of this address.

The syringing of greenhouse plants is an ancient practice. The water alone dislodged many insects from plants and killed others. It was a simple step to add some noxious or insecticidal material to the syringe water and to extend the use of the syringe to plants and shrubs in the garden.

A therapeutic for a fungous disease was used as early as 1847.[1] The year 1845 marked the appearance of the powdery mildew of grapes in England. One Mr. Tucker found that this disease could be held in check by syringing vines with a weak lime-sulphur solution, and John Kyle secured results[2] by dusting the vines with dry sulphur. The disease soon appeared in France (1847) and in 1851 was commonly found throughout French vineyards, soon spreading to all European vineyards.[3] The production of grapes was reduced three-fourths. In 1850, Duchartre employed the method of Tucker, but found that the lime could be omitted. The same year Mr. Gontier devised a sulphuring machine or duster for applying sulphur in the dry condition to moist foliage of the vine. This machine was employed very extensively in 1852 and 1853, under the direction of the French Minister of Agriculture. Dusting became a regular vineyard practice, and ten years after the mildew disease appeared on the continent grape production was back to normal.

Then came the downy mildew (caused by *Plasmopara viticola*). This proved to be a different proposition, for the use of sulphur did not seem to give control of the disease; nor could it be expected to give results if applied as a therapeutic rather than a prophylactic.

Experiments in the use of powdered sulphur, and other powders, for the control of downy mildew were brought to a sudden termination by the accidental discovery of bordeaux mixture. This material proved effective in preventing, first, grape downy mildew and a little

1 Tucker. Gardener's Journal **1847**:212.
2 Kyle, John. Mildewed grapes. Gardener's Chronicle **1848**:493-494.
3 Marès, Henri. Memoire sur la maladie de la vigne. Soc. Agr. Hérault, 1856.
4 Scribner, F. Lamson. Fungous diseases of plants. Rept. U. S. Commr. Agr. 1885:76-88. 1885, page cited, 84.

later black rot. It was introduced into the United States by Scribner,[4] and its use was rapidly extended until it became almost a panacea for fungous diseases. Arsenicals were combined with it for poisoning insects. The whiskbroom of Millardet gave way to a force pump and nozzle and one sees its culmination in the high-power high-pressure spraying outfits in use in the parks of this city (Boston) and vicinity at the present time.

In spite of the development of spraying apparatus the use of powdered sulphur for the control of powdery mildew has continued in Europe and a few years ago sulphur was used for this purpose, in France alone, to the extent of 100,000 tons annually.

At the close of the last century Bordeaux mixture with an arsenical as an insecticide, had become firmly entrenched as a spray mixture for a great variety of field and horticultural crops. About this time Mr. G. C. Johnson, a retired business man, became interested in an orchard near Kansas City, Missouri, and apparently without knowledge of European work set about to develop a method of applying the protective materials in the dry state. "Dry bordeaux" and a machine for applying it were developed. Various formulae were tried and the machine was improved and placed on the market. The method was employed by various experimentalists and varying results were secured. Finally the method was practically abandoned because the dry bordeaux did not give satisfactory control of apple scab and diseases of that nature.

Liquid bordeaux held sway until Cordley made a mistake in his spray schedule, and rediscovered the value of lime-sulphur solution as a fungicide for protecting fruit and foliage. Lime-sulphur solution quickly replaced bordeaux mixture in most orchard work because it eliminated the well-recognized bordeaux injury, and already arsenate of lead had practically replaced paris green and other arsenicals for insect control. A chemical study of lime-sulphur solution and its disintegration products showed that within a few hours after the solution is applied to foliage the only material remaining which has fungicidal value is pure sulphur in a very fine state of division.[5] It seemed, therefore, that if pure sulphur were brought into an exceedingly fine condition by grinding and were mixed with powdered arsenate of lead a combination would result which, when dusted on trees would be identical with the condition existing a few hours after the same materials were applied as a spray. Indeed, if the materials were applied to trees while wet with dew that condition would be realized at once and at the latest

[5] Haywood, J. K. U. S. Dept. Agr., Bur. Chem. Bul. 101. 1917.
Wallace, Errett, Blodgett, F. M. and Hesler, Lex R. Studies of the fungicidal value of lime-sulfur preparations. Cornell Uni. Agr. Exp. Sta. Bul. 290. 1911.

would come with the dew of the succeeding night. This was the basis on which dusting for orchard protection was taken up in New York in 1912.

The first experiments were performed with apples because it was in apple orchards that a rapid method of treatment was most needed. Many New York farmers have a relatively large proportion of their farms set to apple trees with the result that at certain seasons of the year they have large amounts of work to do and at others very little. Furthermore, all of western New York, where orcharding is most intensively followed, is a region of unusual raininess. The actual precipitation is not unusual, but prolonged rains with fog are very common and there are few places in the United States where there are more cloudy days—particularly during May and June. These conditions are ideal for the rapid spread of the apple scab fungus. For this disease protective materials must be employed. It is not at all uncommon to find that at the time when a protective treatment is needed there are only two, three, or possibly four, rainless days in which the work can be done effectively. Nor is it unusual to find that an apple grower cannot spray his orchard in less than a week because he cannot afford to keep the equipment, teams and men with which to do it. Five treatments during the growing season are commonly necessary in order to produce a good grade of apples. The result of this condition is that spraying is done at the expense of other orchard practices and of work with general farm crop and animal production. Even so, parts of the orchard may not have received treatment at the opportune time with the result that the apples are inferior in quality. This was the condition five years ago but it is much more acute now that new orchards have come into bearing and farm labor is seriously reduced. It is not surprising, therefore, that New York orchardists have followed the dusting work with the keenest interest and have afforded material aid in every way possible.

The experiments performed in New York apple orchards covered a period of four years. The plans of the work, methods and results have been set forth in detail in bulletins and in the horticultural press. Most of you have seen these so that they need not be repeated here. Some of the most important generalizations resulting from the work, however, are of interest.

### Time Factor.

The important advantage of dusting over spraying lies in the rapidity with which the work can be done. Large trees can be covered with dust as fast as the duster can be drawn through the orchard; there is no time lost in driving to and from the filling tank and no time lost for filling; enough dust mixture can be taken to the

orchard at one load to last a half day; the dusting outfit is relatively light and can be drawn over wet ground when a spraying outfit would mire in the mud. The full significance of all this was not fully realized by the writer and his collaborators in their experimental work, for in the experiments, dust treatments were made in the same number and on the same days as spray treatments. It seems evident enough to them now that, from the standpoint of orchard protection, the all-important thing is the fact that applications may be made, depending on circumstances, which would not be possible with the spray machine on account of time and of physical conditions in the orchard.

### Materials.

In all of the experiments ground sulphur and arsenate of lead were used. The sulphur was so finely ground that most of it would pass through a sieve of 200 meshes to the inch. This is very much finer than flowers of sulphur or than the ground brimstone commonly found on the market, but the particles are not so fine as those resulting from the disintegration of lime-sulphur solution. The arsenate of lead was very finely powdered and of a fluffy type. It constituted varying proportions of the mixture but usually was employed to the extent of either ten or fifteen per cent.

As will appear presently the action of the arsenate leaves little to be desired but in the case of the sulphur it was evident that it did not adhere to fruit and foliage as well as the solution. The writer has seen ground sulphur which would pass a four hundred mesh screen, but is not aware that this degree of fineness is as yet a commercial possibility. Theoretically, material of this fineness should give better results and experiments to demonstrate that it will, doubtless would bring about a process of producing it commercially.

### Relative Cost of Dusting and Spraying.

Records were kept in all of the experiments to determine the relative cost of the two methods of treatment. This is not so simple as it seems on first thought. The cost of materials was greater for all dust treatments than for liquid application, but the cost of labor was much less for dusting than for spraying. So far as actual outlay on the orchard is concerned the two methods are about equal in total cost, but when timeliness of application, shortage of labor, the possibility of doing other orchard or farm work, and the like, are concerned, the dust method has the advantage.

### Effectiveness of Treatments.

When all is said and done the value of one method over another depends upon the results secured. From the commercial standpoint the effectiveness of a method of treatment depends upon the

soundness of the crop obtained. It matters little to the grower whether the blemished fruits are injured by insects or disease. From this point of view the results of the comparative dusting and spraying experiments usually have been in favor of dusting. Notable exceptions occur in the year 1914 on the variety Ben Davis. These exceptions have been used by the writer repeatedly as examples of the importance of timeliness of application. The difference is due entirely to the presence of apple scab. It is to be noted, however, that under the circumstances the spray gave decidedly better results. This is attributable to the greater adhesiveness of the spray. The question is considered at length in Cornell bulletin 354 (p. 77 to 80), and need not be repeated here.

From the technical standpoint the control of specific diseases and insects is of importance. In the case of diseases, only two, amenable to protective treatments, occurred in sufficient abundance to be of any consequence in the work, namely scab (caused by *Venturia inaequalis* [Cooke] Winter) and sooty blotch (caused by *Phyllacora pomigena* L. d. S.).

Scab is by far the most important disease in western New York orchards. The experiments show that in most instances the dust mixtures employed have not given as good results in the control of the disease as has spraying. Usually the differences have been small or insignificant. The actual amount of the essential fungicidal ingredient, sulphur, applied per tree usually has been much higher in the dusted plats than in the sprayed ones and it would appear that the difference in effectiveness must be attributed to the difference in fineness of the material. Sooty blotch appeared in great abundance one year. The regular treatments for scab resulted in excellent control of sooty blotch but as for scab, the control with dust mixtures was not so good as with spray. Here again the difference was small.

Codling moth is the commonest insect in New York orchards as well as the most destructive. Unfortunately it was not abundant in most of the experimental orchards. The records show, however, that in practically every instance dusted apples were more free from the pest than were sprayed ones. In an orchard showing twenty-nine per cent. infestation in the untreated plat, the amount of arsenate of lead applied per tree was actually less in the dusted plats than in the sprayed one and yet the records show eleven per cent. wormy apples in the sprayed block, and six and five per cent., respectively, in two dusted blocks. It seems that the results can indicate only one thing, namely that a better distribution of the poison is secured by dusting than by spraying. It is also evident

that under New York conditions there is no necessity for applying the poison with force.

All treatments were made with special reference to scab and codling moth. Various other insects were present in the orchards, but there is little evidence in the records to show that they were suppressed by the treatments, or for that matter that they did a great deal of damage. In one instance tent caterpillars and canker worms were readily suppressed by one application of dust and in one other instance Curculio was greatly reduced by spraying or dusting.

EXTENSION OF DUSTING TO OTHER HORTICULTURAL CROPS.

*Peaches.*—Experiments by the writer with sulfur dust and with a powdered soda-sulfur for the control of peach leaf-curl indicated that the disease cannot be controlled in this way. Recently, however, a peach grower in New York having nearly one thousand acres of peach trees, claims to have controlled leaf-curl by dusting. The matter should receive further investigation because growers frequently fail to control this disease owing to their inability to put a heavy sprayer in the orchard at the proper time.

The brown rot (caused by *Sclerotinia cinerea*), scab (caused by *Cladosporium carpophilum*) and Curculio *(Conotrachelus nenuphar)* are so scarce in New York orchards that very few satisfactory experiments have been made. Indications are that scab may be controlled by a single timely application of dust. Theoretically, dusting with sulfur should yield just as satisfactory results as spraying with Scott's mixture for the control of scab and brown rot. Arsenate of lead to the extent of ten per cent. by weight of the dust mixture has been used on peach foliage with no apparent injury. The control of curculio by dusting does not seem to have been established definitely. The experiments of Chase[7] indicate very strongly that it may be possible and the results of his experiments of the current season are awaited with a great deal of interest, both by scientists and growers alike.

*Grapes.*—Tons of sulfur are used annually in European vineyards for the control of powdery mildew. As this is the only important fungous disease occuring on fruit or foliage in the Chautauqua grape belt, the writer once started demonstration experiments in fifty vineyards for its control. The experiments were discontinued because of injury to the vines. Subsequent experiments by Gladwin and Reddick[8] indicate that sulfur cannot be used on varieties of American origin with safety.

[6] Reddick, Donald and Toan, Lewis A. Control of leaf-curl diseases of peaches. West. N. Y. Hort. Soc. Proc. 62:28-32. 1917.

[7] Chase, W. W. Experimental dusting and spraying of peaches. Georgia State Bd. Ent. Circs. 21. 1-15. 1917.

[8] Gladwin, F. E. and Reddick, Donald. Sulfuring Concord grapes to prevent mildew. Phytopathology 7:66. 1917.

SMALL TREES AND BUSH FRUITS.

The most extensive reports dealing with small tree and bush fruits are those of Stewart.[9] He has worked in the nursery and his attention has een given exclusively to the control of foliage diseases. The experiments have extended over a number of seasons and include a variety of crops. He reports that dusting with a sulfur and lead arsenate mixture is effective in the control of the following diseases: Leafspot of cherry and plum (caused by *Coccomyces hiemalis* Higgins and *C. prunophorae* Higgins, respectively(, leafspot of quince (caused by *Fabraea maculata* [Lev.] Atk.), leafspots of currant (caused by *Mycosphaerella grossulariae* [Fr.] Lind. and *Pseudopeziza ribis* Kleb.), leafbight of horse chestnut (caused by *Guignardia Aesculi* [Peek] Stewart), and mildew of rose (caused by *Sphaerotheca pannosa* var. *rosae* Wor.).

The fundamental fact has been established that these diseases may be controlled satisfactorily, under the most severe conditions, by dusting. There is every reason to believe, therefore, that dusting will prove practicable under average orchard conditions, although, so far as is known to the writer, very little work has been done along this line.

WORK IN OTHER STATES WITH APPLES.

The writer is aware that experimental work in dusting apples in various other states is in progress. The published data on these are very meager at present. In some instances oral reports indicate that dusting has failed completely in the control of scab. Some of these experiments, however, apparently have not been conducted by a pathologist nor in consultation with one. It would seem, therefore, that such failures should not be necessarily charged against the method. When the comparative treatments have been made on the same days, however, the results should be sufficiently decisive. It then remains to explain why a method yields results for a specific disease in one instance and not in another. This has not been done in many cases and not at all for apple scab.

Work in Illinois in 1915, by Watkins[10] shows that dusting of two varieties (Willowtwig and Ben Davis) gave better control of scab than did spraying with bordeaux mixture. Blotch (caused by *Phyllosticta solitaria*) was present in the check blocks of the two varieties to the extent of seventy-seven and fifty-seven per cent, respectively. Bordeaux-sprayed plats showed ten and four per cent., respectively, and dusted plats twenty per cent. each. The marked reduction in the

9 Stewart, Vern B. Dusting and spraying nursery stock. Cornell Univ. Agr. Exp. Sta. Bul. 385:285-361. 1917.

10 Watkins, O. S. Results of spraying experiments for 1915, Neoga Station, Cumberland County. Trans. Illinois Hort. Soc. 1915:02-209. 1916.

amount of blotch in the dusted plats is of special interest, because ordinarily, the disease is not thought to be amenable to sulfur treatment.

Experiments in Illinois[11] in 1916 showed dusting to be considerably less effective in control of diseases than was spraying. Insects, including curculio, were controlled as well by dusting as by spraying. It is suggested that dusting will prove of value only in orchards of such extent that they cannot be protected satisfactorily by spraying.

Caesar[12] working in the Niagara district of Ontario reports very satisfactory control of apple scab, codling moth and curculio, of brown rot in sweet cherries and plums and of mildew on Rogers grapes. Curiously enough Caesar seems to question somewhat the validity of his results.

WORK IN 1916 AND 1917 IN NEW YORK.

In 1916 the work in New York was in the hands of Farm Bureau agents. In other words, it was thought that the investigation had reached a stage where any further work was in the nature of demonstration. Twelve such demonstration experiments were performed. The season proved to be the most favorable one in ten years for testing the value of protective materials and the writer regrets exceedingly that he did not continue his experimental work another year. Conditions were such that the value of additional treatments could have been determined. The outcome of the demonstration experiments has been presented by Whetzel and Blodgett.[13] Their report shows that under the conditions neither spraying nor dusting was very satisfactory. Untreated trees showed from two to twenty-five per cent. of the fruit free from blemish, sprayed ones from twenty-five to seventy-nine per cent. free and dusted ones from eleven to sixty-five per cent. free. There was almost constant rain during May and June with the result that the scab fungus spread very rapidly. The soggy condition of the soil made spraying difficult, whereas, the duster might have been used more frequently and perhaps to good advantage.

The condition just stated appears much worse on paper than it was in reality. After July 1, 1916, almost no rain fell and the scab spots corked over so that they scarcely constitute a blemish. Many apples showing such spots were placed in "class A" by growers. Such fruit, when promptly placed in cold storage, kept just as well

11 Gunderson, A. J. and Brock, W. S. Field experiments in spraying apple orchards in 1916. Univ. Illinois Agr. Exp. Sta. Circ. 194:1-151.

12 Whetzel, H. H. and Blodgett, F. M. Dusting as a substitute for spraying. History and Progress. Proc. New York State Fruit Growers' Assoc. 16:61-75. 1917.

13 Caneout. La luette contre le black-rot dans le Sud-Ouest. Prog. Agr. et Vit. 28:201-206. 1897.

as fruit which had never been affected. Aside from the twelve co-operators, opinions were secured from fifty-five other growers in the state who had used a duster. A tabulation of their replies showed that seventy-five per cent. of them expected to dust again in 1917. This indicates perhaps better than anything else the status of dusting in the State of New York. It is to be noted that some of the growers who were not satisfied with results were not fully aware of the very unsatisfactory conditions existing in all orchards in 1916, and that others, more fortunate, are basing their conclusions on inadequate evidence in that untreated trees were not left in their orchards. The following letter in response to an inquiry expresses the former state of affairs.

WOLCOTT, N. Y., Nov. —, 1916.

Dear Sir:

I dusted in 1916. I will not dust again next year I have no suggestions for improvements unless something can be found that will stay on and protect fruit. The dust both blows off and washes off. Have machine to sell at liberal discount.

Better spend your time on something else. The statements in your bulletin are very misleading. It looks to me as if a theory had been taken and then proof sought for.

It cost me $1,000 for the experiment.

Very truly yours,

In contrast with the aforegoing letter is one received only a few days ago and including, as may be seen, an estimate of the work in 1917.

STUYVESANT FALLS, N. Y., Oct. 12, 1917.

*My Dear Professor Reddick:*

This makes the third season that I have used dust extensively. This year I used more than ever before, and dusted on ten farms; something in the neighborhood of 1,000 acres of bearing fruit, and I suppose two hundred or three hundred acres of young trees.

One must understand the difficulties that a grower contends with in the way of inexperienced help, or none at all; soft ground, bad weather, and heavy land; cranky engines, leaky pumps, and the many other things that you know so much about, to appreciate the great advantage that dusting has over the liquid method. It would have been impossible for me, and several of my neighbors, to have protected our fruit by any other method, and now that we are

picking and packing, our satisfaction with the results is even greater than our appreciation of the ease of operation that we experienced in the springtime.

The fruit on dusted orchards, with hardly an exception, is free from codling moth and fungus [scab], to an extent that we estimate at at least twenty-five per cent. over the orchards that were sprayed.

On none of the dusted orchards has the fruit been seriously hurt by either of these, whereas in sprayed orchards, this is sometimes the case. This would seem to bear out my contention, that whereas spraying may in some cases be more effective than dusting, that spraying will often fail, whereas dust is more universally successful.

The fruit is packing in this section about fifty per cent. A grade, where it was thoroughly dusted, or sprayed. Our chief injuries are from red bug, aphis and hail, and also from a very late infestation of side-worms, for which nobody was prepared.

I am convinced that in this section a late dormant spray of lime-sulfur and black-leaf 40, for scale, aphis and very early fungus infections, is highly advisable, and is also a standard protection against psylla. I am truly convinced that dusting is the best, and soon will be the standard method of applying practically all of our fungueides during the growing period. I have never seen an absolute failure where dust was used, and all my own applications of dust have given better results than spray, without exception, during the last three years.

I used this year, principally, a dust of 50 sulfur, 10 lead, and 40 tobacco. The results on red bug and pyslla were hard to determine; on aphis they were good; but none of the ingredients were of a sufficient fineness to give the best results.

Very truly yours,

This diversity of opinion calls to mind the controversy in 1897[13] over the efficacy of bordeaux mixture in the control of black rot of grape.[14]

The outcome of dusting in 1917 in New York will be difficult to determine. Records are being taken at the present time (November 1) and will be tabulated as soon as possible. The very poor yield of fruit throughout the state makes all records unsatisfactory, but the increased number of dusted orchards may help to offset this to some extent.

### Future of Dusting.

No one can predict at this time the future possibilities of dusting as a method of orchard protection. At present the method is one for the owner of large acreage, the owner of the small home orchard who has never bothered to spray, and for the backyard horticulturist who cannot spray. The applicability of the method must be broadened to cover a wider range of insects and diseases. Until a dry method of killing sucking insects is developed the grower must employ the two methods and while this is being done, it is not always economical nor practicable. The writer is of the opinion that when as much time and effort have been expended on developing dry, contact insecticides as has been given to the development of spray methods, for the same insects the results will be equally as good if not better. This, of course, is only speculation, but is based on the idea that a great variety of materials might be tested all of which possess killing properties. Some of the first substances to be tried would be powdered tobacco, anhydrous substances requiring water for crystal formation and those that deliquensce on exposure to air.

For fungous diseases one of the first combinations worthy of test would be a mixture of anhydrous copper sulfate and hydrated lime. In the presence of dew typical bordeaux mixture should result and of the great fungicidal value of this mixture there can be no doubt. The writer in collaboration with Dr. V. B. Stewart, has tried such a combination on potatoes with some indication of success.

## COMMERCIAL APPLE GROWING IN MASSACHUSETTS.

E. Cyrus Miller.

For nearly thirty years I have been actively engaged in commercial apple growing. Since being asked to speak on this topic I have harked back into the past and find that I have been interested in either the planting, management or direction of some four hundred acres of apple orchards in the old Bay State. These, together with several hundred which I have planted and directed in other New England states, may show you how deeply if not vitally interested I must be in this phase of our horticultural industry.

Thirty years is not a long period, *yet,* it has brought many changes both in the personnel of the leaders in this field of work and likewise in the changed economic conditions which surround us. When my father, then fifty years old, with whom I was associated, began this orchard work I well remember the discouraging counsel he encountered. Some said he would not live to see the trees bear fruit; others, that when they *did* bear he would not be able to sell

them. *Well, the facts are:* that the old gentleman is still very much alive. He has lived to see thousands on thousands of barrels of apples borne by his first planting, and never a year in those that have passed but that they were easily sold and at a fair margin of profit. This year surely caps the climax, for I certainly have never seen apples sell as high at the harvest season and it may be that none of us here will live long enough to see such conditions again.

With all the interest and development of the apple industry in our state it is not yet near the stage of development, taking it as a whole, as it may be found to be in some other sections of our country—notably the Pacific Northwest and Virginia. To me this has always seemed paradoxical and indeed strange. Our Massachusetts soils and climate so suited to growing apples of the finest quality and appearance, our orchard lands nestling close to larger cities and towns and to nearby export points have almost entirely failed to attract capital for the development of commercial orchards as have many other sections with fewer natural advantages than we possess. Personally I believe the next few years will see a change in this respect.

In 1888 I really began my active orchard work. I remember that year particularly, for in addition to our own crops I bought quite a good many apples on the trees for fifty cents the barrel, expecting to make some money on the transaction. As a matter of fact I lost money. Have never since bought apples so cheaply, yet never, up to the present as I now remember, have I lost a dollar in what might be called apple speculation. The year 1896 I distinctly remember refusing early in the season an offer of one dollar per barrel for my crop, later selling for sixty cents repacked. This was the year of the "big crop," as apple growers and dealers describe it—the year when everyone early in the season lost money. Most growers and dealers who exported apples that year had return charges to pay. The party who bought my apples at the ridiculously low price I have stated lost eight dollars on the deal besides his time and expenses. We can never see this year repeated, because while we may have the capacity for producing as large a crop yet we *now* have such an abundance of cold storage facilities for absorbing the surplus of our orchard product at the harvest season that the experience of 1896 cannot be well repeated. Right here I may well affirm what I have many times privately and publicly stated, that there is *no other one thing* that gives to the apple industry of our country such *stability* as does the refrigeration store house, which carries our fruit from times of plenty to those of shortage—in fact, extending easily the marketing of the apple from one season to another.

The year 1901 produced a short crop and prices were higher up to that year than I ever saw. In 1902 there was another big crop the country over but this not so disastrous to those engaged in the industry as in 1896. From 1902 to 1912 we had seasons of fair crops and uniformly high prices. It was in these years we began to see a larger interest among our Massachusetts apple growers in the expansion of their orchards and in the improved cultural care of what was already planted. In these years there was a conference of Governors of the New England states at Boston at which one entire session was devoted to a discussion, led by Prof. John Craig, of Cornell, of orchard opportunities and possibilities of this section of the country. In my short life I have seen a great improvement in the character and appearance of fruit at our horticultural exhibits and of what is displayed for sale in the open market. Those who are growing apples as a business are giving attention to the details of their work which makes for success from every point of view.

Our academic friends have told us *how* to grow apples, yet as age comes creeping upon me I am more and more impressed with the importance of the correct mental attitude of the grower towards his occupation and the need of his adopting the methods that are the best suited to his particular environment. I beg to confess that in these years I have not been a regular attendant at horticultural meetings or a great exhibitor of fruit. In my busy life I have not felt the need of these inspiring forces. I have found inspiration for my work in doing the work. I love my trees and my vocation. No line of work on God's earth can excell that (in my opinion) of planting the fruit tree and tenderly caring for the same. (My orchard work is based on the care of the individual tree). No joy can excel that of the true orchardist when he finds the first blossom on the young tree he has planted; no delight greater than to pluck the first fruit.

In these few words I have made no attempt to go into the details of orchard work and management. I have not tried to give you anything new. There is nothing really new beyond what is already possessed by most that are engaged in this line of work. Care, courage, patience and perseverence are the cornerstones upon which our horticultural edifice is built. Our success, whether in Oregon or Massachusetts, will be in proportion to the strength of these mental and moral qualities exhibited by us.

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*The interplanting of varieties of apple is very important. I believe in it fully. We should carefully study the association of varieties.*—C. S. CRANDALL.

## RESULTS OF SUMMER SPRAYING AND DUSTING PEACHES.

ARTHUR J. FARLEY, *New Jersey.*

Self-boiled lime-sulfur, for several years the standard mixture used as a summer spray on peaches and some other stone fruits has been an important factor in commercial peach production in many parts of the country. Its introduction several years ago as a result of experiments carried on by the United States Department of Agriculture under the direction of Prof. W. M. Scott has stabilized the commercial production of peaches in districts where peach growing had always been a gamble, owing to the great danger of serious damage caused by scab and brown rot. On the other hand, there are certain difficulties connected with the preparation and use of self-boiled lime sulfur that make it far from perfect as a spray mixture. Among the chief difficulties found in preparing the self-boiled are: (1) the securing of a pure grade of calcium lime that will slake vigorously with sufficient heat to produce a uniform mixture of the proper strength; (2) the variability of the mixture due to the varying quality of the lime used, the amount of slaking allowed, the temperature of the water used and the amount made up at one time; (3) the rapid increase in the price of high-grade stone lime; (4) the difficulty found by the man with a small number of trees, located four or five miles from town, in keeping on hand an ample supply of stone lime. In addition to the difficulties met in the preparation of self-boiled the application is not always easy, owing to the heavy nature of the sediment it contains. The tendency of this sediment to clog nozzles and pump valves is particularly troublesome whenever it is necessary to use a barrel pump provided with an inefficient agitator. Finally, self-boiled applied within three or four weeks of the ripening period is liable to disfigure the fruit by producing a white-washed appearance.

In an attempt to find a mixture that would not have the objectionable features of self-boiled lime-sulfur and still control peach scab and brown rot without injury to peach foliage, the New Jersey Experiment Station has tested several mixtures of lime and sulfur during the last few years with varying results.

Favorable results in dusting peaches indicate that the presence of soluble sulphides in the spray mixture is not necessary in order to control scab, the most important consideration being the maintenance of a thorough coating of material on the fruit during the period when scab is likely to develop. This being true it naturally follows that it is unnecessary to boil or even heat a mixture of lime and sulfur in order to secure an efficient fungicide for use against peach scab and brown rot. The chief difficulty lies in the mixing of

a mass of dry lime and sulfur with cold water to form a smooth mixture containing no lumps. Following a suggestion made by Mr. F. H. Pough, of the Union Sulfur Company, such a mixture was prepared by treating a mixture of hydrated lime and finely ground sulfur with a glue solution to insure its ready suspension in water. The following formula was followed in preparing this mixture: Eight pounds sulfur (commercially ground sulfur flour, flowers of sulfur), four pounds hydrated lime, one and one-half ounces of ground glue dissolved in three gallons of water; water to make fifty gallons of mixture.

### Preparation.

(1) Weigh out the proper amounts of sulfur and hydrated lime. (2) Run each material through a fine sieve to eliminate all lumps. (3) Thoroughly mix the dry sulfur and lime in a barrel or other container which will hold water. (4) Add the glue solution slowly, stirring the mixture so that the grains of sulfur and lime will become thoroughly coated with the solution. (5) After the glue solution has been well stirred into the sulfur and lime, and sufficient water to produce a mixture that will readily pass through a strainer into a spray barrel or tank.

### Preparation of Glue Solution.

For every eight pounds of dry sulfur used, prepare three gallons of glue solution containing one-half ounce of fine glue to the gallon. The glue should be in every case be completely dissolved in water. This is easily accomplished by mixing the ground glue with boiling hot water or by simply soaking it in water for several hours. It is very important that the mixture of sulfur and lime be thoroughly moistened with the glue solution before any water is added; otherwise, the grains of lime and sulfur will not go into suspension readily and may form lumps that will clog strainers and nozzles.

Practical field tests of this mixture have been conducted in several orchards in New Jersey during the last two years, the results of which indicate that it will control peach scab fully as well as self-boiled. These results have been tabulated as shown in the following table covering the varieties Champion, Elberta, Frances, Edgemont and Krummel.

TABLE I.

COMPARATIVE EFFECT OF SELF-BOILED LIME-SULFUR AND HYDRATED LIME SULFUR AND GLUE IN THE CONTROL OF PEACH SCAB.

| *Treatment.* | Total Number of Fruits Counted. | *Free from Scab.* | | *Slightly Scabby.* | | *Badly Scabby.* | |
|---|---|---|---|---|---|---|---|
| | | Number of Fruits. | Percentage. | Number of Fruits. | Percentage. | Number of Fruits. | Percentage. |
| Variety Champion. | | | | | | | |
| Self-boiled lime-sulfur | 671 | 653 | 97.31 | ..... | ..... | 18 | 2.68 |
| Hydrated lime sulfur and glue | 552 | 539 | 97.64 | ..... | ..... | 13 | 2.36 |
| Check | 726 | 138 | 19.00 | ..... | ..... | 588 | 80.99 |
| Elberta Test No. 1. | | | | | | | |
| Self-boiled lime-sulfur | 756 | 582 | 76.98 | 87 | 11.50 | 87 | 11.50 |
| Hydrated lime sulfur and glue | 794 | 617 | 77.70 | 88 | 11.08 | 89 | 11.20 |
| Elberta Test No. 2. | | | | | | | |
| Self-boiled lime-sulfur | 2,940 | 2,899 | 98.60 | 34 | 1.15 | 7 | .23 |
| Hydrated lime sulfur and glue | 2,843 | 2,723 | 85.74 | 101 | 3.55 | 19 | .66 |
| Check | 2,312 | 1,304 | 56.40 | 662 | 28.63 | 346 | 14.96 |
| Frances. | | | | | | | |
| Self-boiled lime-sulfur | 3,516 | 3,549 | 98.17 | 58 | 1.60 | 8 | .22 |
| Hydrated lime sulfur and glue | 3,471 | 3,166 | 91.21 | 290 | 8.35 | 15 | .43 |
| Check | 2,737 | 513 | 18.74 | 1,527 | 55.79 | 697 | 25.46 |
| Edgemont. | | | | | | | |
| Self-boiled lime-sulfur | 3,014 | 3,012 | 99.93 | 2 | .07 | ... | ..... |
| Hydrated lime sulfur and glue | 2,362 | 2,347 | 99.36 | 15 | .63 | ... | ..... |
| Check | 2,284 | 1,636 | 71.26 | 521 | 22.81 | 127 | 5.56 |
| Krummel's. | | | | | | | |
| Self-boiled lime-sulfur | 2,830 | 2,351 | 83.07 | 406 | 14.34 | 73 | 2.57 |
| Hydrated lime sulfur and glue | 2,375 | 1,819 | 76.58 | 420 | 17.64 | 136 | 5.67 |
| Check | 2,996 | 615 | 22.81 | 1,139 | 42.21 | 942 | 34.96 |

We do not predict as a result of these tests, that this mixture will ever entirely replace self-boiled lime-sulfur as a summer fungicide for stone fruits, nor do we recommend it to all peach growers, but we strongly recommend it for trial particularly under the following conditions: (1) Where growers have had difficulty in preparing or applying "self-boiled." (2) Where it is difficult to secure the proper grade of stone lime needed to successfully prepare self-boiled. (3) Where a small number of trees is involved, thus making it difficult to keep a supply of stone lime on hand. (4) Where a summer spray has never been used and the owner does not care to prepare self-boiled or buy a commercial preparation. (5) Where it is necessary to make an application within three weeks of the ripening period. Several large commercial peach growers in New Jersey used this mixture almost exclusively this year as a substitute for self-boiled, and their fruit was very clean in spite of the fact that conditions this year were very favorable for the development of scab. Several others have signified their intention of using it next year, thereby expressing their confidence in its value as a summer fungicide for peaches.

### Results of Dusting Peaches.

There has been considerable interest during the last few years in the application of insecticides and fungicides to fruit trees in a dry form. The results published so far largely pertain to apple orchards with only an occasional reference to the peach. In view of this fact it was thought that a brief report of the results secured in dusting peaches in New Jersey during the past season would be of interest to some of those present at this meeting. The experiments from which these results were secured were conducted in a large commercial peach orchard located near Haddonfield, in Camden County. The orchard is five years old, and has been heavily fertilized and well cultivated, with the result that the trees are quite large for their age, having produced their second full crop this year. Four varieties are included in the planting, namely: Elberta, Frances, Edgemont and Krummel. The experimental plots, consisting of approximately one hundred trees each, were laid out in such a manner that each plot with the exception of the check or unsprayed block included from fifteen to forty trees of each variety. Two combinations of dust were used, one consisting of sixty-five parts sulfur, twenty-five parts hydrated lime and ten parts powdered arsenate of lead to make a hundred and the other consisting of forty-five parts sulfur, forty-five parts hydrated lime and ten parts arsenate of lead to make a hundred. As checks on these mixtures, one plot was sprayed with self-boiled lime-sulfur and another was left unsprayed with the exception of the dormant application

of concentrated lime-sulfur, applied to all plots to control San Jose Scale and leaf curl. Three applications were made to each plot as follows: First, on May twenty-three, or immediately after the "husks" had fallen from the small fruits; second, on June thirteen, and third on July five. The above applications were in accordance with the spraying schedule recommended by the Experiment Station and followed by the majority of our commercial peach growers. Four and in some cases five trees of each variety were selected at random from the center row of each plot and counts made of the entire crop produced by these trees. In making these counts "scab" was the only blemish considered, all others being so slight as to have no effect from a commercial standpoint. In order to accurately determine the relative amount of scab present on the fruit produced on the various plots three grades of fruit were made as follows:

"Clean fruit: All specimens which were absolutely free from scab.

Slightly scabby: All specimens having from one to six or eight small spots of scab which did not materially disfigure the fruit.

Badly scabby: All specimens having sufficient scab to materially reduce their market value. This might mean a large number of small spots or a small number of large prominent spots that seriously disfigured the fruit.

The following table shows the comparative effect of lime and sulfur dust and self-boiled lime-sulfur on the development of peach scab:

COMPARATIVE VALUE OF LIME AND SULFUR DUST AND SELF-BOILED LIME-SULFUR IN THE CONTROL OF PEACH SCAB.

| *Treatment.* | Total Number of Fruits Counted. | *Free from Scab.* | | *Slightly Scabby.* | | *Badly Scabby.* | |
|---|---|---|---|---|---|---|---|
| | | Number of Fruits. | Percentage. | Number of Fruits. | Percentage. | Number of Fruits. | Percentage. |
| Variety, Elberta; picked September 10, 1917. | | | | | | | |
| Dust 45-45-10 | 2,797 | 2,649 | 94.70 | 124 | 4.43 | 24 | .85 |
| Dust 65-25-10 | 3,066 | 3,016 | 98.36 | 45 | 1.46 | 5 | .16 |
| Self-boiled lime-sulfur | 2,940 | 2,899 | 98.60 | 34 | 1.15 | 7 | .23 |
| Check, unsprayed | 2,312 | 1,304 | 56.40 | 662 | 28.63 | 346 | 14.96 |
| Variety, Frances; picked September 17, 1917. | | | | | | | |
| Dust 45-45-10 | 3,212 | 2,583 | 80.41 | 551 | 17.15 | 78 | 2.42 |
| Dust 65-25-10 | 4,091 | 3,749 | 91.64 | 251 | 6.13 | 91 | 2.22 |
| Self-boiled lime sulfur | 3,615 | 3,549 | 98.17 | 58 | 1.60 | 8 | .22 |
| Check, unsprayed | 2,737 | 513 | 18.74 | 1,527 | 55.79 | 697 | 25.46 |
| Variety, Edgemont; picked September, 19, 1917. | | | | | | | |
| Dust 45-45-10 | 3,825 | 3,775 | 98.69 | 45 | 1.17 | 5 | .13 |
| Dust 65-25-10 | 3,338 | 3,313 | 99.25 | 24 | .71 | 1 | .03 |
| Self-boiled lime-sulfur | 3,014 | 3,012 | 99.93 | 2 | .07 | ... | ..... |
| Check, unsprayed | 2,284 | 1,636 | 71.62 | 521 | 22.81 | 127 | 5.56 |
| Variety, Krummel; picked October 4, 1917. | | | | | | | |
| Dust 45-45-10 | 1,656 | 1,197 | 72.28 | 330 | 19.92 | 129 | 7.78 |
| Dust 65-25-10 | 2,899 | 2,433 | 83.92 | 321 | 11.07 | 145 | 5.00 |
| Self-boiled lime-sulfur | 2,830 | 2,351 | 83.07 | 406 | 14.34 | 73 | 2.57 |
| Check, unsprayed | 2,696 | 615 | 22.81 | 1,139 | 42.21 | 942 | 34.96 |

The figures indicate: First, that the dust made up by the 65-25-10 formula gave better control of scab than the dust made up by the 45-45-10 formula. Such a result is no more than should be expected in view of the great difference in the relative amounts of sulfur present in the two mixtures. Second, that the 65-25-10 dust is a close second to self-boiled lime-sulfur inthe control of peach scab. Third, that both of the dust mixtures controlled scab fully as well as self-boiled as applied under average conditions.

Other points of interest in connection with this experiment are: First, the average time required to apply the dust to one hundred trees was thirty-five minutes as compared to one hour and a half required to apply the self-boiled lime-sulfur to the same number of trees. Second, the average amount of dust required to cover one hundred trees was eighty pounds and the average amount of self-boiled one hundred and fifty gallons. This is equivalent to fifty-two pounds sulfur, twenty pounds lime and eight pounds lead arsenate when the 65-25-10 dust formula is used; thirty-six pounds sulfur, thirty-six pounds lime and eight pounds lead arsenate when the 45-45-10 dust formula is used and twenty-four pounds lime, twenty-four pounds sulfur and five pounds lead arsenate when self-boiled lime-sulfur is used. Third, there was no injury to fruit or foliage under any treatment. Fourth, the fruit from the dusted trees appeared to be somewhat brighter in color than that from the trees sprayed with self-boiled lime-sulfur.

Analyzing these results from the standpoint of the practical peach grower, the chief problem resolves itself into a question of the comparative cost of the two methods. In the dust method we have a saving of time and a loss of material in comparison with self-boiled lime-sulfur where just the opposite condition exists.

Furthermore, dusting necessitates the purchase of additional machinery in the form of a blower or duster which cannot be utilized in applying the dormant spray. There is no doubt but what lime and sulfur applied in the form of a fine dust will control peach scab fully as well as any of the liquid preparations now in use. Its chief value as far as the peach grower is concerned rests upon the fact that large numbers of trees can be covered in a minimum amount of time, thus assuring more uniform protection against scab and brown rot. This should be a very important consideration for the commercial grower who has a large number of trees to cover during a limited period in which other kinds of work demand attention.

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*You ought to come to Illinois in four or five years to study Crandall's new apples.*—J. R. REASONER.

## PROGRESS OF POMOLOGY ON THE DELAWARE-CHESAPEAKE PENINSULA.

WESLEY WEBB, *Delaware.*

The Delaware-Chesapeake Peninsula is a Horticultural District by itself. It is nearly surrounded by broad bodies of salt water, having the Chesapeake Bay on the west and the Delaware Bay and Atlantic Ocean on the east, modifying the climate in both summer and winter. It is in the lower half of the Temperate Zone and, with a diversified and productive soil and an abundant rainfall, it produces successfully and profitably a great variety of crops. The growing season is long and the soil is kindly. Delaware is a mere nick in the edge of the Peninsula and people sometimes sneer at the State because it is small,—only a hundred miles long and so narrow at one point that a man can walk across it in two or three hours. Yet it is a great State, famous for men, for fruits and flowers, and for the most amiable and beautiful women in the world. No matter how large other States may be, a hundred-acre farm in Delaware is as large as a hundred-acre farm in Texas, and a small Delaware farm contains as much good land as one will see in a Sabbath Day's journey in some parts of the world.

Two hundred years ago peaches and apples on the Peninsula produced abundant crops. The fruit was eaten fresh, was dried or preserved or was used for making brandy. Peaches were even shipped by sailing vessels to New York.

It is a far cry from those old days of seedling peaches and sailing ships to the luscious fruits that now go by express train over steel rails or by trucks over concrete roads.

The first budded peaches were planted in Delaware about 1832. In 1875, the upper end of the Peninsula was almost one continuous peach orchard. These were the peaches that made Delaware famous. But peach yellows swept the orchards out and the industry gradually declined, the "peach center" slowly moving southward. After the first onslaught of yellows had subsided and orchards began to be planted anew the San Jose Scale, little peach, and brown rot had to be fought. Science, fostered by State and Nation, combined with the skill of the mechanic in making spraying outfits, found and applied remedies until these troubles are no longer feared and peach growing is coming back to the Peninsula in all its old time glory and profit. It will not monopolize the land, however, for the apple will contend with the peach for supremacy; and market gardening will vie with fruit growing, and the Peninsula will continue to lead the world in strawberry production. It was a man of fine perceptions who said, "Doubtless, God might have made a better berry

than the strawberry, but, doubtless, he never did." This year, 1917, the berry shipments from the Peninsula reached twenty-three million quarts.

Our peach growers are up with the times in cultural and marketing methods. They spray a little more thoroughly and a little oftener than the experiment station men advise, so as to be sure of results. Of course, there are slackers who do not spray at all, and always and everywhere there are those who try to get off with poorly done tasks. Verily, these have their reward, loss and shame, just as the thorough-going man has success and satisfaction.

Work done at the Delaware Experiment Station indicates that nitrate of soda can be applied freely to the peach orchard with good results, and this conclusion is confirmed by some experiments in New Jersey and in West Virginia. Professor C. A. McCue planned and carried out the work in Delaware. It covers a period of nine years from the planting of the orchard until this time, during which six crops of fruit have been gathered. There are 24 blocks of 25 trees each. Professor McCue furnishes the following tabulation and explanation:

| Block. | Treatment yearly per acre. | Total yield per acre (6 crops) Bushels. |
|---|---|---|
| 1. | 100 lbs. Muriate of Potash | 1438 |
| 2. | Nothing | 1213 |
| 3. | 200 lbs. Muriate of Potash | 2218 |
| 4. | 350 lbs. Acid Phosphate | 1602 |
| 5. | Nothing | 764 |
| 6. | 700 lbs. Acid Phosphate | 1083 |
| 7. | Nothing | 1100 |
| 8. | 100 lbs. Muriate of Potash, 350 lbs. Acid Phosphate | 1492 |
| 9. | 333 lbs. Nitrate of Soda | 2495 |
| 11. | 333 lbs. Nitrate of Soda, 100 lbs. Muriate of Potash | 2907 |
| 12. | 333 lbs. Nitrate of Soda, 350 lbs. Acid Phosphate | 1961 |
| 13. | 200 lbs. Muirate of Potash, 350 lbs. Acid Phosphate | 1794 |
| 14. | 100 lbs. Muriate of Potash, 350 lbs. Acid Phosphate, 333 lbs. Nitrate of Soda | 2340 |
| 15. | 100 lbs. Muriate of Potash, 350 lbs. Acid Phosphate, 666 lbs. Nitrate of Soda | 3100 |
| 16. | 100 lbs. Muriate of Potash, 666 lbs. Nitrate of Soda | 3826 |
| 17. | 350 lbs. Acid Phosphate, 666 lbs. Nitrate of Soda | 2670 |
| 18. | Nothing | 951 |
| 19. | 200 lbs. Muriate of Potash, 350 lbs. Acid Phosphate, 333 lbs. Nitrate of Soda | 2351 |
| 20. | Nothing | 1317 |

| Block. | Treatment yearly per acre. | Total yield per acre (6 crops) Bushels. |
|---|---|---|
| 21. | 100 lbs. Muriate of Potash, 700 lbs. Acid Phosphate, 333 lbs. Nitrate of Soda | 3089 |
| 22. | 300 lbs. Muriate of Potash, 350 lbs. Acid Phosphate, 333 lbs. Nitrate of Soda | 3335 |
| 23. | 100 lbs. Muriate of Potash, 350 lbs. Acid Phosphate, 999 lbs. Nitrate of Soda | 3488 |
| 24. | 100 lbs. Muriate of Potash, 1050 lbs. Acid Phosphate, 333 lbs. Nitrate of Soda | 2507 |

Average yield of check blocks.....1069 bushels per acre

The above represents the total yield per acre for the various fertilizer blocks during their entire lifetime. This represents six crops and a few off pounds of fruit from the first year in bearing. I have given you the yield in bushels per acre as the term bushel is more commonly used for yields than any other unit of measure. I have used 48 pounds to the bushel and have figured to the nearest bushel disregarding fractions. You will note that in all cases, with possibly one exception, that the large yields are associated with Nitrate of Soda treatments. The possible exception is with block 3, where we have used a large quantity of potash alone. Another interesting fact that you will note is that larger amounts of Acid Phosphate used alone or in excess with potash and nitrogen have decreased the yield, note blocks 6 and 24. Block 24 lies adjacent to blocks 18 and 23, block 18 lies between 12 and 24, and block 6 cornering on block 5. Even a casual survey of these figures, I think, proves beyond the point of contradiction that nitrogen plays a very important part in the production of peaches. Whether or not this nitrogen is to be supplied by means of commercial fertilizer is largely a local question . Over supplies of nitrogen in the form of Nitrate of Soda tend to produce a large yearly growth correlated with heavy leaf production, the result being that peaches produced on trees so treated are from ten days to two weeks later in ripening than upon untreated trees. The fruit is deficient in color and consequently in flavor and quality. The sweetness of the peach is dependent largely upon the sugar content. Sugar and color are largely matters of sunshine, providing the basic elements have been furnished, in fact "sugar is concentrated sunshine." The heavy leaf production on over stimulated trees shuts out sunlight, thus we see that there is an optimum point in the application of Nitrate of Soda. This point can be estimated for the individual orchard only through trial and experimentation.

As far as the State of Delaware is concerned the average peach orchard is suffering for the want of nitrogen plant food. Under

pre-war conditions the cheapest, most efficient and most profitable way to supply this want was through the use of Nitrate of Soda. The same effect can be secured by the continued use of certain cover-crops, particularly cowpeas. The effect, however, is only obtained gradually and is accumulative rather than direct. In demonstrating (on about 30 Delaware farms) the use of Nitrate of Soda as a top dressing for peach orchards it was found, in nearly all cases, to be an efficient means of aiding peach production. It not only tended towards the prevention of a heavy June drop, but also furnished better foliage for the ripening of the crop and resulted in a greater annual growth of wood, consequently a much larger amount of fruit-buds with possibilities for the coming crop. In two instances only did the use of Nitrate of Soda fail to produce results that were visible to the eye, in both cases the orchards were young and had been excellently taken care of. No doubt the required amount of nitrogen had been made available and released to the trees by proper cultivation. I feel confident that by a judicious use of Nitrate of Soda upon the existing orchards of the State that peach production could be increased fully 25%, without additional plantings.

The use of Nitrate of Soda on peach in Delaware has become general since these results have become known. In fact, it has been used to a considerable extent on the Peninsula as well as in New Jersey for quite a number of years, New Jersey having taken the lead in its use.

With this new development in manuring the planting of new peach orchards may be expected to increase rather rapidly during the next few years. Farmers are confident that they can overcome all the known diseases and pests and they are reasonably sure of pretty regular crops. The Georgia peach carrier is now used in place of the old Delaware peach basket that served its generation well but is not suited to modern methods of handling and selling peaches.

A very great variety of apples grow successfully on the Peninsula. Forty or fifty years ago a number of public-spirited farmers and nurserymen planted many promising kinds of apples for the purpose of testing them. Other fruits were also tried. But now the orchardist is limiting his plantings to a few commercial varieties, to those that are the most profitable—omitting, however, the Ben Davis because of its poor quality. The Ben Davis grows wells, bears well and pays well on the Peninsula but it grows no better and pays no better than the Stayman Winesap and (Mammoth Black Twig) Paragon and other varieties that are of excellent quality. York Imperial has also been discarded. The early varieties now

being planted are Yellow Transparent, Early Ripe, Williams (Early Red), and a few others. The fall and winter varieties are Jonathan, Grimes, Rome Beauty, Stayman Winesap, (Mammoth Black Twig) Paragon, and Winesap. Delicious and a dozen other late varieties are on trial.

The enactment of apple grading and packing laws in both Delaware and Maryland has resulted in marked improvement in the uniformity, quality and appearance of the fruit that is now put on the market from these States. The sizing machines grade as to size and the sharp eyes of young men and women soon learn to detect even the slightest defect from insect or fungus or other cause, and to grade for uniformity in color. The early apples are sent to market in hampers that hold a bushel each. The late apples are nearly all sent to cold storage, a few of them in boxes, some in hampers but the greater part are packed in double-headed barrels. The hamper used for this purpose is packed top down so it can be faced just as barrels are faced, and then the bottom is pressed in and nailed. The best Delaware apples, especially Stayman Winesap, have a fine reputation in Philadelphia, and sell nearly as well in three-bushel barrels as in bushel boxes.

A good many Delaware farmers have become specialists in growing fruit crops and there is a strong tendency at this time for the best farmers to specialize in one or more fruits or vegetables. Probably the ultimate result will be good both for the specialist and for the specialty because better cultural methods will be devised.

It is to be regretted that the farmers of the Peninsula are now doing but little to test new fruits or fruits that are known in other places but whose value for the Peninsula has not been determined. Some years ago a number of nurserymen and farmers in both Delaware and the Eastern Shore of Maryland were spending time and money to test new and old fruits. These men have now passed on and we are waiting for a new generation to take up this work. After the experiment stations were established there was a general feeling that these institutions should test all kind of crops, because they could do it better than it can be done by individual farmers. It is obvious that there is a limit to the amount of work of this kind that experiment stations can do properly. But the private horticulturist who has the means and the leisure to do such work and who loves nature cannot find anything more delightful and the result of such investigations will bring blessings to humanity in more delicious fruits and more palatable vegetables. Such work is beginning to revive among us and we fervently say, "Speed the day."

## THE ROME BEAUTY APPLE IN OHIO.

U. T. Cox, *Ohio.*

When Ohio was settled the old varieties of apples grown in the North and East were taken to the new settlements and planted for home use. General Rufus Putnam started a nursery at Marietta soon after this place became permanently established and safe for the people and as they moved to newer settlements they took a supply of trees with them to start the home orchards. In 1816 Joel Gillette moved from Marietta down the Ohio River to what is now Lawrence County, and just above Proctorville he started a new home. While planting some trees that he had brought with him, he observed that one of them had a sprout below the graft. He, thinking it was no good, pitched it out to his son, Alanson, saying, "There is a democrat, you can have that." The lad took it and set it out near the bank of the Ohio River and in a few years it bore such nice fruit it was spoken of as Gillette's seedling, but about 1832, George Walton suggested the name of Rome Beauty,—Rome the name of the township in which it grew, and beauty on account of its appearance. Grafting wood was first taken off the original tree about 1827 or 1828. At the time of the gold discoveries in California, Preston Gillette carried the variety to the far West and it has been spread over all the western apple growing regions from that beginning. Hon. H. N. Gillette did more to spread the new apple through Ohio than any other man by showing it at meetings where horticulturists met for discussions.

John Chapman, better known as Johnny Appleseed, went about over Ohio, Indiana and some other States planting apple seeds he had gathered in the older settlements and often gave away his trees to lovers of fruit, and in that way more apple trees were planted all over the States than otherwise would have been planted, but they were seedlings, and it was sometime later before grafted standard varieties were introduced.

When the early orchards came of an age to produce crops the fruit was loaded on boats and floated down stream to the cities along the Ohio and Mississippi Rivers and sold on their markets. Then steamboats later on transported the freight either up the river to Pittsburgh or down the river to the lower markets and later the railroads came in for their share of the traffic. Local markets became an important factor in a few years, and the electric lines now vie with the trucks in making short hauls to markets. Most of the apples produced in the State are consumed in its own territory and besides, large quantities are shipped in from outside.

Ohio was one of the first States to experiment with spraying and I made the first test in our county in 1890, and it early became an

established practice. Southern Ohio Rome Beauty apples from Lawrence County became famous wherever they were shipped. The growers generally picked and packed their own fruit and most all of them learned to grade them better than fruit from many other sections, and my father, Nelson Cox, commenced the practice of picking only the ripest fruit and letting the small and green specimens grow and color for later pickings. It is now generally practiced on early ripening varieties but many of the late varieties are still gathered at one picking, but it would be better for the growers, and the consumers, too, if the small and green ones were left on the trees to grow and color more for a later picking. There would be fewer drops and more barrels of good fruit, more money, and fewer waste apples, and the picking season could be extended about two weeks, or the harvesting done with fewer pickers.

As old orchards died (out of starvation), our experiment station made some tests with commercial fertilizers and found it paid well and on the hills in the southern part of the State, nitrate of soda is now generally applied every spring and many of the growers use acid phosphate, too, and get better growths of grass and clover.

Every dollar invested in fertilizer and used on the orchards intelligently has resulted in the production of an increase of several dollars worth of apples. The trees also make better growth, while the fruit increases in size, more of it is set and more or less of a crop is produced in off years. About five pounds each of nitrate of soda and acid phosphate is sown around the trees by hand on sod and the rains dissolve it and carry it into the soil. Potash has not yet proved its worth here.

While apples may be grown over most of the State the bulk of the fruit is grown in certain sections and along the hills in the southern part of the State. The level land is better adapted to grain, but along the lake, in the north, fruit, especially peaches, are grown largely. A few counties in the south grow as many as 100,000 barrels each of commercial apples, but the last two years the State has grown less than a million barrels per year.

Many good seedlings have originated in Ohio and these together with the other good varieties introduced supply us with an ample list for general planting.

While Rome Beauty is the great commercial apple along the Ohio River there are several distinct types or sorts of it. Most of them look like the mother parent in tree and foliage and the quality is about the same but with some the color is better. For several years I have had some Rome Beauty sports that are red all over. Recently I have found one that is very dark red all over, in fact, it is as dark as Winesap or Paragon and the size of Rome Beauty.

This I pronounce as good as Rome Beauty in quality, but some say it is better. The sprout came out at the root of an old Rome Beauty tree, probably above where it was grafted, but the old tree did not have dark red apples. It is worth propagating it seems to me. I have been advised to give it a new name, rather than to designate it as some kind of a Rome Beauty.

The Ensee was a chance seedling on our place but of much better quality and it seems to be as good as Rome in all particulars. It blossoms early; is of good size, high color, and a prolific bearer; it is a good keeper and a good seller.

## SELLING TO LOCAL MARKETS.

R. W. PILLSBURY, *New Hampshire.*

Selling to local markets is one of the hardest problems the fruit grower has to meet and I can only approach it in a general way. The results are not usually satisfactory, owing to a mistaken view of the local merchants.

Denmark is the most complete and successful example of a thoroughly organized community; a people organized to win the victories of peace, not welded together under the stress of war; a country with the most widely diversified products, it is the best model for us to study in a project for marketing our products. It is an example of material prosperity won in spite of great physical impediments, a chill climate, poor soil and negligible mineral and forest resources.

We find Danish products not only control in their own market, but her various products are marketed through government agencies. The Danish government markets the farmers' produce. It maintains offices for that purpose in the big cities of England, Germany and France, as well as at home. Danish butter through this system has the monopoly of all tropical countries, as well as its home markets. The government not only sells but grades the goods. The producer sees there is nothing in raising inferior things and trying to work them off, something our people have not all learned yet. With them the national reputation is at stake. *We must grade our produce* through some agency, establish recognized standards, and give better goods if we are ever to maintain a good market at home, in fact, this is the *main essential* for establishing and keeping a market either at home or abroad.

The State should grade our products and the purchaser will soon come to know that the State certificate of inspection and grading means something and the producer would be stopped from selling poor things and the buyer would be prevented from haggling

and beating down on the price. Bargaining is one of the greatest detriments to all classes of agricultural interests. It must go with other evils. It has its roots in selfishness and is carried on dishonestly. Beating down is a mild form of robbery and is most prevalent in some parts of New England.

In the West things are sold according to the city quotations of the morning papers. The grade it known; the proper price is known, and there is no haggling.

We must study market conditions to be familiar with the desires and needs of different localities. We must have cold storage plants so that our markets will not be glutted for a time, then starved. This may in time be taken in hand by the State. To discuss all the possibilities of State co-operation would take more time than we have to give to the subject.

To get all branches of land production on a higher basis with more profit to the producers, we must work in many other domains than scientific agriculture, most people think that it is an agricultural question and that the remedy is to apply scientific agricultural knowledge. The fruit grower already has scientific knowledge. The State colleges and State experiment stations have been giving the State all the agricultural knowledge any agency could give and the native ability and knowledge of the growers and the labors of the county agents have fully supplemented that. It is not now a question of how to raise things. It is an economical question; a pyschological question. The trouble does not lie in raising things, but in selling them; even selling them at all, or selling them at a cost of less time and worry than it took to raise them.

With the best markets in the world the producer has the greatest difficulty in selling his product. If he peddles his own product there is an enormous loss of time. If he sells to the store he gets a low price and that in barter oftimes; but he cannot buy fertilizer, machinery, nor pay taxes in barter, nor can he trade with anyone except the general store. He cannot take his barter from the general store to the drug store, to the furniture store, to the doctor, nor to the dentist. This faulty system under which we are living is the reason there are so many unoccupied farms.

In Louisiana, in 1915-16, meetings were held in towns all over the State where townspeople and agricultural producers got together to thrash out things and explain their troubles to each other and see what was best for town and country. We can profit if we follow their example. It is one of the banes of local stores that so many people send away large quantities of money, particularly to Chicago mail order houses. It is a great injury to the local merchant but very curiously while this evil is recognized and con-

demned, nothing is said about the equally great evil of the storekeeper sending off for things that cannot be raised here! The merchant should pay the producer cash instead of barter. Only a few have the aptitude to peddle at private houses. A farmer may travel the whole afternoon trying to sell apples and find only two purchasers. It is the business of the stores to look after this at a fair measure of profit. The producer of any large quantity of fruit cannot profitably try to sell to private customers a large percentage of his output. If the storekeeper would pay largely in cash, the growers would go ahead and raise everything, possible to raise in the climate, which the store requires. The storekeeper buys apples from all parts of the country rather than to pay cash to the local growers, because they do not understand each other. This is costly inefficiency. With hired help at present prices and costly transportation the marketing of fruit is a problem. All over America they wail over the help problem. Raise your own help. The good sized family was half the secret of the old prosperity. Boys and girls are the one most valuable product of the farm; the one great remedy for the help problem, the one successful permanent solution that will solve it today as it solved it a hundred years ago and will solve it a hundred years from now is to raise that help right on the farm. I have had great assistance from my daughter, who is at home, and from the neighboring women, in picking and marketing my apples. Packing and picking fruit can be done by women equally as well as by men, and for local markets a woman's taste may be even better than a man's. I have tried to obtain a local market; have advertised through newspapers, circulars, postcards, etc., and am selling some apples this way, but the part of my crop which I can sell to local trade is due to having a cold storage plant which enables me to give an even supply the year through and from the constant effort to produce better apples each year. And my constant endeavor in the future will be to raise better fruit. I will find a market for it at reasonable prices if I maintain a high standard of quality.

## AFTERTHOUGHTS FROM SOME NOT AT BOSTON.

### Revive Amateur Pomology.

Commercial pomology has had its innings during the last thirty years very completely. Its devotees have been active sometimes to belligerency and they have been mighty useful in awakening a wider interest in fruit growing, and through graphic illustrations in art and typography have caught the attention of people and secured an interest in planting which could hardly be brought about through any other agency. The market has been widened. Varieties have

been promulgated and adapted to long distance shipments. Through persistence and insistence, the products of pomology have become known in the far-away places of the land.

In the meantime, however, the amateur who was so strongly in evidence in the half century before 1880, seems to have been almost lost in the shuffle. The men growing fruit for the fun of it have lost their significant position in awakening a love for the very best things in the lists of fruits. We have lost our wide range of varieties which has been developed by men grounded deeply in the science of pomology and in whom the market idea has had a small place.

Fruits of the highest quality of the most delicate flavor and the most perfect texture, which three years ago were found at all our large exhibitions, are now rarely seen at conventions of fruit growers. In apples, let me mention the Mother — Jefferis, Large Yellow Bough, Green Sweet, Belmont, Early Joe, Lady, Dyer, Fall Pippin, Gravenstein and McLellen. In cherries — The Elton, the Reine Hortense, the White Ox-heart and Yellow Spanish have found substitutes better adapted to shipment but which are lacking in quality. In peaches, the marvel of delicacy — George the IV and the Old Mixon are rarely seen; and in grapes — what has become of the Adirondack, the Iona, the Eumelan; and in pears — how rarely we find Winter Nelis, the White Doyenne, the Mt. Vernon and all too rarely the Lawrence. Of course, most of these beautiful and delicate creations make no appeal to commercial horticulture, because of the lack of some quality which would subserve market purposes. But, in the development and maintenance of fruits of this high character, whether it will pay to grow them for market or not, is of the highest importance. It matters very little to the amateur whether a variety is a prolific bearer, if he can get something of useful quality that tickles the eye and satisfies the palate.

I consider pomology the most wonderful resource for old age; and its value to the devotee who is in the decline of life, largely depends upon awakening an interest in the scientific side of fruit growing. Why not revive amateur pomology? Why not bring out to the meetings of our society, an army of men who are engaged in the growing of fruits for other purposes than the market and thus awaken anew the interest in the most beautiful and delicate creations of our art. We are at a period when wonderful changes are going to take place throughout the world. New views of service and responsibility will come in and the dominance of commercialism in the world's progress will have to give away to the humanities of life. Our ideals must be changed and the almighty dollar, although it must strongly be in evidence in all of the movements that

make for a better world, will cease to be a fetish, and the new evolution which will bring about higher and nobler ideals ought to catch our sympathies and activities in such a degree that we shall be a part of the great forward movement.

Yours sincerely,

CHAS. W. GARFIELD.

**Traditions! Why Not?**

"Stonehenge," Charlottesville, Va.,
December 10, 1917.

Dear Mr. Secretary:

I was sincerely disappointed when circumstances prevented me from attending the Boston meeting.

I see Bailey is President, that is good. My mind runs back to one morning in 1885 when I visited Lansing and called upon him. He was in the midst of a lecture. His style and manner of presentation was most interesting and greatly impressed me. Now he and I are "old men," as the times go, but as for me, I am more active and vigorous than I was at forty. I did not personally know Marshall P. Wilder, but every President of the old "Pomolog" since, I have known and honored. How much these men have stood for! We may all feel proud of the position of Pomology in both economic and social life, and its future is secure.

However, I wish that we might cultivate more binding traditions. I would like to see the work of the father grip the son until we have something of the wonderful "esprit du corps" of the French pomologists. One can never understand this until he has been able to sit with them as a brother in their homes and enjoy their simple life. I have noted on the library walls of a friend the "Diplome" of the grandfather, father and son or present owner. Each in turn *had done something* for France, for the world, by producing better fruit. What greater heritage of honor could a fruit grower wish.

American pomologists have done splendid work for our land but somehow ideals fail to "grip" us and the life work of the father dies for want of a son who can estimate its real worth and continue it.

Pardon me for rambling on in this fashion.

Sincerely,

WM. B. ALWOOD.

**Eighty-five; Still Enthusiastic.**

Charles City, Iowa,
February 25, 1918.

Dear Mr. Secretary:

Eighty-five years passed and feeble health at the time, made it impossible for me to have the great pleasure of attending the Boston meeting. I seemed to need it as a fitting compliment to a long life of horticultural labor.

It may surprise you, if I restate a little that I said at our last Iowa meeting: "There is not another place in the whole United States where there is laid such a foundation for the practical and scientific breeding of the pear as at Charles City."

We not only have blight resisting stocks, but the trees which will remain uninjured by thirty to forty degrees below zero, with which we are mingling our high class, hardiest and nearest non-blighting varieties. And now, the work of more than thirty years' effort is well under way, and it is destined to greatly aid the growth and permanence of the pear industry throughout our entire country.

Although I am well started on the eighty-sixth mile stretch in the journey of life, I still retain a lively interest in pomology.

Have just now in preparation, fully four thousand cross bred seeds, mostly of the apple and representing about seventy combinations sent here from the Agricultural College at Ames.

The State now owns my experiment grounds, yet indulge in planting a few seeds for pasttime and pleasure.

My one great source of sadness is the passing of so many of my life-long horticultural friends, Col. G. B. Brackett and Capt. C. L. Watrous of Iowa, and so many in two or three other States, that I begin to feel alone as one belonging to another generation.

Many thanks for your very kindly memory.

C. G. Patten.

**NEBRASKA.**

A. A. Schenck.

As to new varieties, Nebraska has been very quiet. This State has not had to put up any such plucky fight against climate as Wisconsin, Minnesota and Canada. The varieties suited to the several districts have been fairly well determined. Out of several hundred new varieties of apple developed since the publication of Bulletin 56, U. S. Department of Agriculture, Nomenclature of the Apple, not half a dozen are from Nebraska. The German nurseries at Beatrice have the Franz apple, Bliss gives the Minklin (Minkler?), the Fairbury Nurseries have played with a seedless, Marshall Bros. have had "one put over on them" in their supposed Golden Swede, which they now report not true to name.

Prof. Beach of Ames, Iowa, has been pushing the question of Jonathan apple along the bluffs of the Missouri River. It was with regret that I declined an invitation to a pomological trip along the Bluffs region; but later Professors Beach and Greene showed me in their experimental orchard near Council Bluffs, Jonathans surpassing in color the Pacific Coast Jonathan. (Anything within a dozen miles of the Missouri is claimed as Nebraska.) Weaver of Nebraska has shown what a natural apple territory is found in the Bluff region of Nebraska, as also Marshall Bros. Omaha is one of the large cities now paying heavy freight bills for Colorado Jonathans, while having a fine territory available for this variety close at hand. Pollard is developing high grade fruit.

As to markets, there is no question that the Northwestern boxed apple has encroached upon the Nebraska markets, while the high grade Nebraska packs, such as Weavers, Marshall Bros., etc., seem to be going away from the State in large measure. The Atlantic says to the Pacific about the apple, you have everything but flavor. The Pacific retorts, you have everything but honesty. Nebraska claims both, at least in her large commercial orchards. Selling organizations as yet are in the process of "being born"—The numerous orchards that are merely an annex to a farm do not tend towards a strong selling organization, such as are found in commercial orchard districts. The commission men favor the growers who can bring them other products besides apples, taking the apples in poor condition as against the better grade fruit of other growers.

The sudden embargo against Newtowns to England last winter tended to put this variety into the markets of western Nebraska and Wyoming, but owing to lack of care after leaving cold storage, they did not hold up well. This very late variety should find good markets in the Middle West without interfering with Nebraska's normal crop.

The peach in Nebraska is crowded out by the southerly States.

Nebraska is going much more extensively and systematically into spraying and general orchard care than formerly.

In by-products, greater attention is being given to utilization of uncommercial fruit. In many Nebraska orchards about all the fruit is "by"—owing to the preponderance of corn and wheat.

In small fruits Nebraska has not lived up to her possibilities. There is a large area in Nebraska, of somewhat sandy soil, that could duplicate South Jersey or Puyallup as a berry growing region. Water is abundant a few feet underground, wind abundant for pumping in the irrigating season, and gasoline is being produced in great quantities westward,—in Wyoming, if gasoline en-

gines are required for pumping. I have examined strawberry patches so irrigated that were producing up to $500 per acre. Being near Omaha, a better (but softer) berry even than the famous Clark of the Hood River territory could be put on the market from this region, owing to the short haul.

A. A.SCHENCK.

# COMMITTEE REPORTS.

## TROPICAL FRUITS.

WILSON POPENOE, *Chairman.*

Those who have chosen to work with tropical fruits have often found the lack of uniformity in the use and orthography of common names highly confusing. In such matters there is no court of last appeal, and it is left to each one to choose for himself the form which he considers to have the sanction of the best usage, or which appeals to him as most appropriate.

Attempting to change a name once established has always been difficult, and not infrequently impossible. The efforts to supplant *grapefruit* with *pomelo* and *avocado* with *ahuacate* have not been particularly fruitful of results, insofar as the public at large is concerned. Those who advocated *ahuacate* are in most cases now content to concentrate upon the elimination of the objectionable appelation *alligator pear.*

In this matter of common names, usage must be allowed to control. Yet in some instances,—particularly with the many tropical fruits which are just beginning to receive the attention of horticulturists,—usage can be influenced by those who have in hand the dissemination of the fruits and information concerning them. When *Feijoa Sellowiana* was introduced into California some 15 years ago the nurserymen catalogued it under the common name of *feijoa;* and in spite of the difficulty which the uninitiated experience in pronouncing this word, almost no one, at the present time, thinks of using any other.

Tropical pomology is a new science. Most of the fruits with which we are working are not well known horticulturally and in many cases the common names which will be used by cultivators in the future depend upon those which investigators and nurserymen use in their publications at the present day. In some cases, no common name is yet established in the English language. In others, there are several, one of which may be greatly preferable to the rest. Oftentimes the foreign name is introduced along with the fruit itself; it is important for horticulturists to see that this is retained in its proper form and orthography, instead of being allowed to degenerate into one of the atrocious barbarisms of which we already have an abundance.

This committee has asked the opinions of the most prominent horticulturists engaged in the development of tropical pomology, and all have agreed that it is desirable to work toward a greater degree of uniformity in this matter. It is realized that common names are dependent upon popular usage, and are not the universally immutable things which botanical names are, or should be; but at the same time a certain degree of uniformity is possible, at least in America.

Because of the fact that some of the little known tropical fruits have no common names in general use, it is often difficult for one writing or speaking of them to decide by what name they should be called. It is the purpose of the committee, in offering this annotated list, to select the names which seem most suitable, both for well known fruits and for those which are too little known to have been widely listed under common names in this country. In making this selection, good usage has been given the first consideration. Where the fruit is not sufficiently well known to have a name in common use, euphony and appropriateness have been allowed to control in selecting a foreign name, preferably one from the native home of the fruit, which might be adopted in the United States. The list can not be considered final by any means, but it is the best which it has been possible to prepare at the present time, and it is felt by the committee that it is a step in the right direction. If it succeeds in enlisting the sympathy of pomologists to the extent that they will use the preferred names in every case where there is not a good reason for doing otherwise (such, for instance, as the local usage of a different one), it will aid greatly in clarifying the present unsatisfactory situation, and will tend toward the elimination of many barbarities which have gradually been creeping into our pomological literature.

The botanical nomenclature here employed is that used in the publications of the Office of Foreign Seed and Plant Introduction of the Bureau of Plant Industry, U. S. Department of Agriculture, which does not conform to the Vienna code; where other names are in common use among horticulturists, they are given as synonyms:

*Aberia caffra*, see *Dovyalis caffra*.

*Aberia gardneri*, see *Dovyalis gardneri*.

*Achradelpha mammosa* (L.) O. F. Cook (*Lucuma mammosa* Gaertn. f.). Sapote, plural sapotes. While called marmalade plum in some of the West Indian Islands, the name sapote, by which this fruit is known in Central America and some other regions, seems much more desirable.

*Achradelpha viridis* O. F. Cook. Green sapote, plural green sapotes. The Guatemalan name for this fruit, in the language of

the Kekchi Indians, is raxtul; translated literally this means green sapote. Since the species comes from Guatemala and has as yet no English name it seems better to adopt this rather than the Spanish name *injerto.*

*Achras zapota* L. Sapodilla, plural sapodillas. This is the name commonly used in Florida. Pittier derives it from *zapotillo,* and prefers the latter as the common name of this species, but sapodilla has the advantage of being current in English-speaking countries. The name *naseberry* (doubtless a corruption of the Spanish *nispero*) is used in the British West Indies, but is decidedly less euphonious than sapodilla. *Chicozapote,* often abbreviated to *chico,* is used in some countries, the name chico being commonly applied to this fruit in the Philippines.

*Actinidia chinensis* Planch. Yang tao, plural yang taos. The spelling which has sometimes been used, yangtaw, does not indicate the proper pronunciation of this Chinese name.

*Aegle marmelos,* see *Belou marmelos.*

*Aleurites moluccana* (L.) Willd. (*A. triloba* Forst.). Lumbang, plural lumbangs. The names *candle-nut* and *kukui* are also applied to this plant, but the Philippine *lumbang* seems preferable.

*Anacardium occidentable* L. Cashew, plural cashews. This is the spelling commonly used in the British West Indies, and generally in English-speaking countries. The name is derived from the Tupi *acajú,* through the Portuguese adaptation *cajú,* which latter is the current name in Brazil. The fleshy fruit stalk should be called the cashew, and the reniform fruit (seed) the cashew-nut. According to Martius, *acajú* signifies *year* in the Tupi language, because the Indians were accustomed to number the years by the fruiting of this tree.

*Annona cherimola* Mill. Cherimoya, plural cherimoyas. This is the form commonly used in the United States, though the spelling *cherimoyer* is frequent in the British West Indies. Safford prefers cherimoya, and derives the name, in his article in Bailey's Standard Cyclopedia of Horticulture, from the Quichua *chirimuya,* signifying "cold seeds." The spelling *chirimoya* is often seen in Mexico, and is preferable to cherimoya except on the grounds of usage.

*Annona diversifolia* Safford. Ilama, plural ilamas. This south Mexican and Central American fruit seems likely to become popular in other parts of the world, hence it is desirable to establish its correct Mexican name, ilama, in literature.

*Annona glabra L.* Pondapple, plural pondapples. No better name seems to be current, hence it is not possible to do away with the objectionable *apple* combination in this case.

*Annona muricata* L. Soursop, plural soursops. While not an attractive name, this is firmly established in the English language and would be difficult to replace by the Spanish guanábana or any other appelation. Its origin is uncertain, but it probably has come to us from Jamaica, where many such names seem to have originated.

*Annona purpurea* Moc. & Sessé. Soncoya, plural soncoyas. The Central American name here used is euphonious and pronounceable. It is certainly preferable to any of the English appelations, such as *negro head*, which have occasionally crept into print.

*Annona reticulata* L. Custardapple, plural custardapples. This name is in common use, and there seems to be no preferable one equally common. The name *bullock-heart* is sometimes seen. By some writers the Annonas as a genus are termed custardapples.

*Annona squamosa* L. Sugarapple, plural sugarapples. The only alternative is *sweetsop*, and sugarapple is the least objectionable of the two. Both are about equally common. It is unfortunate that the names apple, plum, and cherry have been applied to so many tropical fruits which have no relation whatever to these northern genera. Wherever possible they should be avoided.

*Aristoclesia esculenta* (Arruda) Stuntz (*Platonia insignis* Mart.). Bakuri, plural bakuris. This is the aboriginal Brazilian name for this fruit. No other seems to be known.

*Artocarpus integra* (Thunb.) L. (*Artocarpus integrifolia* L.). Jackfruit, plural jackfruits. The Malayan name of this fruit is said to be *jak*. Doubtless the term jackfruit was formed by the English from this. While the Malayan name is shorter and in some respects preferable, jackfruit is well established in English-speaking countries.

*Artocarpus communis* Forster (*A. incisa* L. f.). Breadfruit, plural breadfruits. No other name is current in English. The seed of the seminiferous variety is called breadnut.

*Averrhoa bilimbi* L. Bilimbi, plural bilimbis. The spelling bilimbing or blimbing is sometimes seen, but it seems best to use the specific botanical name, which seems to represent the oriental common name as well as any other form.

*Averrhoa carambola* L. Carambola, plural carambolas. This appears to be the only name for this fruit current in English, and has the advantage of being the one widely used in the Orient where the plant is native.

*Belou marmelos* (L.) Lyons (*Aegle marmelos* (L.) Correa). Bel, plural bels. This name is often spelled *bael* or *bhel*, but the form here chosen is a transliteration of the Urdu, from which language we get the name. While it might be spelled *bil* as well as bel, the latter seems more accurately to represent the pronunciation of the name in the Indian peninsula at the present day.

*Blighia sapida* Koenig (*Cupania sapida* Voigt.). Akee, plural akees. In accordance with the principle of orthography now generally adopted by scientific workers, this name should be spelled *aki,* but the form akee is of such long standing and so generally used that it is unwise to attempt a change.

*Canarium indicum* Stickman (*C. commune* L.). Kanari, plural kanaris. An oriental species which comes to us with this name.

*Canarium ovatum* Engler. Pili nut, plural pili nuts. In the markets of the Eastern United States pili nuts have made their appearance in recent years, and have usually gone under this name, which, fortunately, is the precise form used in the Philippines, native home of the species.

*Carica papaya* L. Papaya, plural papayas. This form is generally recognized as the correct one in English, and should always be used in preference to *papaw*, which latter tends to confuse the plant with *Asimina triloba.* Papaya is considered to have its origin in the Carib *ababai.* Martius gives the aboriginal Brazilian name (Tupi language) as *ambapaya.*

*Carissa carandas* L. Karanda, plural karandas. This name, commonly used in India, is certainly preferable to the one published by Watt, *Bengal-currant.* The orthography here used is a transliteration of the Urdu.

*Carissa bispinosa* (L.) Desf. (*Carissa arduina* Lam.). This plant seems to have no common name in the United States. It might be called *amatungulu*, which is also used in Natal for *C. grandiflora*, but as the latter species is becoming generally known in this country as carissa, the name amatungulu might be applied exclusively to *C. bispinosa.*

*Carissa grandiflora* (Meyer) DC. Carissa, plural carissas. The term Natal-plum has been applied to this fruit in the United States, but carissa is becoming more common, and seems preferable on the whole.

*Caryophyllus jambos* (L.) Stokes (*Eugenia jambos* L.). Rose-apple, plural roseapples. This name is so well established that it does not seem advisable to attempt a change, although the Malayan name *jambo*, represented in the specific name jambos, might be preferable on some grounds.

*Caryophyllus malaccensis* (L.) Stokes (*Eugenia malaccensis* L.). Ohia, plural ohias. This is the name commonly used in Hawaii, and is probably worthy of acceptance in this country where the species has as yet no common name. The Malayan name *jambo* is sometimes seen, and *Malay-apple* is used in some of the British colonies. The latter must be considered objectionable, and its use should not be encouraged.

*Casimiroa edulis* LaLlave. White sapote, plural white sapotes. The Mexican name of this fruit, zapote blanco, can only be translated white sapote. The Nahuatl term tzapotl, applied by the Aztecs to all soft, sweet fruits, has passed into Spanish as zapote, sometimes, but incorrectly, spelled sapote, and is applied to many distinct fruits in tropical America. The spelling sapote, in place of zapote, probably more accurately represents in English the pronunciation of the Spanish name. *Sapota* should not be used. The Guatemalan name for this fruit, *matasano*, is perhaps preferable to white sapote in some ways, but the latter has the advantage of usage in the United States.

*Chrysobalanus icaco* L. Icaco, plural icacos. While the name *coco-plum* is often seen in literature, it has no meaning and is objectionable because of the use of the word plum. Icaco, while not so well adapted to the English language, is the only other name sanctioned by usage which seems acceptable. It has the advantage of widespread use in Spanish-speaking countries.

*Chrysophyllum cainito* L. Caimito, plural caimitos. The name *starapple* is used in Jamaica and other English-speaking islands, and considered solely on the grounds of usage would probably have to be retained. Since, however, the fruit is not yet grown extensively in any part of the tropics, and the name caimito is used in Cuba and other Spanish-speaking countries, it may perhaps be desirable to adopt it in place of starapple.

*Ceratonia siliqua* L. Carob, plural carobs. This name is in general use in the United States, and is the precise form used in the Mediterranean region, whence we have received the plant.

*Cereus spp.* Pitaya, plural pitayas. Several species of Cereus, producing large pink fruits, are cultivated in tropical America and known under this name, or its variant *pitahaya*.

*Cicca disticha*, see *Phyllanthus acida*.

*Claucena lansium* (Lour.) Skeels (*Claucena wampi* Oliver). Wampi, plural wampis. The specific name of this plant, wampi, is also its common name.

*Cocos nucifera* L. Coconut, plural coconuts. The orthography *cocoanut* was based upon a typographical error in an early dictionary, and has long been recognized as erroneous. *Coconut* is the correnf form and is rapidly being adopted by horticulturists and others.

*Cudrania triscuspidata* (Carr.) Bureau (*C. triloba* Hance). Cudrania, plural cudranias. Lacking a better word, the generic name may be applied to this new fruit.

*Cupania sapida*, see *Blighia sapida*.

*Cyphomandra betacea* (Cav.) Sendt. Tree tomato, plural tree tomatos. No other common name seems to be in general use.

*Dimocarpus longan* Lour. (*Euphoria longana* Lam., *Nephelium longana* Cambess.). Longan, plural longans. Several spellings of this name are found in the literature, but the one here preferred seems to be the most widely used and the most satisfactory.

*Diospyros ebenaster* Retz. Black sapote, plural black sapotes. The Mexican name of this fruit is zapote prieto or zapote negro, hence it should be called in English black sapote. See remarks under *Casimiroa edulis*. The name black sapote is already current in the United States.

*Diospyros discolor* Willd. Mabolo, plural mabolos. A little known Philippine fruit not yet produced in the United States. Its Philippine name, mabolo, is practically the only one found in literature.

*Diospyros kaki* L. f. Kaki, plural kakis. Both this name and *Japanese persimmon* are current in the United States, the latter being the more common of the two. The fact that kaki is so much shorter than Japanese persimmon makes it seem the most desirable to encourage, but the latter will in all probability predominate in popular usage, just as *alligator pear* still predominates in place of the much preferable *avocado*.

*Dovyalis caffra* (Hook Harv.) Warb. (*Aberia caffra* Hook. & Harv.). Umkolo, plural umkolos. This plant, which is still rare in the United States, has been called *kei-apple*, often erroneously spelled *kai-apple*. It is desirable to do away with as many of these apple combinations as possible, hence it may be appropriate to adopt an abbreviation of the native name *umkokolo* from Portuguese East Africa, where the species in indigenous.

*Dovyalis hebecarpa* (Gardn.) Warb. (*Aberia gardneri* Clos.). Ketembilla, plural ketembillas. This rather euphonious name from Ceylon seems much more worthy of adoption in the United States than *Ceylon-gooseberry*, which has occasionally been used.

*Durio zibethinus* Murr. Durian, plural durians. No other name is current in English literature.

*Eriobotrya japonica* (Thunb.) Lindl. Loquat, plural loquats. Said to have its origin in the Chinese *luh-kwat*. The only name in general use.

*Eugenia dombeyi* (Spreng.) Skeels (*E. brasiliensis* Lam.). Grumichama, plural grumichamas. The Brazilians sometimes spell this word *grumixama*, but as the spelling here preferred is about as common, and more accurately represents the pronunciation of the word in English, it may well be adopted.

*Eugenia jambolana*, see *Syzygium cumini*.

*Eugenia jambos*, see *Caryophyllus jambos*.

*Eugenia javanica* Lam. Macopa, plural macopas. This species is too little known in America to have received a common name, hence it is best, perhaps, to choose the one current in the Philippines, which is macopa. Macmillan of Ceylon uses *wax jambo.*

*Eugenia malaccensis,* see *Caryophyllus malaccensis.*

*Eugenia uniflora* L. (*Eugenia michelii* Lam.). Pitanga, plural pitangas. This is the aboriginal Tupi name of Brazil, and the one universally used in that country. While *Surinam cherry* is more extensively used in Florida than pitanga, the reverse is the case in California. Pitanga being much preferable, it seems well to adopt it to the exclusion of Surinam cherry, insofar as possible

*Euphoria longana,* see *Dimocarpus longan.*

*Feijoa sellowiana* Berg. Feijoa, plural feijoas. The name pineapple guava has been used in California to a limited extent, but feijoa seems to be replacing it. It may be noted that feijoa is of Portuguese origin, from the proper name *Feijo,* and should therefore be pronounced *fay-zho-a,* accenting the middle syllable.

*Flacourtia ramontchi* L'Herit. Ramontchi, plural ramontchis. The objectionable name *governor's plum* has occasionally been used in the literature, but the native name from Madagascar, ramontchi, is much preferable. As the fruit is little known in the United States, it will probably be a simple matter to establish this name in place of others.

*Garcinia mangostana* L. Mangosteen, plural mangosteens. This name is too well known to require comment. None other is current in English.

*Genipa americana* L. Genipa, plural genipas. This is an old Brazilian name as well as the generic name. *Marmalade box,* a name occasionally seen in West Indian literature, is highly objectionable.

*Lansium domesticum* Jack. Langsat, plural langsats. While this Malayan name has been spelled in several ways, the form langsat is probably the commonest in English literature and seems to be the best. A variety is called *duku,* plural *dukus.* In the Philippines the Spanish form *lanzon* is used.

*Litchi chinensis* Sonner. (*Nephelium litchi* Cambess.). Litchi, plural litchis. It seems rather unfortunate that this orthography should have become so well established in the United States, as it does not represent the pronunciation of the word, ly-chee. Since it is the specific name of the plant, however, it is not particularly objectionable.

*Lucuma mammosa,* see *Achradelpha mammosa.*

*Lucuma nervosa* DC. Canistel, plural canistels. The Cuban name seems preferable to *egg-fruit* or *tiess,* both of which are occasionally used in south Florida.

*Macadamia ternifolia* Muell. Macadamia, plural macadamias. The name *Queensland nut* is occasionally used, being fairly common in California. Macadamia is also seen, however, and may be considered preferable on the grounds of brevity.

*Malpighia glabra* L. Malpighia, plural malpighias. This plant, little known in the United States, has been called *Barbados cherry,* but since it is desirable to do away with as many of the apple, plum and cherry combinations as possible, it may perhaps be allowable to term this fruit malpighia. Since only one species is in cultivation this can lead to no confusion, and a similar application of the generic name has taken places in other species, e. g. *Carissa, Feijoa.*

*Mammea americana* L. Mamey, plural mameys. In the English colonies this fruit is usually known as *mammee-apple,* a corruption of the Spanish name mamey. Since the latter is well adapted to the English language, it seems advisable to use it, and rid ourselves of the term *apple,* which has no more application here than it does in most of the other cases where it is applied to tropical fruits.

*Mangifera indica* L. Mango, plural mangos. In forming the plural of this word it is unnecessary to add an e, making it *mangoes*; the name comes to us from the Spanish, in which the plural is *mangos,* and in accordance with the modern tendency to do away with needless letters this same form should be used.

*Melicocca bijuga* L. Mamoncillo, plural mamoncillos. The term *Spanish lime* is sometimes used in Florida, but the Cuban name for this fruit is vastly preferable.

*Monstera deliciosa* Liebm. Ceriman, plural cerimans. This name seems to be the only one recognized in good English usage. The generic name Monstera is occasionally applied, but where a fruit has a common name which is not objectionable there is no occasion to fall back upon the generic name.

*Myrciaria cauliflora* (Mart.) Berg. Jaboticaba, plural jaboticabas. The aboringinal Brazilian name for this fruit is the only one in use.

*Nephelium lappaceum* L. Rambutan, plural rambutans. This Malayan name is not generally spelled in any other way than that here accepted. *Rambustan* is occasionally seen.

*Nephelium longana,* see *Dimocarpus longan.*

*Nephelium mutabile* Blume. Pulasan, plural pulasans. While sometimes spelled pulassan, the simpler form is preferred.

*Opuntia spp.* Tuna, plural tunas. The prickly fruits of several species of Opuntia are known to the inhabitants of tropical America as *tuna;* in the United States they are often called prickly pear. Unquestionably tuna should be preferred.

*Passiflora edulis* Sims. Purple granadilla, plural purple granadillas. The presence of so many passifloras with edible fruits necessitates accurate terminology to avoid confusion. In the tropics several of them go under the name *granadilla,* and in this country the term *passion fruit* is loosely applied. In order to distinguish between them and yet avoid objectionable names it has been thought desirable to apply the name granadilla to each, thus showing their relationship, with the addition of a qualifying word which refers to a conspicuous characteristic of the species in question. Since the nomenclature of these species has never become established in the horticultural usage of this country, it will probably be an easy matter to adopt the names here suggested.

*Passiflora laurifolia* L. Yellow granadilla, plural yellow granadillas. The name *water lemon* is sometimes applied to this species.

*Passiflora ligularis* Juss. Sweet granadilla, plural sweet granadillas. In Central America this species is known simply as granadilla, but its unusually sweet flavor suggests the addition of this word to distinguish it from the other granadillas.

*Passiflora quadrangularis* L. Giant granadilla, plural giant granadillas. This is another species known in the tropics simply as granadilla. Its fruits are several times the size of those of the other species.

*Persea americana* Mill. (*P. gratissima* Gaertn.). Avocado, plural avocados. The plural should not be spelled avocadoes.

*Platonia insignis*, see *Aristoclesia esculenta.*

*Pouteria caimito* (R. & P.) Radlkofer (*Lucuma caimito* R. & P.). Abiu, plural abius. This fruit is as yet little known in the United States, but in Brazil, where it is popular and widely grown, it goes under the name abiu, a word of Tupi origin.

*Phyllanthus acida* (L.) Skeels (*Phyllanthus distichus* Muell. Arg., *Cicca disticha* L.). Iba, plural ibas. This short and euphonious name, current in the Philippines, seems much preferable to the lengthy one *Otaheite gooseberry,* which has occasionally been used in the United States and elsewhere.

*Phyllanthus emblica* L. Nelli, plural nellis. The Indian name for this species.

*Physalis peruviana* L. Poha, plural pohas. This euphonious Hawaiian name is much preferable to *Cape gooseberry.* It is already established in American literature, and is even used commercially, poha jam being a Hawaiian product sold in the United States.

*Psidium cattleianum* Sabine. Strawberry guava, plural strawberry guavas. The name *Cattley guava* might be preferable, but strawberry guava has become so firmly established in California

that it is scarcely advisable to attempt a change, particularly in view of the fact that the name is not objectionable.

*Psidium friedrichsthalianum* Niedenzu. Costa Rican guava, plural Costa Rican guavas. The vernacular name *cás,* used by Pittier, is not adapted to the English language, hence it is necessary to adopt the name Costa Rican guava, which has already appeared in print.

*Psidium guajava* L. Guava, plural guavas. Varieties of this common tropical fruit are distinguished by the addition of a qualifying word, such as lemon guava, pear guava, etc.

*Psidium molle* Bertol. Guisaro, plural guisaros. This species has sometimes been called *sour guisaro,* and also *sour guava,* but the name guisaro seems sufficient in itself, and preferable to any combination with *guava* in it.

*Rollinia deliciosa* Safford. Biribá, plural biribás. A name from the Amazon region, intrduced into the United States along with the tree itself.

*Sandoricum indicum* Cac. Santol, plural santols. This name, which is current in the Philippines, is attractive and in every way acceptable.

*Solanum muricatum* Aiton. Pepino, plural pepinos. In Guatemala, where the species is commonly grown, the fruit is known under this name, which is the Spanish for cucumber. Since no other good name for it is known, it is well to retain this.

*Spondias cytherea* Sonner. (*S. dulcis* Forster). Ambarella, plural ambarellas. The Tahitian name of this species is said to be *vi, evi,* or *hevi,* the first being pronounced as *we* in English. Since this is not a name adapted for use in English, it is necessary to choose another; *ambarella,* the Sinhalese name current in Ceylon (according to Macmillan) seems vastly preferable to *Otaheite-apple,* which is sometimes used in English publications. In the United States no name has really become current as yet, since the tree is not widely grown in this country.

*Spondias lutea* L. Hog-plum, plural hog-plums.

*Spondias mombin* L. (*S. purpurea* L.). Mombin, plural mombins. This fruit seems to have no well known name in English. It is sometimes called *Spanish plum,* but in view of the objectionable character of this and the fact that it is not well established as yet, it seems desirable to adopt the specific name, which is also the common name in some of the French West Indies. The Spondias as a genus are termed hog-plums by some writers, but this name had best be restricted to *S. lutea,* which it best fits.

*Spondias tuberosa* Arruda. Imbu, plural imbus. This fruit, which has only recently been introduced to horticulture, should retain its Brazilian name.

*Tamarindus indica* L. Tamarind, plural tamarinds. This name is too well known to need explanation. There is none other current in English.

*Syzygium cumini* (L.) Skeels (*Eugenia jambolana* Lam.). Jambolan, plural jambolans. Probably a close approximation to the Malayan name.

*Vaccinium reticulatum* Smith. Ohelo, plural ohelos. Since this plant comes from Hawaii it is well to retain the Hawaiian name.

*Zizyphus jujuba* Miller (*Z. vulgaris* Lam., *Z. sativa* Gaertn.). Jujube, plural jujubes. No other name appears to be common in horticultural literature, and this one has the advantage of being reasonably attractive.

*Zizyphus mauritiana* Lam. (*Z. jujuba* Lam.). Bor, plural bors. While not particularly euphonious, this Indian name seems to be the most acceptable one which is at present used for this fruit. In order to connect these fruits with the common names under which they have been mentioned or described by various writers, the most important works in English which treat of tropical fruits have been examined, and the common names used therein have been listed below. Following each of these names is the botanical name of the species to which it has been applied. Following this is the approved common name as explained and accepted in the above annotated list. Where there are only two names, one common and one botanical, the first is the approved name and the second the species under which it will be found in the above list.

The works which have been consulted are: Clute, Tropical Agriculture (Manila, 1914); Cook and Collins, Economic Plants of Porto Rico (Washington, 1903); Macmillan, A Handbook of Tropical Gardening and Planting (Colombo, 1914); Bailey's Standard Cyclopedia of Horticulture (New York); Wester, The Food Plants of the Philippines (in the Philippine Agricultural Review, IX, 3, 1916); Woodrow, Gardening in India (Bombay, 1889); Wilder, Fruits of the Hawaiian Islands (Honolulu, 1911); Von Mueller, Select Extra Tropical Plants (Detroit, Mich., 1884); Wickson, California Fruits (San Francisco, 1910); Wilcox, Tropical Agriculture (New York, 1916); and the published Inventories of the Office of Foreign Seed and Plant Introduction, Bureau of Plant Industry, of the U. S. Department of Agriculture.

In order to make this check list as complete as possible, all of the common names mentioned in the annotated list are included in it, with the botanical names of the species under which they will be found, followed by the preferred common names of these species.

Abiu, *Pouteria caimito.*
Acaju, *Anacardium occidentale*, cashew.
Aguacate, *Persea americana*, avocado.
Ahuacate, *Persea americana*, avocado.
Akee, *Blighia sapida.*
Aki, *Blighia sapida*, akee.
Alligator apple, *Annona glabra*, pondapple.
Alligator pear, *Persea americana*, avocado.
Amatungula, *Carissa bispinosa*, amatungulu.
Amatungulu, *Carissa bispinosa.*
Ambapaya, *Carica papaya*, papaya.
Ambarella, *Spondias cytherea.*
Arbol de pan, *Artocarpus communis*, breadfruit.
Avocado, *Persea americana.*
Bael, *Belou marmelos*, bel.
Bakuri, *Aristoclesia esculenta.*
Balimbing, *Averrhoa carambola*, carambola.
Barbados cherry, *Malpighia glabra*, malpighia.
Bel, *Belou marmelos.*
Bell apple, *Passiflora laurifolia*, yellow granadilla.
Bengal currant, *Carissa carandas*, karanda.
Bengal quince, *Belou marmelos*, bel.
Bhel, *Belou marmelos*, bel.
Bilimbi, *Averrhoa bilimbi.*
Bilimbing, *Averrhoa bilimbi*, bilimbi.
Bimbling, *Averrhoa bilimbi*, bilimbi.
Blimbing, *Averrhoa bilimbi*, bilimbi.
Biribá, *Rollinia deliciosa.*
Bor, *Zizyphus mauritiana.*
Brazil cherry, *Eugenia uniflora*, pitanga.
Brazilian plum, *Eugenia dombeyi*, grumichama.
Breadfruit, *Artocarpus communis.*
Breadnut, *Artocarpus communis.*
Bullock heart, *Annona reticulata*, custardapple.
Bull's heart, *Annona reticulata*, custardapple.
Bully tree, *Achras zapota*, sapodilla.
Caimito, *Chrysophyllum cainito.*
Cajazeiro, *Spondias lutea*, hog-plum.
Cajú, *Anacardium occidentale*, cashew.
Calcutta guava, *Psidium cattleianum*, strawberry guava.
Camias, *Averrhoa bilimbi*, bilimbi.
Candlenut, *Aleurites moluccana*, lumbang.
Canistel, *Lucuma nervosa.*
Cape gooseberry, *Physalis peruviana*, poha.

Carambola, *Averrhoa carambola.*
Caraunda, *Carissa carandas,* karanda.
Carissa, *Carissa grandiflora.*
Carob, *Ceratonia siliqua.*
Carob bean, *Ceratonia siliqua,* carob.
Cas, *Psidium friedrichsthalianum,* Costa Rican guava.
Cashew, *Anacardium occidentale.*
Ceriman, *Monstera deliciosa.*
Ceylon gooseberry, *Dovyalis hebecarpa,* ketembilla.
Che, *Cudrania tricuspidata,* cudrania.
Cherimoya, *Annona cherimola.*
Cherimoyer, *Annona cherimola,* cherimoya.
Chicle tree, *Achras zapota,* sapodilla.
Chico, *Achras zapota,* sapodilla.
Chicomamey, *Achradelpha mammosa,* sapote.
Chicozapote, *Achras zapota,* sapodilla.
China guava, *Psidium cattleianum,* strawberry guava.
Chinese date, *Zizyphus jujuba,* jujube.
Chirimoya, *Annona cherimola,* cherimoya.
Christ's thorn, *Carissa carandas,* karanda.
Ciruela, *Spondias mombin,* mombin.
Ciruela, *Spondias lutea,* hog-plum.
Civet-cat fruit, *Durio zibethinus,* durian.
Cocoanut, *Cocos nucifera,* coconut.
Cocoa plum, *Chrysobalanus icaco,* icaco.
Coconut, *Cocos nucifera.*
Coco-plum, *Chrysobalanus icaco,* icaco.
Corazon, *Annona reticulata,* custardapple.
Corkwood, *Annona glabra,* pondapple.
Cucumber tree, *Averrhoa bilimbi,* bilimbi.
Cudrania, *Cudrania tricuspidata.*
Custardapple, *Annona reticulata.*
Date plum, *Diospyros kaki,* kaki.
Doekoe, *Lansium domesticum,* duku.
Duhat, *Syzygium cumini,* jambolan.
Duku, *Lansium domesticum.*
Durian, *Durio zibethinus.*
Egg fruit, *Lucuma nervosa,* canistel.
Emblic myrobalan, *Phyllanthus emblica,* nelli.
Feijoa, *Feijoa sellowiana.*
French cherry, *Eugenia uniflora,* pitanga.
Genipa, *Genipa americana.*
Genipap, *Genipa americana,* genipa.
Genipapo, *Genipa americana,* genipa.

Genipe, *Melicocca bijuga,* mamoncillo.
Ginep, *Melicocca bijuga,* mamoncillo.
Governor's plum, *Flacourtia ramontchi,* ramontchi.
Granadilla, Giant, *Passiflora quadrangularis.*
Granadilla, *Passiflora ligularis,* sweet granadilla.
Granadilla, Purple, *Passiflora edulis.*
Granadilla, Sweet, *Passiflora ligularis.*
Granadilla, Yellow, *Passiflora laurifolia.*
Grosse sapote, *Achradelpha mammosa,* sapote.
Grumixama, *Eugenia domboyi,* grumichama.
Guanábana, *Annona muricata,* soursop.
Guava, Cattley, *Psidium cattleianum,* strawberry guava.
Guava, Costa Rican, *Psidium friedrichsthalianum.*
Guava, *Psidium guajava.*
Guava, strawberry, *Psidium cattleianum.*
Guayabota, *Diospyros ebenaster,* black sapote.
Guayava, *Psidium guajava,* guava.
Guisaro, *Psidium molle.*
Hog-plum, *Spondias lutea.*
Honeyberry, *Melicocca bijuga,* mamoncillo.
Iba, *Phyllanthus acida.*
Icaco, *Chrysobalanus icaco.*
Ilama, *Annona diversifolia.*
Imbu, *Spondias tuberosa.*
Indian jujube, *Zizyphus mauritiana,* bor.
Injerto, *Achradelpha viridis,* green sapote.
Jaboticaba, *Myrciaria cauliflora.*
Jaca, *Artocarpus integra,* jackfruit.
Jackfruit, *Artocarpus integra.*
Jack plum, *Syzygium cumini,* jambolan.
Jagua, *Genipa americana,* genipa.
Jak, *Artocarpus integra,* jackfruit.
Jamaica honeysuckle, *Passiflora laurifolia,* yellow granadilla.
Jambo, *Caryophyllus jambos,* roseapple.
Jambo, *Caryophyllus malaccensis,* ohia.
Jambolan, *Syzygium cumini.*
Jambolin, *Syzygium cumini,* jambolan.
Japanese medlar, *Eriobotrya japonica,* loquat.
Japanese persimmon, *Diospyros kaki,* kaki.
Java almond, *Canarium indicum,* kanari.
Java plum, *Syzygium cumini,* jambolan.
Jenip, *Melicocca bijuga,* mamoncillo.
Jobo, *Spondias lutea,* hog-plum.
Jujube, *Zizyphus jujuba.*

Jujube, Indian, *Zizyphus mauritiana*, bor.
Kai apple, *Dovyalis caffra*, umkolo.
Kaki, *Diospyros kaki*.
Kanari, *Canarium indicum*.
Kapoelasan, *Nephelium mutabile*, pulasan.
Karanda, *Carissa carandas*.
Kei apple, *Dovyalis Caffra*, umkolo.
Ketembilla, *Dovyalis hebecarpa*.
Kukui, *Aleurites moluccana*, lumbang.
Langsat, *Lansium domesticum*.
Lanseh, *Lansium domesticum*, langsat.
Lanzon, *Lansium domesticum*, langsat.
Leechee, *Litchi chinensis*, litchi.
Leitchee, *Litchi chinensis*, litchi.
Lichee, *Litchi chinensis*, litchi.
Litchi, *Litchi chinensis*.
Locust bean, *Ceratonia siliqua*, carob.
Longan, *Dimocarpus longan*.
Longyen, *Dimocarpus longan*, longan.
Loquat, *Eriobotrya japonica*.
Lumbang, *Aleurites moluccana*.
Ly-chee, *Litchi chinensis*, litchi.
Mabolo, *Diospyros discolor*.
Macadamia, *Macadamia ternifolia*.
Macopa, *Eugenia javanica*.
Malacca apple, *Caryophyllus malaccensis*, ohia.
Malay apple, *Caryophyllus malaccensis*, ohia.
Malpighia, *Malpighia glabra*.
Mamey, *Mammea americana*.
Mammee-apple, *Mammea americana*, mamey.
Mammee sapota, *Achradelpha mammosa*, sapote.
Mamon, *Melicocca bijuga*, mamoncillo.
Mamoncillo, *Melicocca bijuga*.
Mango, *Mangifera indica*.
Mangosteen, *Garcinia mangostana*.
Mangosteen, Wild, *Sandoricum indicum*, santol.
Mangrove annona, *Annona glabra*, pondapple.
Marañon, *Anacardium occidentale*, cashew.
Maritzgula, *Carissa bispinosa*, amatungulu.
Marmalade box, *Genipa americana*, genipa.
Marmalade fruit, *Achradelpha mammosa*, sapote.
Marmalade plum, *Achradelpha mammosa*, sapote.
Matasano, *Casimiroa edulis*, white sapote.
Melon pear, *Solanum muricatum*, pepino.

Melon shrub, *Solanum muricatum,* pepino.
Mexican apple, *Casimiroa edulis,* white sapote.
Mombin, *Spondias mombin.*
Monkey apple, *Annona glabra,* pondapple.
Mountain apple, *Caryophyllus malaccensis,* ohia.
Myrobalan, Emblic, *Phyllanthus emblica,* nelli.
Naseberry, *Achras zapota,* sapodilla.
Natal-plum, *Carissa grandiflora,* carissa.
Negro head, *Annona purpurea,* soncoya.
Nelli, *Phyllanthus emblica.*
Nispere, *Achras zapota,* sapodilla.
Nispero, *Eriobotrya japonica,* loquat.
Ohelo, *Vaccinium reticulatum.*
Ohia, *Caryophyllus malaccensis.*
Otaheite apple, *Spondias cytherea,* ambarella.
Otaheite gooseberry, *Phyllanthus acida,* iba.
Pacuri, *Aristoclesia esculenta,* bakuri.
Pajuil, *Anacardium occidentale,* cashew.
Palta, *Persea americana,* avocado.
Papaw, *Carica papaya,* papaya.
Papaya, *Carica papaya.*
Parcha, *Passiflora laurifolia,* yellow granadilla.
Passion fruit, *Passiflora edulis,* purple granadilla.
Pepino, *Solanum muricatum.*
Persimmon, Japanese, *Diospyros kaki,* kaki.
Peruvian cherry, *Physalis peruviana,* poha.
Pili nut, *Canarium ovatum.*
Pineapple guava, *Feijoa sellowiana,* feijoa.
Pitanga, *Eugenia uniflora.*
Pitaya, *Cereus sp.*
Poha, *Physalis peruviana.*
Poma rosa, *Caryophyllus jambos,* roseapple.
Pomme d'or, *Passiflora laurifolia,* yellow granadilla.
Pondapple, *Annona glabra.*
Pulasan, *Nephelium mutabile.*
Purple guava, *Psidium cattleianum,* strawberry guava.
Queensland nut, *Macadamia ternifolia,* macadamia.
Ramboetan, *Nephelium lappaceum,* rambutan.
Rambustan, *Nephelium lappaceum,* rambutan.
Rambutan, *Nephelium lappaceum.*
Ramontchi, *Flacourtia ramontchi.*
Raxtul, *Achradelpha viridis,* green sapote.
Roseapple, *Caryophyllus jambos.*
Roseapple, large, *Caryophyllus malaccensis,* ohia.

St. John's bread, *Ceratonia siliqua,* carob.
Santo Domingo apricot, *Mammea americana,* mamey.
Santol, *Sandoricum indicum.*
Santor, *Sandoricum indicum,* santol.
Sapodilla, *Achras zapota.*
Sapodilla plum, *Achras zapota,* sapodilla.
Sapote, *Achradelpha mammosa.*
Sapote, Black, *Diospyros ebenaster.*
Sapote, *Diospyros ebenaster,* black sapote.
Sapote, Green, *Achradelphia viridis.*
Sapote, White, *Casimiroa edulis.*
Sapotilla, *Achras zapota,* sapodilla.
Siniguelas, *Spondias mombin,* mombin.
Soncoya, *Annona purpurea.*
Soursop, *Annona muricata.*
Spanish cherry, *Eugenia domboyi,* grumichama.
Spanish lime, *Melicocca bijuga,* mamoncillo.
Spanish nectarine, *Chrysobalanus icaco,* icaco.
Spanish plum, *Spondias mombin,* mombin.
Star apple, *Chrysophyllum cainito,* caimito.
Star gooseberry, *Phyllanthus acida,* iba.
Sugarapple, *Annona squamosa.*
Surinam cherry, *Eugenia uniflora,* pitanga.
Sweetcup, *Passiflora edulis,* purple granadilla.
Sweetsop, *Annona squamosa,* sugarapple.
Tamarind, *Tamarindus indica.*
Ti-ess, *Lucuma nervosa,* canistel.
Tomato, Tree, *Cyphomandra betacea.*
Tree melon, *Carica papaya,* papaya.
Tropical almond, *Canarium indicum,* kanari.
Tsao, *Zizyphus jujuba,* jujube.
Tuna, *Opuntia spp.*
Umkolo, *Dovyalis caffra.*
Vegetable mercury, *Cyphomandra betacea,* tree tomato.
Velvet apple, *Diospyros discolor,* mabolo.
Vi-fruit, *Spondias cytherea,* ambarella.
Wampee, *Claucena lansium,* wampi.
Wampi, *Claucena lansium.*
Water lemon, *Passiflora laurifolia,* yellow granadilla.
Wax jambo, *Eugenia javanica,* macopa.
We-fruit, *Spondias cytherea,* ambarella.
West India gooseberry, *Phyllanthus acida,* iba.
Wi-fruit, *Spondias cytherea,* ambarella.
Yang tao, *Actinidia chinensis.*

Yangtaw, *Actinidia chinensis,* yang tao.
Zapote, *Achras zapota,* sapodilla.
Zapote blanco, *Casimiroa edulis,* white sapote.
Zapote negro, *Diospyros ebenaster,* black sapote.
Zapote prieto, *Diospyros ebenaster,* black sapote.
Zapotillo, *Achras zapota,* sapodilla.

## ON FEDERATION OF HORTICULTURAL SOCIETIES.

Two years ago when in session at Berkeley this honorable body elected as your president Prof. W. N. Hutt, of North Carolina. You acted wisely. Prof Hutt is a man of vision no less than of energy. Less than a year had passed when he called together at Washington the members of your executive committee, and others who were supposed to be keenly interested in Horticulture in its broader aspects. The meeting was called for the purpose of twisting the tail of the old, efficient, but somewhat somnolent American Pomological Society, to see if it would growl a little.

The result, I am constrained to believe, far exceeded his expectations.

Now lest I offend, which is far from my purpose, I will drop these doubtful figures of speech, and relate as coherently as I am able, just what happened.

The purpose of the call was most creditable, viz:—to awaken interest in this Society, and to broaden its scope; in brief, to make a bigger and a better Pomological Society, and none will say that this was not greatly to be desired. But in this connection is it not well to ask, how shall it be made bigger and better? What is the American Pomological Society? Its aims, its purposes, its accomplishments, and its future? The American Pomological Society is the Society of Wilder, Warder, Downing, Barry, Berckmans, Earle, Hovey, Lyon, and a host of others who laid the foundations of Pomology in America, and was organized in New York October 10th, 1848.

Andrew Jackson Downing, the great landscape gardener, was the first to propose such an organization, giving as his reasons for proposing it: "The chaotic condition of our pomology, the want of accurate and well defined knowledge of our fruits, whereby correct conclusions can be drawn as to their various merits; the best means of improving the condition of fruit culture, and the expectancy of establishing an American Society, so that, by interchange of experience, and more cordial intercourse, by general consent, we may preserve those fruits which are valuable, discard those which are worthless, correct the confused nomenclature, and establish a pomology for our whole country."

Certainly the reasons were sufficient for it would appear that there were troubles as well as giants in those days.

For sixty-nine years the American Pomological Society has faithfully followed the precepts laid down by Downing, and amplified by Wilder, that man of splendid vision and foresight, who for nearly half a century served as its president.

In his annual address in 1873, marking the quarter centennial of the Society's organization, Wilder said: "We stand as the conservators of Pomology in America."

In 1876, the centennial of our Republic, he said: "In all this progress of civilization, influence and power, the American Pomological Society is to take a part. What a field of research and promise is open before us. What a vast enterprise to fill our ever-expanding area with fruits suited to our various climes. What a noble and benevolent work, to furnish the luscious fruits of earth for future generations. This is our work! this is the mission of our Society! Let us fulfill it."

If we who have followed these men, have lived up to these ideals for, what does our Society stand? Is it not broadly ethical, philanthropic, humanitarian? A striving for better things, for all the people of all the nation, and all the world? So far as I can learn, commercialism never has become a part of its doctrine.

Why then should we who met in Washington begin now to destroy the traditions of this splendid organization? Increase the scope of its work to meet the rapid development of Pomology, increase the membership, but do not commercialize it. Let this Society stand as the exponent of all that is highest and best in Pomology, the Supreme Court of Pomologists.

But commercial Horticulture is a tremendous industry, and has rights that can not be overlooked or denied. Horticulture comprises one of the basic industries of the United States; the approximate yearly value of commercial horticultural products in this country has been estimated at one billion dollars. We have the apple industry, orchards numbering millions if not billions of trees, stretching in a broad belt across the United States, from Maine to Oregon. The citrus fruit industry, the vegetable and small fruit industries, and even the nuts must be considered.

Many of these industries are represented by organizations, local, state, district or national, each working on problems affecting its own membreship, unaware often that these problems are of national import, and are such problems as can only be solved by the united efforts of similar organizations throughout the United States. Problems of transportation rates and services, domestic and foreign; markets and marketing, these are the problems affecting every unit

of every Horticultural industry in the country, and they are the ones that no unit or organization can solve alone.

Considering these things the conference held in Washington November, 1916, attended by delegates from twelve States, after three days discussion organized the National Congress of Horticulture. Officers were elected and a constitution, and by-laws drafted. In the words of the call recently sent out by the Secretary: "This congress is a body composed of delegates from the various Horticultural organizations of the country, federated for the purpose of handling horticultural questions of national scope. The National Congress of Horticulture does not seek in any way to limit or control the Horticultural societies, or any of its affiliated bodies, but to assist them in handling questions of national import."

The congress should receive the hearty support of every commercial horticultural body in the country, and will, undoubtedly when the idea that it represents is brought to their active attention.

There are now as shown by statistics, compiled by Prof. Hutt, fifty thousand persons affiliated with State Horticultural Societies. Another fifty thousand may be easily counted as members of national organizations, such as the Florists, Nurserymen, Nut Growers, Vegetable Growers, etc.

This, if such organizations as the Pacific Coast Apple Growers and the Citrus Fruit Association unite, will mean at least fifty thousand more. Leaving out individual members, this well indicate an organization of one hundred and fifty thousand at the start, all interested in a common cause and united for a common purpose. It is easy to see that the influence such a body might exert in the promotion of legislation in the interests of Horticulture would be very great.

One of the prominent men of Washington, whose vocation is law and avocation, horticulture, says: "I can conceive of no movement holding greater possibilities for the advancement of horticultural interests than this one."

Pursuant to call the first regular meeting of the National Congress of Horticulture is now being held here in connection with the meeting of the American Pomological Society, and other associations. The officers of the Congress sincerely hope that all who are in attendance at any of these meetings will attend and help promote this movement.

FREDERIC CRANEFIELD, *Chairman.*

## WILDER MEDALS.

The Committee on Wilder Medals takes pleasure in making the following awards:

A silver medal to Joe A. Burton, Mitchell, Indiana, for a plate of the new Winesap seedling apple named Turley. A fuller account is given on page 27, and Plate IV.

A silver medal to the Central Experimental Farm of Ottawa, Canada, for an exhibit of one hundred seedling and cross-bred apples originating in Canada. A list of those named and the parentage of those unnamed, together with some descriptions, are given on pages 219-222.

A silver medal to the Glen St. Mary Nursery Co., Glen St. Mary, Florida, for a collection of forty-two plats of varieties and species of persimmons. A list of these is given on page 217.

A bronze medal to the New Hampshire Horticultural Society for a well arranged exhibit of high grade fruit. Details of the exhibit are given on pages 217-218.

Honorable mention to the United States Department of Agriculture for an unusually fine exhibit of jelly, jam, grape juice, marmalade, etc., made from the Muscadine grape as listed on page 218.

Honorable mention to the State of North Carolina for an exhibit of fine apples, persimmons, pomegranates and pecans. A list of varieties will be found on page 219.

Complimentary mention to the State of Virginia for a display of fine apples, listed on page 219.

## EXHIBITS.

### List of Persimmons Exhibited by the Glen St. Mary Nursery Company.

Acclematation; Collier Tsuru; Costata; D. lotus; D. Sinensis; Gailey; Gui Bochi; Hachiya; Kaurau Kouma; Lienhua; Nitari; Okame; Okame X Phelps (a); Okame X Phelps (b) Ormond; Sanenashi; Siang; S. P. I. No. 26771; S. P. I. No. 26772; S. P. I. No. 26773—Fuyugaki; S. P. I. No. 27086—Fuyu; S. P. I. No. 27088; S. P. I. No. 32886; S. P. I. No. 34713; S. P. I. No. 34970; S. P. I. No. 34971; S. P. I. No. 37197—Omidansu; S. P. I. No. 37212; S. P. I. No. 37471; S. P. I. No. 37530; S. P. I. No. 37533; Tamopan; Tanenashi; Tavares; Triumph; Tsuru; Tsuru X 129 (a); Tsuru X 129 (b); 20th Century; Yemon X 23 (a); Yemon X 23 (b); Zengi.

### Exhibit of the New Hampshire State Horticultural Society.

Barrels—8: 4 Baldwins; 1 Ewalt; 1 Northern Spy; 1 Rhode Island Greening; 1 Tompkins King.

Boxes—19: 8 Baldwins; 1 Banana; 1 Gideon; 1 Gravenstein; 7 McIntosh.

Plates—51: 8 Baldwins; 1 Black Gilliflower; 2 Blue Pearmain; 1 Delicious; 1 Esopus; 2 Fall Pippin; 1 Gano; 1 Golden Russet; 2 Gravenstein; 1 Grimes; 2 Hubbardston; 1 Jonathan; 3 McIntosh; 5 Northern Spy; 1 Oldenburg; 2 Porter; 2 Rhode Island Greening; 1 Rolf; 1 Roxbury; 1 Stark; 1 Stayman Winesap; 1 Tolman; 3 Tompkins King; 1 Wagener; 3 Wealthy; 3 Wolf River.

Fancy Baskets—5: Fruits of various kinds.

EXHIBIT OF MUSCADINE GRAPE PRODUCTS FROM THE UNITED STATES DEPARTMENT OF AGRICULTURE.

Sirup: George, Mish, Scuppernong, Thomas.

Preserve Sirup: Flowers, Thomas.

Flavoring Sirup: Eden, James, Scuppernong, Thomas.

Conserves, Whole Fruit: Eden, Flowers, James, Scuppernong, Thomas.

Pulp & Juice: James, Scuppernong, White Seedling.

Butter: Eden, Flowers, James, Luola, Scuppernong, Thomas, White Seedling.

Mincemeat: Flowers, James, Scuppernong, Thomas.

Jam: Eden, Flowers, Scuppernong, Thomas.

Unfermented Grape Juice—Cold Pressed: Black Grape, Carolina Bell, Eden, George, James, Latham, Mish, San Alba, San Rubra.

Hot Pressed: Eden, Flowers, Scuppernong, Smith, Thomas.

Marmalade—Plain: Eden, Scuppernong, Thomas. With Citron, Nuts, Orange, Pear, Raisins.

Preserves: Flowers, James, Scuppernong, Thomas.

Catsup: Eden, Beula, Munsoniana, Scuppernong, Smith.

Canned in Suger Sirup—Whole Seeded Berries: Flowers, James, Scuppernong, Thomas.

Canned in Cooking Method: Eden, Flowers, James, Luola, Scuppernong, Thomas.

Spiced Grapes: Eden, Flowers, Scuppernong, Thomas.

Jellies—Whole Fruit Jellies: Eden, Flowers, Hermaphrodite, James, Late White, Munsoniana, San Rubra, Scuppernong, Smith, Thomas, White Seedling.

Pulp & Juice Jellies: Eden, Flowers, James, Scuppernong, Smith, Thomas, White Seedling.

Grape & Mint Jelly—Fancy Packed Jellies: Several glasses.

Paste: Eden, Flowers, Grape with Keiffer Pear, Apple or Persimmons, James, Scuppernong, Thomas.

Herbarium Specimens of Scuppernong & Thomas and twelve Muscadine X Euvitis hybrids produced by United States Department of Agriculture.

Fresh Fruit: Six leading commercial varieties in baskets. Specimen fruit clusters of thirty self-fertile hermaphrodite varieties produced by United States Department of Agriculture.

EXHIBIT OF THE STATE OF NORTH CAROLINA.

2 American Limbertwig; 6 Arkansas; 6 Arkansas Black; 1 Baldwin; 1 Banana; 6 Ben Davis; 6 Bonum; 6 Buckingham; 1 Cheese; 2 Delicious; Gano; 1 Gilliflower; 2 Grimes; 4 Hoover; 1 Hubbardstown; 1 Kinnard; 2 Lawver; 1 Nickajack; 1 Northern Spy; 2 Pine Stump; 6 Red Limbertwig; 6 Rome Beauty; 6 Royal Limbertwig; 2 Shockley; 6 Stayman; 6 Virginia Beauty; 6 Winesap; 2 Winter John; 1 Yellow Newton (Albemarle Pippin); 6 York Imperial. One hundred and six plates.

Eight plates of peeans, one each as follows: Delmas; Dewey; Randall; Rome; Schley; Stuart; Sweetmeat; Van Deman.

Four plates of Japanese Persimmons as follows: 1 Okame; 2 Tane Nashi; 1 Zengi.

Two plates of pomegranates.

EXHIBIT OF VIRGINIA STATE HORTICULTURAL SOCIETY.

The following were the leading varieties: Arkansas, Ben Davis, Buckingham, Delicious, Gano, Grimes, Jonathan, King David, Lady, Lowry, McIntosh, Mother, Northern Spy, Northwestern, Paradise, Paragon, Pilot, Rambo, Rome, Stayman Winesap, Smokehouse, Virginia Beauty, Winesap, Yellow Newton (Albemarle Pippin). Eighty plates.

C. P. CLOSE, *Chairman.*
S. W. FLETCHER,
J. T. CROW.

**CANADA.**

The Horticultural Division, Central Experimental Farm, Ottawa, Canada, exhibited one hundred and forty-one varieties of apples, of which one hundred were of Canadian origin. Seventy-four of this one hundred were originated at the Central Experimental Farm, Ottawa, and of these the following twelve were the most promising:

Bingo (Northern Spy Seedling): Fruit, above medium to large; roundish conical; cavity deep, narrow, russeted; stem short, stout; basin narrow, deep, slightly wrinkled; calyx partly open; color, pale greenish-yellow, washed and splashed with crimson with darker splashes; predominant color, crimson; seeds medium size, broad, acute; dots few, white, distinct; skin thick, tough; flesh yellowish with traces of red, tender, moderately juicy; core small; flavor subacid, sprightly, pleasant; quality good; season, December to late winter.

Brisco (Langford Beauty Seedling): Fruit medium size; form roundish; cavity medium depth and width; stem medium to long, slender; basin deep, medium width, slightly wrinkled; calyx closed or partly open; color greenish-yellow washed with deep attractive crimson; predominant color deep crimson; seeds medium size, acute; dots few, yellow, distinct; skin moderately thick, moderately tender; flesh yellowish, crisp, juicy; core above medium, open; flavor briskly subacid, pleasant, spicy; quality good; season, late September to middle November.

Brock (McIntosh Seedling): Fruit large; form roundish, slightly ribbed; cavity medium depth and width, slightly russeted; stem short, stout; basin deep medium width, slightly wrinkled; calyx closed or partly open; color yellow, well splashed and washed with orange red; predominant color, orange red; dots few, pale yellow, indistinct; bloom thin, pinkish; skin moderately thick, tender; seeds medium size, acute; flesh yellowish, tender, moderately juicy; core medium, open; flavor subacid, pleasant vinous; quality good; season, mid-September to early October.

Carno (McIntosh Seedling): Medium size, oblate, regular; cavity medium depth and width; stem short, stout; basin deep, narrow, nearly smooth; calyx partly open; color pale yellow, well washed with attractive crimson; predominant color, crimson; seeds medium, acute; dots few, grey, indistinct; bloom bluish; skin moderately thick, tough; flesh yellowish, crisp, juicy; core small, subacid, pleasant, sprightly; quality good to very good; season evidently November to January.

Consort (Wealthy Seedling): Above medium size, oblate; cavity deep, open; stem short, stout; basin deep, open, nearly smooth; calyx open; greenish-yellow splashed and washed with crimson; seeds above medium, obtuse; dots obscure; bloom pinkish; skin moderately thick, moderately tender; flesh yellow, crisp, tender; core small to medium; flavor subacid, pleasant, juicy; quality good; season late November probably to March.

Elmer (Northern Spy Seedling): Size medium to above, form roundish, slightly ribbed; cavity deep, narrow, russeted at base; stem slender, medium length; basin deep, medium width, slightly wrinkled; calyx partly open or open; color greenish-yellow, well washed and splashed with deep crimson; predominant color, deep crimson; seeds medium size, acute; dots obscure; bloom pinkish; skin moderately thick, moderately tender; flesh yellowish, juicy, crisp, tender; core medium size, open; flavor subacid, pleasant, sprightly; quality good; season, late December to late winter.

Forerunner (McIntosh Seedling): Fruit medium size; form roundish, ribbed; cavity deep, medium width; stem medium to long,

stout; basin medium width, shallow to medium, wrinkled; calyx closed or partly open; color yellow, well washed with rich orange red and crimson; seeds medium size, obtuse; dots few, small, yellow, indistinct; bloom very thin, pinkish; skin moderately thick, moderately tough; flesh yellowish with red near basin, tender, moderately juicy; core medium, open; flavor subacid, little flavor; quality above medium; season mid-August to late September.

Garnet (McIntosh Seedling): Above medium size; oblate, flattened at ends, prominently angular; cavity deep, open; stem short, stout; basin open, deep, slightly wrinkled; calyx closed or partly open; color greenish-yellow, washed with dull crimson; predominant color, dull crimson; seeds abortive 1910, also in 1911; dots obscure; bloom thin, pinkish; skin moderately thick, moderately tough; flesh dull white, tender, moderately juicy; core small, subacid, pleasant flavor; quality above medium to good; season, December to late winter.

Lipton (Northern Spy Seedling): Size medium; form roundish to oblate, conical, ribbed; cavity deep, open, russeted; stem short, stout; basin deep, medium width, wrinkled; calyx partly open or open; color yellow, well washed and splashed with crimson; predominant color, crimson; seeds medium size, acute; dots moderately numerous, yellow, distinct; skin moderately thick, moderately tender; flesh yellow with traces of red, crisp, tender, juicy; core medium; flavor subacid, pleasant; quality good; season late September to February.

Lobo (McIntosh Seedling): Above medium size; roundish, conical; cavity medium depth, open, sometimes russeted; stem short to medium, stout; basin deep, narrow, almost smooth; calyx open, color pale yellow, almost white, washed with bright crimson; predominant color, bright crimson; seeds medium; dots moderately numerous, grey, indistinct; bloom little, if any; skin thick, tough; flesh white with traces of red, fine grained, tender, juicy; core medium; subacid, sprightly, pleasant, not high, flavor; quality good; season, October.

Nemo (McIntosh Seedling): Medium size; oblate to roundish; cavity open, medium depth; stem medium length, stout, slightly ribbed; basin deep, open, wrinkled; calyx open; color yellow, well washed with attractive crimson; predominant color, attractive crimson; seeds medium size, acute; dots few, yellow, indistinct; skin moderately thick, tough; flesh yellowish, tender, juicy; core small, subacid; pleasant flavor; quality good; season, November, probably to February.

Rocket (Northern Spy Seedling): Size above medium to medium; form roundish, conical; cavity deep, medium width, rus-

seted; stem short, moderately stout; basin deep, narrow, slightly wrinkled; calyx partly open; color yellow, washed and splashed with crimson; predominant color, crimson; seeds medium size, acute; dots moderately numerous, yellow, distinct; bloom pinkish; skin thick, moderately tough; flesh yellowish, crisp, tender, juicy; core medium to small, open; flavor subacid, pleasant, sprightly; quality good; season, late October to January.

### Cross-bred Apples.

Lawver X Fameuse 16a/17.
Lawver X McIntosh 16a/4.
Lawver X Northern Spy 7/2.
Lawver X Northern Spy 7/3.

McIntosh V Lawver 20a/1.
McIntosh X Lawver 20a/16.

McLean Seedling 8a/22.

McMahan X Scott Winter Roberval.
McMahan X Scott Winter 4/4.
McMahan X Scott Winter 5/5.

Milwaukee X McIntosh 9/16.

Northern Spy X Milwaukee 6a/10.
Northwestern X Northern Spy 7/12.

Scott Winter X McIntosh 7a/12.

### Seedling Apples.

Banana Seedling: 8/10.
Fameuse Seedling: 5/3.
Gano Seedling: 16/26.
Langford Beauty Seedlings: Briseo, and Nos. 19/9, 12a/40.
Lawver Seedlings: Danville.
McIntosh Seedlings: Brock, Carno, Forerunner, Garner, Grover, Lobo, Nemo, and Nos. 8a/2, 10a/15, 12/3, 20/8, 20a/32, 22/32, 25a/37.
Northern Spy Seedlings: Bingo, Elmer, Epsom, Lipton, Rosalie, Rocket, and Nos. 9/2, 9/4, 10a/22, 10a/28, 11a/20, 11a/23, 11a/32, 14/14, 15/8, 22/4, 22/14.
Russian Seedlings: Percival, Snelling.
Salome Seedlings: Cromer, Stella, and Nos. 20a/40, 21/18, 21a/48, 23/17.
Scott Winter Seedling: Bruno.
Shiawassee Seedlings: 11a/34, 11a/40, 18/14.
Swazie Seedlings: Navan, and Nos. 4/8, 8a/15, 8a/16.
Wealthy Seedlings: Clive, Consort, Mendel, and Nos. 1/2.

### ON CREDENTIALS.

The Committee on Credentials reported the following delegates present and qualified to act for their respective societies:

Connecticut, W. H. Baldwin, C. L. Gold, S. P. Hollister, H. C. C. Miles, Norman S. Platt, E. Rogers, Geo. W. Staples.

Illinois, J. R. Reasoner.

New Jersey, M. A. Blake, Howard De Cou, Horace Roberts.

The Secretary reported Vice-Presidents present and qualified as follows:

Delaware, Wesley Webb; District of Columbia, Charles Dearing; Georgia, J. M. Patterson; Kansas, Albert Dickens; Maryland, C. P. Close; Massachusetts, Wilfrid Wheeler; New Hampshire, J. H. Gourley; New Jersey, Horace Roberts; North Carolina, C. D. Mathews; Ohio, U. T. Cox; Ontario, J. W. Crow; Pennsylvania, J. P. Stewart; South Dakota, N. E. Hansen; Virginia, W. P. Massey; Wisconsin, Frederic Cranefield.

The body organized by electing Professor Hansen chairman; E. R. Lake, secretary, and after due conference, made the following report:

*Mr. President and Fellow Members:* Your Committee on Nominations begs to offer the following for your consideration:

### ON NOMINATIONS.

We endorse the action of the Executive Committee in recommending the passage of the following resolutions:

*Resolved:* That the monies received from life and institutional memberships shall be converted into a permanent fund to be invested and the interest only used by the Society for current expenses.

*Resolved:* That there be established a membership in this body to be known as Society membership, which shall be open to state, provincial and district organizations.

We recommend the following as officers for this Society for the ensuing biennium:

President, L. H. Bailey; Vice-President, W. T. Macoun; Secretary, E. R. Lake; Treasurer, L. R. Taft, and the following Vice-Presidents: Geo. C. Roeding, Norman S. Platt, Wesley Webb, Charles Dearing, H. H. Hume, J. M. Patterson, J. E. Higgins, Silas Wilson, F. O. Harrington, Albert Dickens, W. H. Conant, C. P. Close, Wilfrid Wheeler, A. G. Turney, J. H. Gourley, H. F. De Cou, C. E. Gillett, C. D. Matthews, W. S. Blair, U. T. Cox, J. W. Crow, J. P. Stewart, P. J. Wester, T. G. Bunting, N. E. Hansen, W. P. Massey, J. G. Moore, Aven Nelson.

Executive Committee: F. C. Sears, S. W. Fletcher, W. N. Hutt, Horace Roberts, Frederic Cranefield.

On motion duly made and seconded the recommendation was accepted and the Secretary instructed to cast the ballot of the Society for the list of officers therein; upon the performance of this duty of the Secretary the President declared the above list of officers duly elected for the biennium 1917-1919.

### ON RESOLUTIONS.

*Resolved:* That the American Pomological Society wishes to return most cordial thanks for the welcome extended to the Society and its members by the officers and members of the Massachusetts Horticultural Society, the Massachusetts Agricultural Society, the Massachusetts Agricultural College and the New England Fruit Show.

*Resolved:* That the American Pomological Society heartily favors national legislation on the standardization of grades and packages for fruits and vegetables.

*Resolved:* That the American Pomological Society endorses the effort to secure a national law to license and regulate commission merchants.

*Resolved:* That the Committee on New Fruits be instructed to prepare and submit for publication in the Proceedings of the Society a complete list of the new varieties introduced to the American trade each biennium, with a characterization and statement concerning the origin and history of the same; and that the next report of the committee include this data for the period elapsing since the last comprehensive report on this subject.

*Resolved:* That the American Pomological Society shall appoint a committee to confer with a committee from the Society of Horticultural Science to establish more definitely the field of work for each organization.

*Resolved:* That the American Pomological Society appoint a committee to ascertai nif it is not practicable to devise means to protect the originators of new varieties of fruit.

*Resolved:* That it be the sense of the American Pomological Society that standing committees prepare their reports in writing and submit them for discussion by the Society at its regular sessions; and be it further

*Resolved:* That the Society regrets that so few standing committees have prepared reports for this meeting.

*Resolved:* That the membership of this Society extends to President Hutt a cordial and appreciative vote of thanks for the very earnest and painstaking service with which he has conducted

the affairs of the Society during the past biennium and the proceedings of this convention.

SAMUEL ADAMS, *Chairman.* F. CRANEFIELD
U. P. HEDRICK, N. E. HANSEN

# BUSINESS.

## REPORT OF TREASURER.

East Lansing, Mich., October 31, 1917.

L. R. Taft, Treasurer.

In Account with the American Pomological Society.

| 1915 | | Debits as follows: | Dr. | Cr. |
|---|---|---|---|---|
| Sept. | 1 | Cash on hand | $761.66 | |
| 1916 | | | | |
| Oct. | 31 | Received 188 Bien. Memberships | 376.00 | |
| " | " | Received 5 Life Memberships | 125.00 | |
| " | " | Received Sale of Proceedings (including $3.50 for cloth) | 29.50 | |
| " | " | Received Interest on Bonds | 400.00 | |
| " | " | Received Interest on Life Membership Fund | 21.00 | |
| | | Total Receipts | $1,713.16 | |
| | | Payments as follows: | | |
| Oct. | 31 | Expense of Berkeley Meeting | | $145.45 |
| " | " | Reporting Berkeley Meeting | | 150.00 |
| " | " | Engravings for Report | | 69.75 |
| " | " | Printing Report of Berkeley Meeting | | 411.60 |
| " | " | Salary of Secretary, one year | | 100.00 |
| " | " | Expenses of Secretary's Office | | 233.66 |
| " | " | Expenses of Treasurer's Office | | 22.75 |
| " | " | Total Expenditures | | $1,133.21 |
| " | " | Cash on Hand | | 579.95 |
| | | | $1,713.16 | $1,713.16 |

Respectfully submitted,

L. R. TAFT, *Treasurer.*

List of bills paid, Sept. 1, 1915, to Oct. 31, 1917:

| | | | |
|---|---|---|---|
| 1915 | | | |
| Nov. | 17 | E. R. Lake, Expenses of Berkeley Meeting..... | $145.45 |
| Dec. | 7 | Amer. Man. and Sales Co., Manifolding..... | 7.50 |
| " | " | R. H. Darby Ptg. Co., Printing Aug. Pomologist | 14.55 |
| 1916 | | | |
| Jan. | 13 | J. C. Marriott, Reporting Berkeley Meeting.... | 150.00 |
| " | 14 | Maurice Joyce Engr. Co., Cuts for Report..... | 33.66 |
| Feb. | 17 | Hammond Pub. Co., Stationery for Treasurer.. | 7.75 |
| Mar. | 6 | R. H. Darby Ptg. Co., Printing..... | 14.55 |
| " | 20 | Maurice Joyce Engr. Co., Cuts for Report..... | 34.09 |
| June | 5 | Maurice Joyce Engr. Co., Cut for Report..... | 2.00 |
| Oct. | 17 | City National Bank, Lansing, Safe Deposit Box | 6.00 |
| " | " | E. R. Lake, Salary, One Year..... | 100.00 |
| " | " | E. R. Lake, Postage and Drayage..... | 94.25 |
| " | " | Advertiser-Republican, Printing Pamphlets.... | 19.25 |
| " | 23 | Advertiser-Republican, Printing Report, etc... | 411.60 |
| Dec. | 26 | E. R. Lake, Postage, etc..... | 15.80 |
| 1917 | | | |
| Jan. | 10 | Advertiser-Republican, Printing ..... | 17.00 |
| Sept. | 4 | R. H. Darby Ptg. Co., Envelopes..... | 4.75 |
| Oct. | 20 | R. H. Darby Ptg. Co., Envelopes and Circulars | 11.50 |
| " | 22 | L. R. Taft, Postage, Express and Rent Safe Deposit ..... | 9.00 |
| | | Total Expenditures for biennial period..... | $1,133.21 |

The amount on hand at the time of the last meeting, Sept. 1, 1915, was $761.66. During the two years the receipts amounted to $951.50, of which $125.00 came from Life Memberships, and $400.00 from the interest on the Marshall P. Wilder bonds. $80.00 of this sum belongs to the Wilder Medal Fund. There being no expenditures from this fund, the amount now on hand, together with $355.14 reported at the last meeting, is $435.14. The Life Membership Fund would have amounted to $490.00 had it not been necessary to draw from this fund to pay for the current expenses of the Society.

As compared with the previous biennial period there has been a falling off in the biennial membership fees of $155.00, and of life membership fees of $240.00. This has been in part offset by the small cost of the Berkeley meeting as compared with the previous meeting in Washington, and by the large saving made in the cost of printing the report.

Boston, Mass., November 1, 1917.

We, the undersigned, the duly appointed Auditing Committee, report that we have examined the accounts of the Treasurer, L. R. Taft, and find them correct and accompanied by receipted vouchers, which have been duly approved by the President.

U. T. Cox, B. G. Pratt, Horace Roberts, *Committee.*

The adoption of the following resolutions was the only business of importance transacted at this meeting:

*Resolved:* That the report of the Committee on Wilder Medals be adopted and the Treasurer directed to have the proper medals struck.

*Resolved:* That the monies derived from the fees of life and institutional memberships be covered into a permanent fund which shall be invested in stable securities and the interest thereon only shall be used by the Society for current expenses.

*Resolved:* That there be hereby established a membership to be known as Society membership. (See Article 15 of by-laws on pages 5 and 6 of this report.)

*Resolved:* That the report of the Committee on Resolutions be adopted as read.

**THE LUNCHEON.**

Thursday evening, October 31, was a feature event. The following menu, and the service-plan were the result of the generous, cordial and untiring efforts of Mr. Lombard, of the State Department of Agriculture. It was the one event of the meeting that brought back to the minds of the older members similar events in California in 1915; notably San Diego, Pasadena, Fresno, and 'Frisco and their genial hosts, among whom Roeding and his aids were star performers. The menu in cold type presents only the merest shadow of the real merits of the viands to others than those who were present to enjoy them.

MENU.

Raw Oysters in Ice Blocks Crackers
Bisque of Clam En Tasse
Escalloped Halibut
Baked Beans Brown Bread
Baked Indian Pudding
Pumpkin Pie
Vanilla Ice Cream in Cakes Cakes
Buttered Rolls
Coffee

It is fair to say that visions of the Boston meeting will always reflect the special delights of that evening, with its Baked Beans, Brown Bread, Indian Pudding and Pumpkin Pie.

The repast was followed with a display of New England scenic and historical slides; a libation of Appela, a new carbonated apple-juice drink from Indiana, and short talks leading off with one of Maccun's inimitable readings of original composition. Among others "indulging" were Hansen, Platt, Gourley, Patterson, Reasoner, Roberts, Webb, Darrow, Taft, and Lombard, followed by a round-robin-hand-shake and "Auld Lang Syne."

—::—And Thus Ended the Session of 1915-1917—::—

## NECROLOGY.

In a spirit of sadness and affectionate rememberance we hereby dedicate this page to the memory of those members who have departed this life during the last biennium. We take with us in the continuance our daily earthly tasks a multitude of endearing recollections of the sacred fellowship that we have been permitted to enjoy in this material world with these spirits now beyond that bourne whence none return.

### Life Members.

Nathan W. Blanchard, Parker Earle, L. A. Goodman, J. W. Helmer, F. W. Power, Edwin R. Smith, Jacob Van Gelder, J. Van Lindley.

### Biennial Members.

T. J. Burrill, B. D. Halstead, W. R. Lazenby, A. V. Stubenrauch, Ernest Walker, R. B. Whyte.

VIEWS OF THE BLUEBERRY INDUSTRY.

Upper right — The rejuvenation of the blueberry after a fire.
Upper left — Blueberries growing on sand barrens.
Center insert — A spray of fruit.
Lower right — One type of carrier.
Lower left — Corner of a blueberry pasture.

L. A. GOODMAN
President, 1905-1915.

## OBITUARY.

*Lowell Alonza Goodman,* born at Porter, Michigan, February 6, 1845; spent his boyhood in Mount Clemons; educated in the common schools, Albion College and State University, Michigan; died, Goodman, Missouri, June 26, 1917.

The dispatches of Tuesday, June 26 last, carried news fraught with much distress to American pomologists in the announcement of the sudden and wholly unexpected death of L. A. Goodman, sixth president of this Society. Mr. Goodman in characteristic form passed on "in action"—no other term than that which marks the activities of the great struggle through which the world has just passed may more fittingly express the spirit and impulse of our late president. At all times was he "in action." Little difference to him whether the occasion be orchard work, the Sunday School, ordinary business, convention routine, banquet activities or a picnic, his was the restless nature. His earnest, generous spirit was always seeking something to do to promote efficient service, cordial fellowship and progress in his chosen fields of labor. In recognition of his splendid work on behalf of Missouri pomology he was elected president of this Society in 1895, and as a mark of distinction in tribute to his sterling qualities as a presiding officer was re-elected four times.

In 1915, while at the Berkeley meeting, he expressed a desire to be relieved from further service, having "completed the cycle," as he expressed it, by presiding over the deliberations of the Society from the Atlantic to the Pacific and from Canada to the Gulf A splendid accomplishment in itself.

To those of us who were intimately associated with him in the work, words but feebly express the appreciative respect in which we held him. His ever-present good will, his pleasing personality his untiring efforts, his earnest endeavor, his fund of information his ambitious desires for the welfare of the Society, and its membership permeated the whole atmosphere of committee meetings, conventions and the attending events.

Though always occupied with the every-day duties of an active business life, varied in itself, Mr. Goodman was ever-ready to set these things aside to give consideration to Society problems. Correspondence, which at times, was well nigh burdensome, was always cheerfully and promptly cared for, a boon to the hungry inquirer in these days of procrastinating typewriters. Mr. Goodman long will be remembered as a loyal and untiring laborer in behalf of American pomology; an ardent and devoted admirer of our various fruits ;an outspoken and aggressive champion of all that be-

spoke a better and bigger fruit industry. Upright, or "square," in the parlance of the street; strictly correct, in the very best use of the term, in his home, social, religious and business life; enthusiastic, virile, imaginative, and uncompromising in all views that he deemed honest, just and progressive he was admirably fitted to serve as leader of thought and action in any project undertaken. An indefatigable worker; a keen student; an esteemed and loyal citizen of state and nation; a cherished friend; a worthy foeman: His was an indomitable spirit; an irreproachable character, an unsullied name and a splendid individuality.

Besides a host of sincere and admiring friends, Mr. Goodman left a wife, and three daughters, Mrs. David L. Croysdale, Mrs. Paul A. Simmons and Marie Goodman.

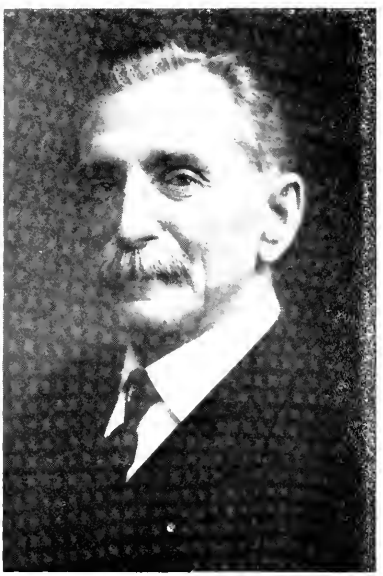
E. R. L.

*W. R. Lazenby:* To the older members of this Society September 7, 1916, brought very sad news in the despatches advising of the death of Professor Lazenby, which occurred at Columbus, Ohio, the preceding day. The personality of this genial character will be sadly missed at our meetings. His cordial handshake and cheerful greeting had become a feature that all expected; and the biennial renewal of fellowship with Lazenby was a boon to all those whom association in A. P. S. had brought into active touch with the pleasing, companionable student, teacher, investigator, cautious adviser, earnest counsellor, and vigorous champion of progress and co-operation. Prof. Lazenby's last piece of work for us was embodied in his report upon the federation of horticultural activities in the largest or broadest use of the word.

Becoming associated with this Society in 1897, Professor Lazenby soon found himself participating in all the activities of the organization and from that day until death, his advice and assistance were in steady demand. His unexpected death came as a severe shock to his co-workers, among whom he was held as a loyal, sincere and trusted friend, an ardent student, faithful worker, delightful companion, and a genuinely lovable character.

He was born at Bellona, Yates County, New York, December 5, 1850; educated at Cornell University, where he taught for some years; in 1881 he became associated with the Ohio State University and remained with it in various capacities until his death. A wife and daughter survive him.

E. R. L.



W. R. LAZENBY.

J. VAN LINDLEY.

*Byron David Halsted:* Born in Venice, New York, June 7, 1852; died in New Brunswick, New Jersey, August 28, 1918. Dr. Halsted was a member of this Society from 1891 to the date of his death. In the decade preceding 1900 he presented several reports and papers of marked interest to the Society, during later years his work has been more directly concerned with other than the so-called fruit-bearing plants. Yet during all this time his interest and best wishes for the welfare of the Society have been frequently manifested. Though an infrequent attendant at the recent meetings of the Society we have been fully cognizant of his activities in matters of more or less direct interest to pomology.

Dr. Halsted's varied lines of work and activities equipped him to act the part of a delightful correspondent and associate. As teacher, editor, investigator and administrator he accomplished much for American Agriculture. And though botany was his major work his influence was deeply felt in the broad, general lines of agriculture; plant breeding, plant diseases, sprays and spraying; plant economics and allied topics. Dr. Halsted's life of faithful, earnest labor, cordial nature and admirable character won for him the respect, affection and honor of his associates; and the scientific workers in American agriculture and horticulture feel keenly the loss of his inspiring counsel, assistance and splendid example of untiring labor in behalf of the truth concerning plants, plant life, and plant-growing problems.

*J. Van Lindley:* In the death of John Van Mons Lindley, which occurred at Pomona, North Carolina, the South lost one of its leading horticulturists. Through all his long life he gave his best energies to the development of horticulture. His father, Joshua Lindley, was one of the founders of the American Pomological Society. J. Van took up his horticultural mantle and with Brackett, Van Deman, Watrous and others became one of "the old guard" of the American Pomological Society. Later members will remember him as the quiet old man who was so enthusiastic on southern commercial peach culture. On this subject he was an authority. He was a man of deeds rather than of words. With rare business instinct he developed the nursery business that bears his name until it has become one of the largest in the country. He was a pioneer in commercial peach orcharding in the Sand Hill region of North Carolina, and on his successes the commercial peach industry of that section is largely based. Under his business ability his horticultural successes quickly developed into financial ones and he became associated with practically every prominent business interest in his city and community.

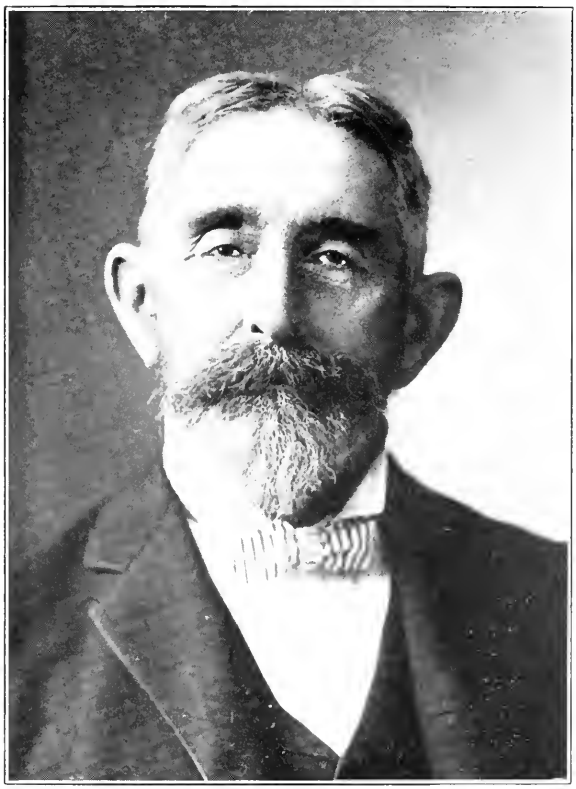
In later life, relieved of business cares by the organization he had built up, he gave his time and means largely to the good of the public. He donated to the City of Greensboro a valuable tract of land which has become its finest public park.

He lived his life well and died full of years honored and respected by all with whom he associated.

W. N. HUTT.

*Parker Earle* was born at Mount Holly, Rutland County, Vermont, August 8, 1831. He went West when a young man to try wheat farming in Gundy County, Illinois. Here he met and married Miss Melanie Tracy in 1855. Later he became a lecturer in politics and temperance for a while, as crops were poor. In 1861 he moved to Cobden, Illinois, where a colony of Northern people had gone to grow peaches for the Chicago market. It was here that he first became interested in the work in which he later accomplished marked results—marketing fruits at a distance, which was the leading work of the balance of his active life. At Cobden he planted strawberries and peaches and with others was interested in the largest pear orchard in the Mississippi Valley. He lead in the organizing of the American Horticultural Society, which was to supplement the work of the American Pomological Society. He was president of the new society during his lifetime. He was Horticultural Commissioner at the New Orleans Exhibition, and after this event transferred his interests to the South and with associates put out peach and tomato plantings in the Mississippi Valley. The panic of 1893 practically depleted his finances. Then he went farther West, Roswell, New Mexico, to get a new start. Here he planted largely of apples and pears. He gave much aid to this section and finally, about 1911, moved to Pasadena, California, where he died January 12, 1917. A man who thought in large terms and strove to work in large fields in a large way. Parker Earle had little interest in scientific pomology. His best effort and achievement was in the field of fruit marketing and transportation, and he will be remembered as the foremost pioneer among practical growers in this field.

*Frank W. Power* was born in Kasson, Minnesota, January 10, 1869, and died at Salem, Oregon, May 22, 1916. His father's family went to California and later to Oregon while he was young. He received his collegiate training at Albany College, and later was graduated in law from Williamette University but never actively engaged in the practice of law. His first active association with pomological matters was when he became an employee of the Oregon



PARKER EARLE.

FRANK W. LOWER.

Nursery Company at Salem in 1893. From that time he was imbued with a strong desire to accomplish something in this line. Later he became secretary of the Chico Nursery Company of California, returning to Oregon he re-engaged with the Oregon Nursery Company and after a lapse of four years, during which time he was interested in orchard development projects, he became Vice-President of the Company, which position he occupied until his sad and untimely death. He was principal of the Pacific Horticultural Correspondence School; secretary for six years of the Oregon State Horticultural Society; president of the Pacific Coast Nurserymen's Association; life member of this Society and chairman on Nomenclature. His activities, correspondence, papers, and addresses covered a vast and varied field, and partook of the practical, scientific and philosophied. Though of a quiet, unassuming attractive, studious nature, he was keenly active and brim-full of optimism. He was fired with an ambition to accomplish much in the upbuilding of Pacific Coast horticulture and pomology in consonance with his ideals and inspirations; filled with a clear concept of what the possibilities of his home field were in these lines be aimed to lend a loyal, unselfish, and devoted life's effort to their accomplishment. Cut off in the midst of these worthy ambitions, just in the prime of life, he has left for others an example of fidelity, faith ,and love all too rare in this busy, eager business world. May the unrealized hopes of Frank Power be the inspiration for the younger sons of Oregon, to the end that the North Pacific Coast in particular may the sooner see the day when the merits and beauties of her horticulture and pomology shall challenge the admiration of the continent and the world.

E. R. L.

*Edwin R. Smith*, born on a farm in Tippecanoe County, Indiana, April 4, 1859, died in Indianapolis, Indiana, October 3, 1917. He was educated in the common schools of his home county and in Naperville, Illinois, and for a number of years taught school in Tippecanoe County, later becoming principal of the West Lafayette schools. For many years he traveled for school book publishers and became one of the best-known representatives of the school book publishers in the country.

He retired from this service a few years ago and devoted his time to his farm and orchard interests in Tippecanoe and Franklin Counties. Mr. Smith, as became his independent, sincere and kindly nature, was deeply interested in public affairs. He was ever-ready to help and serve; and often went far out of his way to perform some service or kindly act. He was influential in the

horticultural affairs of his State; was the chief promoter of the Indiana Apple Show and devoted much time to it; had a genius for friendship and held the affectionate regard of all who knew him.

*Nathan W. Blanchard,* for many years an earnest and solicitous life member of this Society, was a native of Maine, being born there July 24, 1831, though his family for at least four generations were children and residents of the Old Bay State, and earlier of France, whence his forebear, Thomas Blanchard, a Huguenot, was driven prior to 1639. In 1854 the subject of this sketch reached California in response to the "call of the West." In 1864 Nathan went back East only to soon return with a wife and take up new enterprises from which, in due time, 1872, he emerged a recognized successful business man. His business ventures included butchering, lumbering, ranching, stock-raising, milling, irrigation, railroads, orchards and oil, surely diverse enough to exhibit a remarkable business talent. Mr. Blanchard's entrance into pomological activities began with 1874, when Mr. Clark, a nurseryman of Santa Barbara, arranged with Mr. Blanchard to plant a hundred acres in oranges. The trees were raised from the seed of Havana oranges and it took fourteen years of care, cultivation and irrigation before the tract produced enough to pay running expenses. 1889 produced the first renumerative crop. This experiment is unique in the history of citrus orcharding, and at the time attracted much attention and elicited an equal amount of diverse comment from both orchardists and pomological students.

Later the seedling trees were budded to Late Valencia oranges, and lemons and the orchard became known most favorably for the quality of its fruit, and in this way the owner became the pioneer orange and lemon grower of the county.

Mr. Blanchard was the founder of Santa Paula, and remained keenly and constantly alive to the interests of the city and its environs. Throughout his life he was active in all matters of public betterment, especially in the moral, educational, political and civic improvement phases.

Though much interested in the work of this Society he rarely attended the meetings and was known to few members except those of the Pacific Coast. He died at his home October 22, 1917, leaving a wife and four children.

*Jacob Van Gelder:* Jacob Van Gelder was a sturdy, vigorous citizen of New York, and came of a family well known in the Hudson River Valley before revolutionary days. Early in life, following his occupation as a teacher, he became an enthusiastic admirer

R. B. WHYTE.

A. V. STUBENRAUCH

of the fruit-bearing plants of the Temperate Zone and contributed much in an experimental way to the efforts that were being made a quarter of a century ago, to place pomology on a sound cultural basis. Later in life he became interested in banking and real estate and during the final years of his membership was an infrequent attendant upon our meetings and in consequence known to but few of the present active members of the Society. He was born in Katskill, December 7, 1830, and died at his home in Saugerties, New York, November 27, 1916. Two daughters survive him; one, Anna V. G. Thomas, is a present life member and much interested in our work.

*R. B. Whyte:* In the sudden passing of Mr. R. B. Whyte on April 15, 1918, Ottawa lost one of her most useful and respected citizens. He stood for all that was highest in the life of the city and the nation. He scorned all that was mean, dishonest, and low. His aspirations were of the nobliest and the best in everything. What he accomplished is recorded in many ways and not least in the hearts of those who knew him best. The influence of the good which he did during his life will last for many a day. Old men and little children praise him. He was the greatest amateur horticulturist in his time in Canada. Naturalist, collector, organizer, officer and patron of clubs, guilds and societies, gardner, plant breeder, experimenter, farmer, churchman, promoter and supporter of children's agricultural and horticultural clubs, urban, suburban and rural home improvement enthusiast, leading citizen of Ottawa, and for years a most devoted member of this Society, attending three of the last four meetings. He will be sincerely missed by the older members who had become deeply attached to him.

His health began to fail about five years ago, and although he could not take as much physical exercise as in former years, his brain was just as active and his interest in everything as great up to his sudden death from over exertion in his garden. He was sixty-seven years of age when he died, and his wife, two sons and five daughters are left to mourn his loss, besides a host of friends.

W. T. Macoun.

*Arnold V. Stubenrauch,* born in New Orleans, April 27, 1871, died in Berkely, California, February 12, 1917. Though one of the younger members of this Society who had only participated slightly in its workings, the subject of this sketch was well known, through his wide activities, to our whole body. His career in the government service in the Office of Pomology from 1906-1914, and as Professor of Pomology in the University of California after leav-

ing Washington was replete with evidence of his great interest and activities in pomology. He was the author of many papers and addresses upon this subject for convention, bulletin, and report. The results of his investigations in the cold-storage and transportation of fruits were received with much favor and gave him a prominent place among the workers in pomology. Personally, Professor Stubenrauch was pleasing, affable and zealous. An indefatagable worker, he imbued his associates and students with the same spirit. His death was a severe shock to his associates, and a heavy loss to the industry of pomology. A wife and two sons are left to mourn his early death.

*Ernest Walker:* Born at Brownstown, Indiana, November 12, 1862; died at Bolling, Alabama, December 6, 1916. Professor Walker as a small boy was a lover of nature and his early associations with the nursery business of his father was an important factor in shaping his later career. At one time he studied medicine and in this respect stands in much the same way as several of our notable naturalists of early days. He collected and classified the flora and fauna of his home locality, and in other ways manifested the real spirit of the naturalist. He graduated from Cornell University in 1897. In 1896-97 he was student assistant in horticulture, later became student of botany at Harvard and in 1899 became entomologist at Clemson College, South Carolina. in 1900. professor of horticulture, University of Arkansas; in 1913, State Horticulturist of Alabama; in 1916. engaged in private horticultural work at Bolling.

Though Professor Walker joined this Society in 1899, he was present at only a few meetings and was known chiefly to those who were active at the very beginning of 1900. A man well acquainted with the practical side of horticulture, a pleasing and cordial correspondent, he always stood ready to help in the tasks assigned him as committeeman or referee, and will be long remembered by those with whom he was associated.

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Stark, Nurseries, Wm. P. ..... Neosho, Missouri
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*Woolley, Harold C. ..... Brattleboro, Vermont
Wright, W. J. ..... Alfred, New York
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**District Biennial**

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Citrus Experiment Station, 1912-1942..... Riverside, California
Colorado State Agricultural College, 1902-1932 ..... Fort Collins, Colorado
Cornell University Library, 1889-1919..... Ithaca, New York
Crerar Library, The John, 1909-1939..... Chicago, Illinois
Detroit Public Library, 1890-1920..... Detroit, Michigan
Georgia State College of Agriculture Library, 1915-1945 ..... Athens, Georgia
Georgia State University Library, 1911-1941, Athens, Georgia
Illinois State University Horticultural Department, 1908-1938..... Urbana, Illinois
Iowa State College Library, 1902-1932..... Ames, Iowa
Iowa State Horticultural Library, 1892-1922.. Des Moines, Iowa
Kansas State Horticultural Society, 1897-1927 ..... Topeka, Kansas
Maine State Experiment Station Library, 1906-1936 ..... Orono, Maine
Maine State University Library, 1909-1939... Orono, Maine
Maryland Agricultural Experiment Station Library, 1905-1935 ..... College Park, Maryland
Massachusetts Agricultural College Library, 1910-1940 ..... Amherst, Massachusetts
Massahusetts Fruit Growers' Association, 1914-1944 ..... Marlboro, Massachusetts
Michigan Agricultural College Library, 1872, East Lansing, Michigan
Minnesota Agricultural Experiment Station Library, 1899-1929 ..... St. Anthony Park, Minnesota
Mississippi State Agricultural College Library, 1900-1930 ..... Agricultural College, Mississippi
Missouri Fruit Experiment Station, 1901-1931 ..... Mountain Grove, Missouri
Missouri State Horticultural Society, 1897-1927 ..... Columbia, Missouri
Missouri State University Library, 1898-1928 ..... Columbia, Missouri
Missouri State University Library, 1898-1928 ..... Columbia, Missouri
Montana Experiment Station Library, 1904-1934 ..... Bozeman, Montana
Montana State Board of Horticulture, 1911-1941 ..... Missoula, Montana
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Oregon State Agricultural Experiment, 1912-1942 ..... Talent, Oregon
Purdue University Experiment Station, 1912-1942 ..... LaFayette, Indiana
Purdue University Library, 1912-1942..... LaFayette, Indiana
Rhode Island Experiment Station Library, Kingston, Rhode Island
Riverside Public Library, 1915-1945..... Riverside, California
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State University Library, 1913-1943..... Linoln, Nebraska
Texas Agricultural College Library, 1906-1936 ..... College Stateio, Texas
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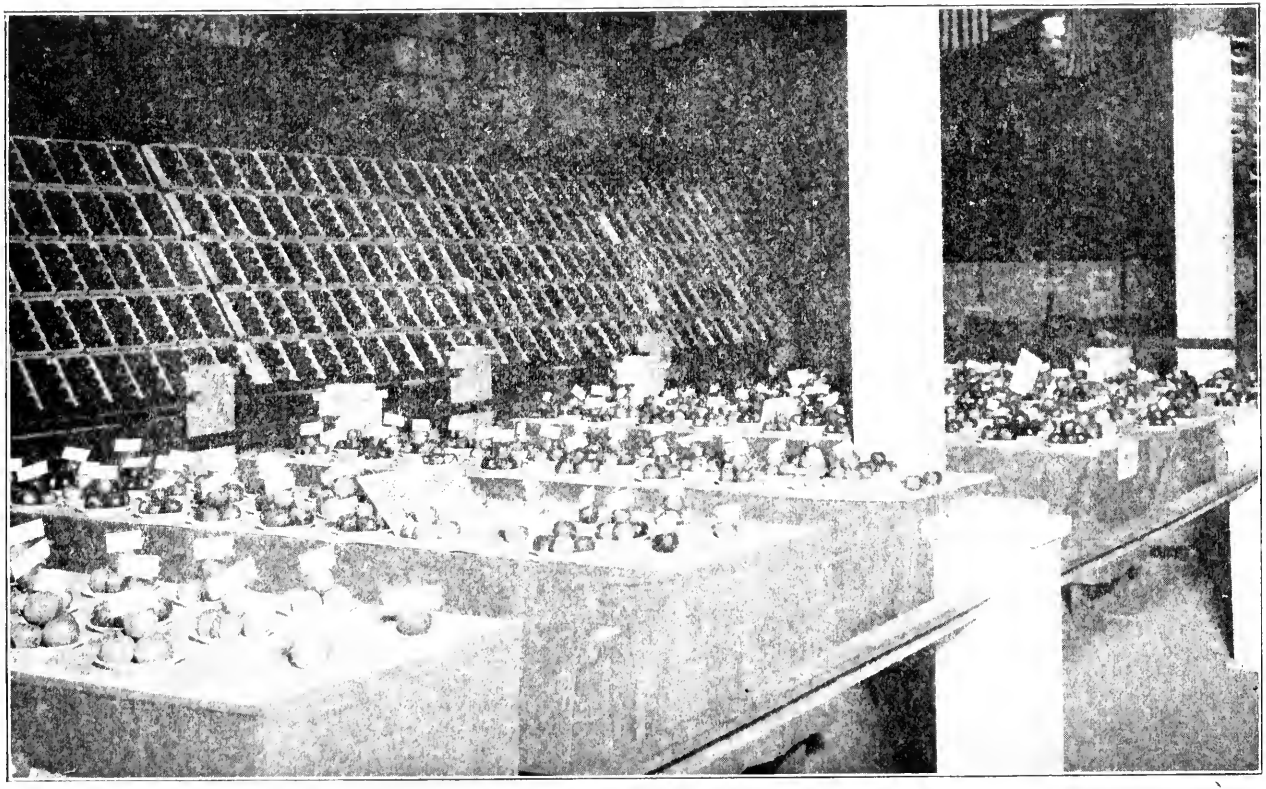

Corner at 1920 Apple Show and Fruit Exhibit.

# PROCEEDINGS

OF THE

## Thirty-Sixth and Thirty-Seventh Meetings

OF THE

# American Pomological Society

ORGANIZED 1848

ST. LOUIS, MO.
Dec. 30, 31, 1919 - Jan. 1, 1920

COLUMBUS, OHIO
December 1 - 3, 1920

COLUMBUS, OHIO:
THE F. J. HEER PRINTING CO.
1921

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# THE AMERICAN POMOLOGICAL SOCIETY*

L. H. Bailey

The fruit interests of North America are strikingly large. They are commercial, representing great areas and the investment of heavy capital, with the application of marked technical and manual skill and the exercise of much resourcefulness in marketing. They are also amateur, contributing to the home-making instinct and affording the exercise of attractive personal ingenuity in the growing of the choicest products. These fruits are of extensive variety, ranging through all the orchard kinds to nuts, grapes, berries, citrus and tropical fruits, and the still wild produce of woods and fields.

It may not be generally known that these extensive interests are represented by a society of great age and high standing. This, the American Pomological Society, is the subject of this article, inasmuch as it is now in process of active reorganization and it is attracting renewed attention. Even as long ago as 1880, the cautious Robert Manning, in writing his history of the Massachusetts Horticultural Society and incidentally of American horticulture, was able to say that the American Pomological Society "has effected more for the advancement of pomology than any other association in the world, and its publications have become a standard on the subject." In fact, this shelf of volumes is indispensable to any one who would understand the development of the horticulture of the country.

The Society has been called "the supreme court of horticulture". In particular, its opinions on varieties and nomenclature have been accepted. It has tried to maintain the best standards, to prevent duplication, substitution, misnaming, and the exploitation of inferior kinds. The Fruit Catalogue was long a recognized authority. This Catalogue, with recommended varieties and often with ratings, was published in the report of the convention of 1852, although beginnings of it were taken at the first meeting in 1848.

The garden of fruits, with a careful choice of varieties and the plants receiving much personal care, was once an important adjunct to a home. Patrick Barry's book called "The Fruit Garden", appearing in 1851 and going through several editions, was long a standard. In recent years the amateur horticultural interests have gone largely to ornamentals, design, and architectural features; these developments are all to the good, yet there should also be a conscious plan for fruit-trees and bushes and vines. The American Pomological Society proposes to hold fast to this amateur fruit-growing interest and to stimulate it, to put a fruit-garden of one kind or another on private places all over the country. This will add much to the interest of the home, provide attractive employment for all members of the family, be a means of education, and produce useful healthful supplies for the table. It will stimulate fruit interests of all kinds.

On the commercial side, the Society expects to consider national affairs that touch the growing of fruits, as legislation, quarantine, export, transportation, standardizing of methods. The industry needs to be understood as a whole and tied together. Strong new committees are to be constituted, to keep in touch with these large affairs.

Although a society cannot live on its past, a backward look gives us the reasons and reassures us for the new work. Particularly is this true when the history is rich in personalities and accomplishment. Out of the past comes the future.

On the tenth of October in the year 1848 an "American Congress of Fruit-Growers" came together in New York City, pursuant to a call of the horticultural societies of Massachusetts, Pennsylvania, New Jersey and New Haven, as well as of the American Institute under whose auspices it was held. The main objects of this Congress were:



* With certain omissions, this article appeared in The Country Gentleman, in its issue of Sept. 4, 1920.

To compare fruits from various sources and localities, with a view of arriving at correct conclusions as to their merits, and to settle doubtful points respecting them.

To assist in determining the synonyms by which the same fruit is known in different parts of the country.

To compare opinions respecting the value of the numerous varieties already in cultivation, and to endeavor to abridge, by general consent, the long catalogue of indifferent or worthless sorts at the present time propagated by nurserymen and fruit-growers.

To elicit and disseminate pomological information, and to maintain a cordial spirit of intercourse among horticulturists.

The presiding officer of this convention was Marshall P. Wilder, a prosperous merchant of Boston and known for his extensive interest in good works, particularly in horticulture, agriculture, local history, and agricultural education. It will be noted that the discussion of varieties was the paramount purpose of the Congress; it is natural, therefore, that "its first work was the appointment of a Special Fruit Committee", and that the chairman of that committee was the lamented Andrew Jackson Downing, whose writings on pomology, landscape gardening and country life have woven a charm about these subjects.

The session lasted three days, wherein there was adopted "a list of fruits worthy of general cultivation" and when there was "discussion of other varieties"; and the Congress adjourned, as the record reads, to meet in the city of New York on the first Tuesday of October in 1849. I have no record that this adjourned meeting was held.

A month before this Congress, however, another convention was called in the city of Buffalo (September 1, 1848) by the New York State Agricultural Society. This convention also had for its purpose the discussion of varieties: "Its objects, apart from general discussion, were to identify synonyms, to correct errors in the names of our fruits, and to establish a uniform nomenclature".

The sessions of the Buffalo gathering, which called itself the "North American Pomological Convention", also lasted three days, wherein there were "interesting discussions of many varieties of fruits". The next meeting of this Convention was held in Syracuse, New York, September 14, 1849.

It would be interesting to trace the origins of these similar and almost coincident movements, and to discover the personalities and the circumstances in the backgrounds; but incipient movements do not appear in records and we can form our opinions only from sidelights in contemporaneous writings, the original actors now have passed in the fullness of time. It is apparent that the country was ready for a national movement with fruits for the subject. Varieties were multiplying and were beginning to be studied. Order must be brought out of confusion. Knowledge and experience must be assembled, and solid sound advice must be given to those who would plant.

"But it was plain", as Wilder later wrote, "that, for the decision of a Pomological Convention to carry due weight, there must be but one". This spirit seems also to have possessed the Buffalo gathering, for we find resolutions adopted in the Syracuse meeting, in 1849, looking to the union of the two conventions. This proposition met with "a hearty response" from the Congress of Fruit-Growers, and Downing was appointed to head a committee of conference. We are glad to read that

> At this conference, the utmost harmony and good feeling prevailed; and it was agreed, with the largest spirit of fraternity and good-will on all sides, that the North American Pomological Convention should surrender its organization, and that the two associations should be consolidated as the "American Pomological Congress". At this meeting, a few concise by-laws were established, the select list was enlarged, a list of new varieties, which promised well was adopted, and a beginning was made of a rejected list, by discarding, as unworthy of cultivation, twenty-seven varieties of apples and ninety-nine varieties of pears.

The first meeting of the united conventions was held in 1850 in Cincinnati, and then was adopted the name "American Pomological Society". Because of

the necessary absence of the president of the Congress, Mr. Wilder, the chair was occupied by W. D. Brincklé, physician and amateur pomologist, whose name is yet familiar to students of pomology in his writings, his extensive experiments in the raising of seedlings, and his liberal distribution of plants with charges prepaid. At this meeting Brincklé was elected president of the American Pomological Society.

Although the American Pomological Society did not appear under this name until 1850, yet it reckons its age from the earlier year and its medals bear the impression, "founded in 1848". At first the age appears to have been reckoned from 1850. The report of the convention of 1852, at Philadelphia, is called "Transactions of the second session of the American Pomological Society"; the report of the convention of 1854, at Boston, is "Proceedings of the third session", although the call of the president was for the fifth session; the report of the meeting of 1856, Rochester, is proceedings of the sixth session, showing that 1848 was then taken as the date of founding. I assume that the meeting of the North American Pomological Convention at Syracuse in 1849, at which the action was taken to combine the two movements, is accounted the second session.

It would be interesting to analyze the ideas in the seventy-nine pages of the report of the 1850 convention. We should see that seventy years have had their effect. But we can stop only for mention of some of the persons. Those who know even the outlines of our horticultural progress will recognize the names. It is written that in order to effect a permanent organization, Dr. J. A. Kennicott of Illinois was called to the chair. The "names of gentlemen desirous of participating in the doings of the body" "and also of those who attended as delegated from societies", number ninety-nine. The Buffalo Horticultural Society sent sixteen delegates. Vice-presidents were chosen for Illinois, Kentucky, Canada West, Ohio, Missouri, Wisconsin, New York, Indiana, Delaware, Georgia, South Carolina. Charles Downing and Lewis F. Allen were among the delegates, and the secretaries were F. R. Elliott, P. Barry and J. A. Warder, all authors then or later of important pomological books. S. F. Carey of College Hill, Cincinnati, was a delegate; he was publicist, educator and lecturer, brother of F. G. Carey, founder of Farmers' College. Other men of prominence and leading were in the company. Cincinnati was a horticultural center at the middle of the past century, and the interest in the convention must have been great.

The Society started on the even year, with biennial conventions, but just after the Civil War one year was passed, and the meetings have since been held on the odd year, although the biennium of 1893 was passed. The last regular convention was held in Boston, being the thirty-fifth and covering a period of seventy fruitful years.

In all these seventy years, the Society has had but seven presidents. Mr. Wilder served for thirty-five years, leading the society with grace and dignity and bringing to his aid the best pomological talent in the country, although frequently unable to attend the conventions. By his will he left a sum "for the general purposes of the Society", and another fund for the Wilder medals to be bestowed "for objects of special merit".

Wilder was succeeded by Prosper J. Berckmans, long known for his scholarly attainments and gracious personality; and then by C. L. Watrous of Iowa, J. H. Hale of Connecticut and Georgia, and L. A. Goodman of Missouri, all known in their days for their commanding personalities and their devotion to great interests in American fruit-growing. All these men are much lamented. Still later the call came to Professor W. N. Hutt, then State Horticulturist of North Carolina, now actively engaged in pomological work of importance.

In 1919, no regular open convention was called, but a conference was held at St. Louis and important plans of reorganization were set afoot, the activities of the Society having been arrested by the World War. Committees made their reports. Hereafter the conventions and exhibitions are to be annual. The St. Louis conference is properly the thirty-sixth convention in the long processes of the Society, and a report is expected to be published. The thirty-seventh convention is to be held in Columbus, Ohio, the first three days of December, 1920. The vice-president of the Society is the Dominion Horticulturist of Canada, Professor W. T. Macoun. The Society is heartily international in this territory.

Something of the range of the activities of the American Pomological Society may be gathered from the following complete list of its conventions:

1848, Buffalo and New York. 1849, Syracuse, N. Y. 1850, Cincinnati; W. D. Brincklé, Philadelphia, President. 1852, Philadelphia; Marshall P. Wilder, Boston, President. 1854, Boston. 1856, Rochester, N. Y. 1858, New York. 1860, Philadelphia. 1862, Boston. 1864, Rochester. 1867, St. Louis. 1869, Philadelphia. 1871, Richmond, Va. 1873, Boston. 1875, Chicago. 1877, Baltimore. 1879, Rochester, N. Y. 1881, Boston. 1883, Philadelphia. 1885, Grand Rapids, Mich. 1887, Boston; Prosper J. Berckmans, Augusta, Georgia, President. 1889, Ocala, Florida. 1891, Washington. 1895, Sacramento, Cal. 1897, Columbus, Ohio; C. L. Watrous, Des Moines, Iowa, President. 1899, Philadelphia. 1901, Buffalo. 1903, Boston; J. H. Hale, S. Glastonbury, Ct., President. 1905, Kansas City; L. A. Goodman, President. 1907, Jamestown, Virginia. 1909, St. Catherines, Ontario. 1911, Tampa, Florida. 1913, Washington. 1915, Berkeley, Cal.; Professor W. N. Hutt, Raleigh, N. C., President. 1917, Boston. 1919, St. Louis; L. H. Bailey, Ithaca, N. Y., President.

I cannot forget the wholesome enthusiasm of the first meeting of the American Pomological Society I attended. It was the Grand Rapids convention in 1885. Michigan had come into notice with an exhibition at the Richmond meeting of 1871, comprising 101 varieties of apples, six of grapes, nine of peaches and eleven of pears. The State was filling up with pomological enthusiasm, under the leadership of T. T. Lyon and others. The convention of 1885 was well staged under the able secretaryship of Professor W. J. Beal, with the cooperation of his successor, a citizen of Grand Rapids, Charles W. Garfield. It was a great disappointment that the president and first vice-president, Wilder and Berckmans, were unable to be present, but we were all gratified when Patrick Barry took the chair. Here were such men as Munson of Texas, Gipson of Colorado, Bessey of Nebraska, Budd of Iowa, Augur of Connecticut, Gideon of Minnesota, Hilborn of Ontario, Hape of Georgia, Gibb of Quebec, Lyman of Virginia, Earle of Illinois, Hexamer of New York, Goodman of Missouri, Campbell of Ohio, Manning of Massachusetts, Engle of Pennsylvania, Plumb of Wisconsin, Coleman of Washington, D. C., and many others, with delegates from societies far and wide. It was a national company of notables and the younger ones of us sat in a constant anticipation as the sessions followed one another all too quickly.

The dominant note was real pomology, — the fruits themselves and the trees that bore them, for we had not then arrived at the time when discussion of scientific method and of the mechanics and economics of commerce were to hold first place. It was inspiration to note the personal enthusiasm of the men for good fruits just because they were good, and to hear the discussions of the novelties. These motives we mostly miss from the modern meetings. Probably we have made progress in our conventions; certainly we have more knowledge; but as I am now, in my turn, one of the older ones and remember the meetings succeeding 1885, I doubt whether we have more satisfaction. Certainly it was an event of first importance in those days for a State or locality to have a meeting of the American Pomological Society.

There was a peculiar hopefulness in the discussion of the novelties, always the expectation of something better and the possibility of a more useful adaptation to a locality or a special use. Now the tendency is to discourage novelties, as interfering with the standardization of commercial practices, and thereby do we lose much of the enthusiasm.

The plant-breeders of the present day little realize the extent of the experiments of the early pomologists. The stimulus came largely from the Belgian, Van Mons, and other European worthies, fostered by the Downings, Brincklé, Wilder, Longworth and others. Wilder was a breeder of camellias as well as of fruits, and at one time he had as many as 300 varieties. In azaleas, clematis, lilies, and many other things his name was known, and the Marshall P. Wilder rose is still current. In pears he was able to exhibit 400 varieties and he had tested three times that number. Those years were long before the days of the experiment stations and the government test grounds; the introducing and breeding of plants was not then a public function.

At the St. Louis convention of 1867, Wilder declared that

> In no one of my previous addresses have I omitted to urge the importance of this branch of our science; and as Van Mons advised his friends "to sow, to sow again, to resow, to sow perpetually", so now I repeat the

words in which my views on this subject have heretofore been summed up; and as it was my first, so it shall be my continual and last advice, — "Plant the most mature and perfect seeds of the most hardy, vigorous, and valuable varieties; and, as a shorter process, insuring more certain and happy results, cross or hybridize your best fruits".

These were the times of the "amelioration" of plants, a term that seems strangely out of place in the present discussions of genetics, with the special and formidable terminology. The days of the dominance of varieties are passed and with them goes much of the romance. But the days of larger things have come, and to these horizons the Society must train its vision.

### The Prospect

Little is to be said of the present and the future, because the record is yet to be made. Yet large plans of reconstruction await the approval and support of the public. The Society makes its appeal to both the amateur and the commercial grower, covering the field. Membership in a national society of high standing should give every grower a larger interest in his work, whether he grows for the market or for his own table.

Chapters are being organized among the students in the colleges of agriculture, giving the young persons the benefit of a strong national affiliation, providing them with a convention in which they may take part, and assuring the Society of a recruiting ground.

The old habit of exchange of specimens and cions should be revived. It can be accomplished in full conformity with quarantine regulations. The effort is to be made by these and other means to popularize the knowledge of fruits and the desire to grow them. The correspondence from the office of the secretary should come in time to be a resourceful means of aiding the people.

Probably I cannot do better than to state the main categories in the plan of reorganization:

Annual Convention and exhibition, representing all parts of the United States and Canada, with judging teams from the colleges in competition.

Pomological Annual, comprising the report of the Convention and much other material indispensable both to the commercial and amateur fruit-grower.

Publications periodically for the membership.

Cooperation among the fruit-growers, tying the interests together.

Affiliation with State, Provincial and local societies.

The organizing of Junior Branches in the Colleges of Agriculture.

Stimulation of local exhibitions of fruit.

Legislation for the extension and safeguarding of the fruit interests.

Making public the best information on the new methods in control of insects and diseases, condition of markets, and other pomological work.

Registration of new fruits, with accurate descriptions.

Awarding of prizes for meritorious fruits.

Encouragement of the breeding of new fruits, and the thorough testing and dissemination of meritorious kinds.

Reissue of the standard Fruit Catalogue, brought down to date.

Exchange of fruits, cions and cuttings amongst the membership.

Extensive correspondence with the membership from the secretary's office.

Campaign of education for the consumption of more fruit of better quality. The people should be acquainted with the pomological productions and possibilities of the continent and with the value of fruits as articles of food.

These large affairs cannot be carried to completion without adequate help in the secretary's office, with a continuous activity covering the year. The opportunity for service is great.

For many years the American Pomological Society has looked forward to a "home", — to a sufficient plot of ground to enable it to make its tests, a residence and office and library in charge of its secretary, a place that can be considered as headquarters for the voluntary pomological interests of the continent. Here is an opportunity for a municipality or a person to make a distinct departure and a contribution to the public good.

## THIRTY-SIXTH CONVENTION

### Sessions Held in Hotel Statler, St. Louis, Missouri, December 30, 31, 1919, to January 1, 1920

This meeting was more a conference than a convention but in all respects apparently met the full needs of the occasion. Under the conditions it was impossible to hold to a regular schedule, though the call for the first session was promptly kept, but subsequent sessions were "zig-zagged" to meet the expressed wishes of a majority of those interested. The presence of so many other conferences in the city was disconcerting on the whole.

The first real working session was held under the designation of "a Smoker" on December 30, jointly with the American Society for Horticultural Science. Here the real work before the Society was effectively presented by President Bailey. Adjournment was then taken until January 1, on which date two very active sessions were held, of which the following notes represent a fair account, though not a full one.

### AMERICAN POMOLOGICAL SOCIETY AND AMERICAN SOCIETY FOR HORTICULTURAL SCIENCE,

#### In Joint Meeting, December 30, 1919

With the opening of the meeting Dr. Bailey was called upon to lead a round table discussion of American Pomological Society problems and in his characteristic way submitted a program of activities which met with the cordial approval of those present. Then followed a report by the secretary covering the recent meeting at Columbus in connection with the proposed Junior Branch of this Society. In the "round table talk" following, all phases of the situation of American Pomological Society were touched upon, but the final consensus of opinion was positively to the effect that "something must be done." After numerous suggestions had been made as to remedies for the case, the president appointed two committees, designated and composed as follows: Plans and Policy, Pickett, Crow, Cranefield, Lloyd Stark and Greene; Ways and Means, Gardner, Alderman, Macoun, Chandler and Taft.

At the morning session on January 1, 1920, the above special committees, together with certain standing ones offered the following reports:

Committee on Nomenclature—The report of this committee covering the revision of the Code, together with a letter from Dr. Hedrick, Chairman, was presented by the secretary.

"As the Code (revised form) now stands, I judge it will be signed by all the members of the committee excepting Gould, who strongly objects to one or two provisions. Others of the committee, myself included, agree with Gould in his contention but feel that to change the Code as he suggests would prevent its adoption, in the particulars he wants changed, by nurserymen and fruit growers. I hope the (revised) Code will be discussed and either adopted or rejected. I shall be sorry

if it is changed very materially." The report was quite fully discussed by the members who, without a dissenting voice, agreed that it was not acceptable; thereupon it was referred to a special committee with instructions to revise. This special committee, named by acting-president Irish and composed of Close, Hansen and Lake reported at the afternoon session, and this report, after a full discussion, was slightly amended by the members, and finally adopted by unanimous vote, as printed herewith.

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## CODE OF POMOLOGICAL NOMENCLATURE

### THE ST. LOUIS CODE

#### Its Purpose

This code aims to establish a simple and pure system of pomological nomenclature that shall be appropriate, dignified and stable. In consonance with this idea it is urged that all persons conferring names upon new varieties of fruits endeavor to select simple (and preferably) one-word names that are fittingly expressive of some character, quality, place, person or event associated with the source, time or place of origin of the variety.

The paramount right of the originator, discoverer or introducer of a new variety to name it, within the limitations of this code, is recognized and established.

#### Priority

A name once used in a group shall not be used again, provided that a name once established through long usage for two or more American varieties shall not be displaced for either or radically modified except when a well-known synonym can be used in its place. When no such synonym is available the varieties bearing identical names shall be distinguished by the addition of the name of the author who first described each, or some other suitable distinguishing term.

This code applies to all cultivated fruits including nuts, which are grouped together in common usage without regard to their botanical relationship.

The name first published for a variety shall be the accepted and recognized name except when contrary to the provisions of this code, and provided that names thoroughly established in American pomological literature shall not be displaced.

Names appearing in dated publications shall have precedence over those undated even though there be evidence that the two are of the same calendar year.

#### Form of Names

Names of new varieties shall be of one word preferably but two words will be accepted. Names of existing varieties shall not be changed in such way as to lead to confusion or loss of identity.

#### Spelling

The spelling and pronunciation of a variety name shall be the same as that of the person, place, substance or quality from which it is derived.

A possessive noun shall not be used.

A name shall not be formed by the compounding or hyphenating of two or more existing names, but this does not prohibit the formation of a one-word name by the use of parts of two or more existing names.

Neither Bartlett-Seckel nor Bar Seck may be used but Barseck is admissible.

The hyphen shall not be used between the words of a name.

Initials shall not be used as a part of a variety name, — e. g. J. H. Hale.

The use of such general terms as seedling, hybrid, beurre, damson, pippin, rare-ripe, etc., shall not be permitted.

An imported variety shall retail its foreign name provided it does not conflict with the provisions of this code or with an existing American name in the same group.

The name of a person shall not be applied to a variety during his life without his consent.

The name of a deceased person shall not be so applied except through formal action by some competent pomological body, preferably that with which the deceased was most closely associated.

### Registration

Names of new varieties shall be registered with this society and such registration shall be considered priority of publication.

Registration also includes, if known, (1) the name of the originator or discoverer; (2) the time and place of origin or discovery; (3) the parentage; (4) the derivation and significance of the name.

### Publication of Names

Publication consists (1) in registration as above; (2) in the public distribution of a printed name and description or characterization of the fruit; (3) in the publication of a new name for a variety described elsewhere under a different name, number, or other untenable designation, the synonym being given; or a varietal name may be established by current usage in the locality of its origin, when well known, and shall be considered as published and have precedence over a later printed name for the same variety.

Publication may be made in any book, bulletin, report, trade catalog or periodical bearing date of issue, and of public distribution.

### Type of Variety

The type of a variety is the fruit of the original plant; and type descriptions or illustrations shall be made from material produced by the original plant, or when this is not available, from a plant as near as possible to the original in a sexual reproduction, and preferably grown in the same pomological region.

### Description

The complete description of a variety shall consist of a detailed account of the detailed characteristics of the plant, foliage, flowers, fruit, and habit of growth, so as to distinguish it from other varieties of similar appearance.

### Citation

The full citation of a variety name consists of the name of the author who first described the variety, and the name, page and date of the publication in which the description first appeared.

An author-citation following a name refers to the author of the original description of a variety: e. g. Turley, C.P.C.

Names of authors and published works may be abbreviated, in accordance with the usages of this society.

C. P. Close,
N. E. Hansen,
E. R. Lake.

*Committee on New Fruits:* C. P. Close, Chairman, made a verbal report upon the work done, and requested an extension of time in order to bring the report down to 1920, — request granted.

*Committee on Plans and Policy:* This special committee reported as follows: The committee begs to submit the following tentative recommendations:

1. That the American Pomological Society employ a paid executive secretary as soon as the necessary funds for his employment can be secured. The executive secretary shall give his full time to the work of the society and shall be

officially independent of any state, provincial or federal organization. The executive secretary shall be paid a salary on a par with that of business executives of similar responsibility. He shall be responsible to the president and the executive body (committee) of the society, and shall be engaged on the recommendation of the president by the executive body (committee). The executive secretary shall be recognized by title and otherwise as on a par with heads of departments of horticulture in standard agricultural colleges.

2. That the society adopt a definite program for the registration, introduction, and exchange of promising varieties and seedlings of fruits.

3. That the society publish as soon as practicable a carefully edited monthly journal of good appearance devoted to the field of the organization, non-competitive in character.

4. That the society meet annually instead of biennially and that dues cover the calendar year.

5. That the society look with favor upon the affiliation with it of horticultural students in the American colleges teaching this subject, and that steps be taken at an early date to press the organization of students for this purpose.

6. That a vigorous campaign for membership be pressed.

7. That a definite effort be made at once to secure a fund of twenty-five thousand dollars ($25,000) to underwrite the business of the society and that an annual budget of ten thousand dollars ($10,000) be provided for.

8. That temporary headquarters be determined by the president and the executive body (committee) and that permanent headquarters be determined by the society in regular convention.

The above report submitted to the American Pomological Society in a regular meeting held at the Statler Hotel, St. Louis, January 1, 1920.

B. S. Pickett, Illinois, *Chairman,*
J. W. Crow, Ontario,
Laurenz Greene, Indiana,
Frederic Cranefield, Wisconsin,
Lloyd Stark, Missouri.

*Committee on Ways and Means:* Alderman verbally reported that the committee had been unable to reach definite action and as some of the members had been obliged to leave for home the work would have to be done by correspondence and they would try to report in time for the Executive Committee to consider their findings at the proposed early spring meeting of officers.

*Executive Committee:* This committee anticipating favorable action by the members upon the Junior Branch idea, and having in mind the several other proposed new activities, prepared a set of paragraphs dealing with the subject of changes in the constitution and by-laws made necessary by the adoption of the Pickett report. These amended articles were offered as items in the report of the

*Committee on Resolutions:* By McHatton, seconded by Hansen: *Resolved,* that the secretary be directed to solicit each agricultural college or experiment station management to set aside, cultivate and care for an acre, (or as much thereof as necessary) of land to be devoted to the propagation of meritorious new or little known varieties of fruit, the parents of which may be supplied them for such purposes by discoverers or breeders of new varieties, and the product of which, may be distributed to members of the A. P. S. through its official channels.

In fuller explanation of the merits of this resolution Messrs. Hansen and Macoun stated that it was their belief that breeders in experiment stations in particular were anxious to attain a wider distribution of their more promising varieties than is practicable at present. That if the colleges and stations would participate in this kind of a project it would do much to build up a wide interest in the testing out of new fruits: and by the method proposed would enable the originators to get their new varieties into the hands of the persons most interested in such work, thereby obtaining a much earlier and more reliable rating upon the merits of the tested material. — Secy.

By Cranefield; seconded by Lake: *Resolved,* that Article III of the constitution of this body be amended to read as follows:

The membership of this body shall consist of Junior, Annual, Society, Life, and Honorary members.

1. The fees for membership shall be as follows for the calendar year: Junior, one dollar per annum; Annual, two dollars per annum; Society, ten and five dollars per annum respectively (see Paragraph 15 of the by-laws); Life, $100 in one or two payments.

2. Libraries and educational institutions may become members upon payment of fifty dollars; such membership to be designated as institutional and to be limited to a period of thirty years. This membership carries with it the right to receive one copy of all publications issued by the Society.

3. Honorary membership, in recognition of eminent services in pomology, may be conferred upon any person, who has been regularly nominated by the Executive Committee and whose nomination receives a two-thirds vote of approval by the members present at a regular meeting.

4. *Junior Patron.* The title of Junior Patron may be conferred upon any person, who contributes at any one time, to any of the permanent funds of the society, the sum of $500.

5. *Senior Patron.* The title of Senior Patron may likewise be conferred upon any person contributing in similar manner $1,000.

The nomination and election of patron shall be made in the same manner as for honorary membership.

*Cranefield*, seconded by Lake: *Resolved*, that Article IV of the constitution be amended to read as follows:

The regular meetings of this society shall be held annually at such time and place as the Executive Committee may decide.

*Special* meetings may be convened upon the call of the council or by the president on the petition of a majority of the members.

By Cranefield, seconded by Lake: *Resolved*, that Article V of the constitution be amended to read as follows:

The officers of this body shall consist of a president, a vice-president, first and second state vice-presidents, secretary, assistant-secretary, and treasurer, all of whom shall be elected by ballot, or otherwise, at the annual meeting, and who shall hold office for one year or until their successors are duly elected and qualified:

*And, further;* that the language of the other articles of the constitution, and the by-laws be so modified as to conform with the purposes of the above amendments.

By Lake, seconded by Cranefield: *Resolved*, that Article VII of the constitution shall read as follows:

(See Art. VII Constitution (revised).

By Cranefield, seconded by Lake: *Resolved*, that the by-laws of this body be amended as follows:

16. The voting privilege of this body shall be exercised by those life, society, and annual members who are in good standing and whose dues are paid for the current year.

By Dean, seconded by Dickens: *Resolved*: That the thanks of this society be extended to Mr. F. A. Wiggins of the Washington Nursery Company, Toppenish, Washington, for his very kind and generous contribution to the substantial pleasures of the meeting, in the form of a fine box of Rainier apples. "May his name long continue to be a joy on such occasions; and may his kind multiply and prosper unto the ends of this glorious old earth" and, be it further

*Resolved*, that we extend to the management of the Hotel Statler, our appreciative thanks for the courtesies extended in prompt service, delightful meeting rooms, and for a congenial and restful atmosphere all about our 36th biennial sessions.

M. L. Dean,
Frederic Cranefield,
J. P. Stewart.

*The Wilder Medal Committee* reported that a silver medal had been awarded Stark Bros. Nurseries and Orchard Co., Louisiana, Mo., for a meritorious new yellow apple exhibited under the name of Golden Delicious.

# AMERICAN POMOLOGICAL SOCIETY

## COLUMBUS, OHIO, DECEMBER 1-3, 1920

The Thirty-seventh session of the American Pomological Society was held in Columbus, Ohio, December 1-3, 1920. The first session was called to order in the Auditorium at the State Fair Grounds at ten-thirty a. m., December 1st, by the Vice-President, Professor W. T. Macoun, Ottawa, Canada.

W. T. MACOUN: I declare the Thirty-seventh Session of the American Pomological Society to be open. The Secretary will read some communications.

The Secretary, Professor E. R. Lake, read the following letter from the President, Dr. L. H. Bailey.

ITHACA, NEW YORK, Thanksgiving, 1920.

MR. E. R. LAKE,
*Columbus, Ohio.*

DEAR SECRETARY LAKE:

I send you greeting and good wishes. You and the members of the Executive Committee have kept the faith and have worked diligently under difficulties. I trust you will be rewarded by a good convention.

I should like to be with you, to see the result of your efforts and to renew acquaintance with the men and the fruits. The plans to which I devote my later years allow of little in the way of extras; I have been glad to contribute what little I can spare of such extras to the cause of the American Pomological Society.

The purpose of the Society is succinctly stated in the constitution to be "the advancement of the science of pomology". To this definition we may still adhere; but as the science of pomology has undergone such fundamental changes since the constitution was made, so must the Society modify and enlarge its declarations.

Pomology is the wisdom of fruits. Once the growing of fruits was a highly personal practice, and the product was placed mostly in the home of the producer. To obtain new "sorts" was the great ambition. To test these sorts was the special delight of the amateur; and when a company of amateurs came together there was a convention of congenial spirits.

Now pomology is a vast interest, with market quotations, and large plans for the extension of trade. The community interest in the growing of fruits has become so insistent and so extensive as to express itself in great public programs, even in policies and legal enactments. The industry must be defended in a large way against diseases and pests. Great new regions must be opened for planting. Bold plans of marketing and transportation are devised. Cooperation on a new scale is a necessity. International relations must be established. Fascinating technical and scientific problems arise.

The old amateur interest is not dead. It can never pass if fruit-growing for commerce is to remain. The love of fruits must precede the sale of fruits. So it is that the American Pomological Society holds securely to its history. Yet it is not confined to its history. It must properly cover the field named in its title and in its constitution. It may stimulate and safeguard the entire industry, amateur and commercial.

The Society may be a gathering body, collecting all the information about the origination, propagation, growing, handling, transporting and placing of fruits, in this country and abroad, keeping this information for the quick and ready use of any person who inquires. It need have no restrictions against dispersing this information on call. It may be a clearing-house. It may compile information

for its members. It may keep the literature, index it, and answer questions. Without being itself a trade organization, but affiliating with such organizations, it may have opinions and data on marketing, tariff, quarantine, storage, transportation, and the relation of the industry to the public welfare. It may welcome and encourage every effort in investigation that looks to a better understanding of the growing of fruits. It may encourage students. It may join hands with all pomological and horticultural societies. It may rightly have a voice in public policies.

To accomplish these objects, the Society should have a permanent home, with test grounds, library, a paid secretary, and sufficient equipment to represent the expanding interests of pomology.

To this end we should constitute new committees, to represent the expanding field. Committees are needed on legislation, quarantine, transportation, marketing, export trade, and others, in addition to those representing the amateur and traditional interests. The Society cannot remain merely a fruit growers' convention of the old type. Keeping the old, or as much thereof as may be needful, it may also cover the new and yet not interfere with any interest not separately organized.

I trust you will see the promise of the future in the convention at Columbus. I wish to extend to you personally my appreciation of your allegiance to the Society in its dark days and of the excellent effort you have made to hold it to its course.

Sincerely yours,

(Signed) L. H. Bailey.

## ADDRESS OF WELCOME

**F. C. Brown, Ohio**

Mr. Chairman, Ladies and Gentlemen: This grand old State of Ohio has been the recipient of many honors. Our hearts filled with pride when we awakened to the realization that Ohio was the proud possessor of two World's Champion baseball teams in two successive years. Our joy knew no bounds when the football team of our own Ohio State University won the championship in the Western Conference, and when Ohio was represented by three presidential candidates, one of them eminently successful, we seriously discussed building a fence around our State and charging a fee for admittance. But there remained only one thing to fill our cup of joy to overflowing — to be the host of the oldest and most honorable organization of its kind on this continent — the American Pomological Society.

We of the Ohio Horticultural Society honor you for your worthy years. You were old enough to vote when we were born. We honor you for the splendid pioneer work which you have done in scientific research through such men as Wilder, Downing and Barry. We love and welcome you because you are unselfishly interested in the scientific growing of fruits, because you are the highest authority in matters pomological in America, which is the greatest producer of commercial fruits in the world.

We thank you for having come to us. We hope your stay will be a pleasant one, and it is the dearest wish of our hearts that you may see fit to tarry with us indefinitely. I thank you.

W. T. Macoun: I will ask Professor Taft, who has been the Treasurer of this Society for many years and who is one of the oldest living members, to say a few words in response.

## RESPONSE TO ADDRESS OF WELCOME

**L. R. Taft, East Lansing, Michigan**

Mr. Brown has just taken my breath away and I am wondering what the Society has to bring to you. We are very sorry that we could not bring with us our President, who would have responded to this address in eloquent terms; but he has been called away and we are rather illy provided with a spokesman so far as I am concerned.

We appreciate the kind words of the speaker and are very glad to come down to Ohio at this time when you are putting on your Fruit Show. I have been very well pleased in looking it over this morning and I am sure that we will all profit by this Show. We thank you for your Address of Welcome.

W. T. MACOUN: Before calling on those who are to speak on some of our continental fruit problems, and in the absence of Dr. Bailey, I should perhaps say a few words as presiding officer.

Those who have come to this meeting this morning and who know little about the past history of the Society may think it is not an important one. When we look at an old man who is beginning to go down we may think that that man has not a great record behind him; but he may have been one of the most important men in America — he may have been President of the United States or some one equally as important who has a record behind him. Although we have a very small body of men and women here this morning we must not judge by appearances. This is a very old Society and has a great record behind it which you can find in the many volumes which have been published of its work, and just as an old man sees a vision of the coming age of progress which is to be, so we who have been in this Society a long time and have been conducting its affairs in certain directions feel there is now a turning point in the history of the Society and at this convention it is our hope to infuse a new spirit into the Society, a spirit which will combine all the movements in horticulture in America today.

This American Pomological Society was founded in 1848 by men who had what might be called narrow views of horticulture. They were very fine views and I think the highest type of horticulturists existed in those days, men who thought nothing of the money they would make out of fruit but were growing purely for the love of the fruit. These men, because they felt it a patriotic duty and because they loved these fruits, organized this Society in order further to promulgate fruit growing in America. They did their part well, but there came a time when it was found that money could be made in fruit growing and many men who loved fruit for its own sake thought it would be a good idea to combine business with pleasure. The result was that we had commercial fruit growing organizations established. They came to the experiment stations with their large collections of fruits and vegetables and all sorts of things and their large collections overshadowed the fine, though small, collections which had been built up by the men who first established this Society. The younger men did not make such collections of fruit as the founders of this Society had done. The result was that in time, as the work of the experiment stations grew and as the professors at those stations overshadowed in a way by their work and experience the work of the amateurs, the interest in this Society lessened. We could not get to our meetings the men who really loved fruit for its own sake, because they felt they would be overshadowed. At least that is my view of the matter, and for the last few years the attendance has been rather small. But it is now felt that we should try to interest all those who are engaged in growing fruit in America, both commercially and for the love of the fruit. It is hoped at this convention to devise some means of bringing this about.

I want to say these few words in explanation of this relatively small meeting. I repeat that you must not judge by appearances. Those who are here this morning have come to get some information and to try to do something for this Society.

## OUR CONTINENTAL FRUIT PROBLEMS

We have this morning quite a number of speakers to discuss "Our Continental Fruit Problems." Those who live in different parts of the country know that each has its own peculiar problems and it is the thought of those who prepared this program that by bringing out a discussion of these problems some general plan could be devised for the solution of these problems that would be valuable to those living in different parts of America. Our first speaker will be Mr. W. S. Blair of Nova Scotia.

W. S. Blair (Nova Scotia): *Mr. Chairman, Ladies and Gentlemen:* I do not know that I can add very much to the program this morning. In fact, I did not know until this program was put in my hands that I was to address this convention. It is certainly a pleasure to have the opportunity to come here from Nova Scotia and meet with the different pomologists of the United States and through them make it possible for me to improve conditions in Nova Scotia. As compared with some of your states we have a small acreage, yet at the same time our proposition is about the same as yours. Our markets are the Old Country, especially Holland, Great Britain and different European countries. The various problems that confront us are no doubt similar to yours. You have the question of transportation, which probably is our biggest problem at the present time. Another problem is to get our fruit into the hands of the consumer in the best condition possible and in the shortest time. This matter of transportation it seems to me is a continental one because we are facing serious difficulties on every hand and probably the best thing we can do is to get together on some of these transportation problems and solve them to the best interests of fruit growers. For instance, we have to pay the steam ships from Holland and Great Britain a toll of $2.25 per barrel, and not only that, but in order to get our fruit carried we have to prepay the freight, so if the fruit does not turn out as it should we have to stand this loss.

Then again we have the matter of packages. We are shipping largely in barrels. A good deal of the time we furnish our own cooperage. We get our own hoops by cutting down birch trees, and in this way we can get our barrels at from 65c to $1.05 each. The price, of course, varies according to the condition of the market so far as barrels are concerned. That is, if the fruit crop is large it is difficult for us to supply the barrels that are necessary. However, it makes us a very good package. This package, as you know, has been standardized, so that our Nova Scotia barrel is the same as the barrel you have in the United States. There is a great contention now as to whether we should not use boxes more than we have done. The question that confronts us in this connection is that we have not skilled help to handle the large bulk of fruit that we have and place it on the market in boxes, because

we find that men can handle barrels of apples much more easily and skillfully than boxes. Where we have about a half million barrels of apples, as we did this year, and where help is scarce, it is practically impossible for us to handle boxes at all. A certain amount of fruit is being shipped in boxes, but the largest part of it is shipped out in barrels. In this regard our problem is no doubt similar to yours and the thing resolves itself into this — whether we can get satisfactory help to handle our fruit in the best way.

Then we have the question of getting more efficient help — how are we going to bring it about? Of course we have our colleges which are doing a great work in training boys in pomology, but there is a careless tendency at the present time in the average help you get — absolute carelessness and irresponsibility. We are endeavoring as far as possible to overcome this, but it is one of the big problems in our fruit sections. Then we have the question of waste and on every hand we see a great deal of waste of fruit in the orchards at picking time, and this inefficiency of help and waste of fruit all counts in the development of this industry. It is not only more difficult for us to produce fruit, but to place it on the market in the best way. So if we can do anything as a fruit growers' association to encourage more care in the handling of fruit, more care in its distribution, and more care so far as packages are concerned, it will go a long way to improve the conditions that exist at the present time.

In all of these things we must have help through legislation. We must have help from business men and women, and from men who are at least temporarily in power. They must assist the fruit industry by making it possible for the fruit growers to have the assistance they should and the backing they should in order to bring about better conditions in connection with the fruit growing industry.

The fruit growing business, as we know, is a very complicated one. There are so many different things which influence our products. If we are careless in spraying of course our products will contain a lot of waste, and consequently the consumer will have to pay more for the fruit we do sell. These things all bear upon our continental problems so far as the fruit business is concerned. In Nova Scotia we are trying to meet these problems by encouraging the very best methods of spraying and by doing the spraying in the quickest way, by dusting and with the best outfits. We are doing everything possible to require our people to place upon the market fruit of a fairly satisfactory quality.

Another thing I think we should consider in connection with the development of the fruit industry is that we must have a better understanding among the leading pomologists as to varieties — varieties suitable to certain sections, varieties which should be grown in those sections, and varieties which should be put on certain markets. A closer understanding between pomologists in this regard will assist us very materially in getting certain fruits on certain markets at certain times. For instance, we know at what time we can place our Kings, our Ribstons, and our Cox apples upon the English market. If we do not catch a certain boat we do not get the prices we should. Then we should have a better understanding as to the varieties suitable for certain sections. That

was the first idea of this Pomological Society — that certain varieties might be tested in certain sections. At the present time this has been lost sight of in a measure. That is, you may have in Virginia certain varieties which are suitable and good there; you may have developed some new varieties there. We may not hear of them for some time in Nova Scotia, and while they may be entirely unsuitable for us, yet at the same time if there was any means whereby we could be testing out at some of our experiment stations and passing on that information it might be of great benefit to the fruit growers in the different sections.

You will see in the exhibit here some varieties from Nova Scotia and you will notice a great number of English varieties. These varieties are grown in England at a profit, but they may be of no use throughout the United States. A few of them are useful with us. For instance, the Cox Orange apple a few weeks ago sold in the English market at $32.00 a barrel, showing that if the people like a certain apple they will pay for it. That apple might not be suitable to you. It should suit our conditions in Nova Scotia because our climate resembles somewhat the English climate. We are now testing some varieties that grow well throughout the United States. We have Stark Delicious. It proved a wonderful success the past year. The reason was that our mean temperature during the summer was two or three degrees higher than normal. That may not seem very much, but it makes all the difference in the world in the development of certain varieties of fruit. In normal conditions in our climate Stark Delicious does not get sufficient heat for development by harvest time and as a result it is questionable whether it would be a profitable apple for us. The common Stark apple on the other hand is a very profitable apple.

I just want to bring out this point in connection with our problems, and that is that we must take a definite stand in the testing out of some of the newer varieties of fruit and in that way ascertain in what sections certain varieties are profitable. Furthermore, changes are being made all the time and new varieties placed on the market. New varieties are being studied, and the work of Mr. Macoun and Dr. Downing in this direction is certainly worth while.

I think this is all I have to say and I thank you for calling on me to represent Nova Scotia.

W. T. Macoun: Mr. Orlando Harrison of Maryland is here, and we will be glad to hear from him.

Orlando Harrison (Maryland): *Mr. Chairman, Ladies and Gentlemen:* — I do not know of anything I could say that would be of benefit to these men here, because I think each one probably knows the conditions that exist in our section of Maryland. We are near the ocean, only forty-four feet above sea level.

I was interested in the varieties that seem to do well in Nova Scotia. In Maryland we have the Yellow Transparent, Williams Early Red, Duchess and Wealthy. The Stayman Winesap, however, is one of our main varieties on the eastern shore. To my mind the point brought out in reference to varieties is very important, and following the literature of the Pomological Society for a number of years I think this Society

has done a great work in leading the way and educating young men and women in the value of different varieties in different sections.

W. T. MACOUN: Is Mr. Reeves of Iowa here? We would be glad to hear from him.

E. N. REEVES (Iowa): *Mr. Chairman, Ladies and Gentlemen:* For years I have been wishing to attend a meeting of the American Pomological Society, and I was very much gratified when the opportunity came at this time to meet with you. I have read the reports of the Society and recognized, as the speakers have said, that the American Pomological Society is doing a great work in organizing and pushing forward the fruit interests of the country. I think that now is an opportune time for men interested in fruit growing to develop this industry to a wonderful extent, much greater than ever before. In each state we find there are certain varieties peculiarly adapted to that state, and I have noted this clear from the eastern border to the western coast states. If you look over the exhibits of fruit here in the hall you will see a difference in the development of certain varieties in each state. For instance, Golden Delicious grown in New Mexico is a very small apple; New Mexico grows a small, fine-grained apple of very good quality. But you will notice a difference from those of northern California, where they grow large, fine-looking apples. And then farther north in Oregon and Washington they grow a smaller apple. Then as you go farther east (I ask pardon of the western men in the room) you get a higher quality of apple until you get to the coast. My observation has been that there you get the very highest quality of apple, especially when you get to a certain altitude.

In the Mississippi valley, where my home has always been, we have had many difficulties in growing fruit, and we have had some remarkable pioneers in fruit growing. Mr. C. G. Patton has been our leading pioneer and has been in attendance at the meetings of this Society. A few years ago he was honored by receiving the Wilder medal for an exhibit of seedlings of his own propagation. He has been experimenting in horticulture most unselfishly for something over a half century, especially in the development of seedling apples. He has developed some of remarkable value, although they did not come up to his ideals. He has now retired from that work and has sold his experimental orchard to the state, and the State College, under Professor S. A. Beach, father of your Professor Frank Beach, is in charge of that now. At the Mid-west Fruit Show they had an exhibit of a large number of these seedlings, some of undoubted value. So I consider that Mr. Patton has contributed much to fruit growing throughout this country.

At the station at Ames, Professor Beach and Professor Lantz have been doing some remarkable work in regard to seedlings. They have shown that the Ben Davis, which is known the world over and perhaps more extensively grown than any other variety, is practically worthless as a parent in producing seedlings. It has so far produced nothing of more value than itself. The Jonathan, on the other hand, is wonderful from the standpoint of being a parent of good varieties. Doctor Patton and the stations have made thousands of crosses and kept a record, and now they are coming into bearing. In looking over the collection at

Council Bluffs at the Mid-west Show there were quite a number of seedlings, a cross between Jonathan and Salome. The Salome is a long keeping apple — that is its value. The cross between the Jonathan and Salome is remarkable in producing an apple of high quality and a good keeper. So we may look for information of much value in that direction.

I regret that the old members of this Society could not be here to see this show of fruit, to see the new things that are coming on, the old things that must pass away, the new things in a commercial way. Many of us have just been experimenting for the love of the results we would get and not for financial gain, while from now on the matter of fruit growing must become more and more a commercial enterprise.

In northern Iowa we have very few varieties of real commercial value. We have the Duchess and the Wealthy, but beyond that we have few that are really good. Southern Iowa has a long list of good varieties. The Jonathan grows to perfection all through southern Iowa, while in the north they can not grow Jonathan to any extent. Grimes Golden grows in the southern part of the state, and the Stayman Winesap and a good long list of fine varieties and we are looking for still better varieties. We think we are just on the verge of getting results from the experiments that have been carried on.

I come more as a spy to hunt out information than to tell you anything, although if I have any knowledge that would be of use to any one it will be gladly imparted. I thank you for this opportunity of speaking to you.

W. T. Macoun: I notice Mr. W. M. Scott of West Virginia in the room and I would like to call on him to say a few words.

W. M. Scott (West Virginia): *Mr. Chairman, Ladies and Gentlemen:* My name not being on the program I had not expected to say anything today. However, I have had an interest in the American Pomological Society for a good many years, and came to meet some of my old friends and acquaintances and to see whether I could contribute anything to the good of the Society. It is very regretful that there is not more interest manifested in this Society at the present time. I have addressed the American Pomological Society on two different occasions when the attendance was in the neighborhood of one thousand. Of course, they were more or less special occasions — one at the Jamestown Exposition and the other the meeting in Washington, D. C.

In regard to the continental problems referred to on the program, it occurred to me that I might mention a few of the objects of the American Fruit Growers' Association, an organization which was intended to help solve some of these problems. Mr. J. C. Crutchfield of Pittsburgh, and Chester Tyson, a large apple grower of Pennsylvania, known to most of you, conceived the idea of organizing the fruit growing industry on a large scale for the purpose of working out some of these problems. From that original conception grew the American Fruit Growers. It acquired a group of orchards in West Virginia, another group in Maryland, another group in Pennsylvania, one orchard in Virginia, a group in southern Illinois, a group in the Wenatchee valley, another in Yakima valley, the citrus operators in California and in

Florida and vegetable interests in different sections of the country. One of the objects was to distribute the risk so that frost in one section would not necessarily mean failure for the company. The orchards were selected with respect to frost risks and climatic conditions favorable to the production of good fruit, soil conditions and other things being taken into consideration. In connection with that a market department, the nucleus of which was already established in Crutchfield and Woolfolk Company, was built up and produce houses belonging to the company were established in several of the principal markets, the company being represented either by salaried representatives or by brokers in other markets, so that the production and marketing and the distribution ends of the industry are coupled together. One of the largest operations of the company is the handling of products for other growers. These orchards and vegetable interests furnish the nucleus for building up facilities to handle crops for other growers and it is expected that they will be able to benefit the industry very materially in that way. You will perhaps be interested to know just how we operate the production department. The holdings are divided into districts and we have a district manager for each, with an orchard manager in each orchard. As you know, there is a grave doubt in the minds of most people as to the success of absentee ownership in orchard operations. It has been our endeavor to substitute orchard managers for the original owners in such a way that the orchards will be handled just as carefully as they would be if the manager owned the orchard himself. That is the point to which we have been working and I think we have been successful in part at least. We believe that we can handle these properties scattered over the country successfully, at least in many respects more successfully than the individual growers. I thank you.

W. T. Macoun: The next man on our program who is present is Emmor Roberts of New Jersey. We will now hear from him.

Emmor Roberts (New Jersey): New Jersey is very much interested in the fruit game and several sections have been planting very extensively the past few years. If I had had a few minutes to look this up I could give you the approximate number of peach trees that have been planted in the last few years. I would not venture at this time to give it without looking the matter up.

We feel quite optimistic in New Jersey over the fruit industry. Of course, in the last year we have not received as good prices as we did in the two or three years previous, but still the planting has been quite heavy. We are planting chiefly apples and peaches; a few Kiefer pears, but only a few; some cherries, particularly Montmorency; and for peach varieties we plant mostly Elbertas. One-third of our peaches are Elbertas, and the other varieties are probably the Carman, a few Fox, and some Iron Mountain. But we are most successful with the Elberta peaches, and especially the late varieties. In apples we plant the Duchess, the Wealthy, Northern Spy, Delicious, and Grimes Golden. We plant a few Jonathans, but not as many as Delicious. For myself, the Stayman Winesap is the best apple, and the Rome Beauty is being planted quite successfully. For the very late varieties there are five or six we are planting, the Paragon being the most popular variety and next to that

the old-fashioned Winesap. There are sections where they plant far more old-fashioned Winesaps than any other variety.

I certainly wish I had been given time to think over this subject. We do feel this, that New Jersey in many ways is suitable for apple production. We are situated between New York and Philadelphia, so the markets are near by. If we can take as our profit what it costs other sections to market, we are getting a fairly good profit, but we must turn our attention in the future largely to the question of distribution and marketing. If we get together we feel that we can dispose of our fruit crop profitably and we are very hopeful about it.

W. T. Macoun: While there is no one on the program from Virginia, Dr. Guerrant has come in and we will be glad to hear from him.

Dr. Guerrant (Virginia): I am like these other gentlemen — I am not on the program, but if I can say anything that will be of any help to the Society I will be glad to do so. I live in the Piedmont Valley, Virginia, about fifty miles from the North Carolina line. We are in the "Pippin Belt." The Albemarle Pippin is grown there to perfection, but if I were planting apples today I would not plant Pippins in that soil because it is a clay soil and it is hard to make these apples grow. We can make more money from the Ben Davis than Pippins. That may be heresy, but it is the truth. Our finest apple is the old Winesap. There is nothing equal to it for keeping and selling. I brought a barrel with me and I hope you will see them. We are not planting a great many apples in our section. We plant some Staymans and some Delicious, but chiefly the Albemarle Pippin, the old Winesap, York Imperial and Ben Davis. We grow some Black Bens, but they do not produce well. The Staymans and Delicious grow and produce well.

Our greatest problem today is that of transportation. It seems to me that we have to pay too much to get our apples to the consumer. We get $4.00 a barrel for York Imperials, but I do not know what the man pays who finally gets these apples, but I suppose the prices are high like other things. Last night I asked a fellow in the car what he paid for a couple of Grimes he had, and he said "two-for-fifteen." There is too much difference between the man who grows the apple and the man who eats it. What we are going to do I do not know.

Another serious question is what we are going to do with the waste apples. We are not supposed to grow culls, but we have a few of them in our section and we would like to know what to do with them. One year there was a great demand for canned apples and we sold everything we had to the canners; but this year the apples were there and nobody wanted them. We can scarcely sell culls to anybody. One of the most important by-products in our section is what we call Apple Jack. I do not know whether you are familiar with it or not. It is alright if you know where to get it.

I am very glad indeed to attend this meeting of the American Pomological Society. I have only attended one or two meetings but it is a great privilege to get together and discuss our particular problems. Fruit growing is a great industry. Last year in our section we were

spoiled by the prices; we really got too much for our apples. We sold Pippins for seven-fifty a barrel, F. O. B., and a man came this year offering four dollars, which of course did not make us feel very good. I do not know what to do about it, but I think we were spoiled last year. This year our barrels were much higher; they cost from $1.00 to $1.15, and a poor barrel at that, with chestnut staves and pine hoops.

I have to haul my apples eleven miles over a rough road. We are somewhat favored by that, because we are back in the mountains where we do not have to pay high prices for labor. Most of it will run from twenty to twenty-five cents an hour. We have a good many people in our section of the country — the mountain people are prolific. I have four men working on my place who have forty-four children between them, so we have a pretty good prospect of labor down there. I do not know what the population is now as I have been away several days. I thank you.

W. T. Macoun: We have a telegram from Professor Blair stating that important engagements will prevent him from being here. I do not know whether Doctor Fletcher is here or not. I have not seen him.

Prof. F. N. Fagan (Pennsylvania): Dr. Fletcher sent word that it is absolutely impossible for him to come to the meeting this year and asked me to bring his best wishes to all his friends. I do not think he knew that he was on the program.

Our growers felt very nervous this year, as in every state east of the Rocky Mountains, wondering if they were going to get a crop and if they did what they would do with it. I think the most regrettable feature of this past season's work in Pennsylvania has been the economic waste that has taken place in our uncared for orchards. We had probably the largest crop that Pennsylvania has had for many years, and when we look at the records of the state of Pennsylvania we find it ranks high as an apple producing state. But when we look the state over carefully we find enormous waste comes from the farm orchards. Pennsylvania is one of the leading states for good-sized farm orchards of probably two hundred and fifty to three hundred trees which are not cared for at all. That product has gone into our markets in Pennsylvania as bulk stuff, thousands of bushels, and I suppose more cider was made this year than ever before and more apple butter; but the by-products have gone down hill. We are splendidly situated in Pennsylvania, and we can grow practically all the commercial varieties in some county of the state. We can grow Baldwins, Spys, Staymans, Grimes Golden and Delicious some place in the state. But our most serious problem is the large economic waste. From the fruit growers' point of view this fruit should be all loss, for it is unsprayed and uncared for and really has no place on the market. But the fruit growers of Pennsylvania are really not downcast. I think they feel rather optimistic in regard to fruit growing in the coming year. Years such as this do not happen very often and we are fortunate that we have been so successful in the past. Our peach industry fared well this year. We had a good growing season and good market for the fruit.

## WEDNESDAY AFTERNOON SESSION

The Wednesday afternoon session was called to order at two o'clock by the chairman, W. T. Macoun.

THE CHAIRMAN: We will now come to order for our afternoon session. It has been the custom at the various conventions of this Society to have as much information forthcoming as possible in regard to the fruit grown in the part of America where the convention is held, so this afternoon a group of men from Ohio will give a symposium on Ohio Fruit Growing. I will first call on Mr. W. J. Green.

## OHIO SYMPOSIUM

W. J. GREEN (Ohio): *Mr. Chairman, Ladies and Gentlemen:* If we had had time to get together and put all that we are going to say in one paper it would be a much better presentation of the matter than each man talking separately. But we will try to give you an idea of fruit growing in the state of Ohio.

We have not such marked fruit belts in Ohio as in some other states although we do have one or two fruit belts. Along Lake Erie we have a very excellent section for peach culture and it has been well worked up. I can not give you statistics on that subject. I know they grow large, fine crops and for the most part sell to good advantage. There have been attempts made at different times to work up other peach belts in Ohio, one near Coshocton and another in Muskingum County, and still another near Athens; but they have all been wiped out either by bad methods or management. They grew their peaches mostly in grass, but they did not succeed, and the business has been entirely given up in those counties.

Our apple belts are not so well defined as the peach belts. We can grow apples in all parts of the state except in the northwestern part on black land. We have no trouble whatever to find good apple soil with plenty of elevation in nearly all parts of the state. They are not all alike, some parts are better than others, and certain varieties are adapted to certain locations. I do not know that we ought to say that southeastern Ohio is the best section for apple growing, although it is excellent. For certain varieties it is the best. For Rome Beauties it is the very best in the state, and I am almost inclined to say the very best in the United States. That apple will grow there better than any place I know of — in two or three counties along the Ohio river — provided they give it sufficient elevation. The Rome Beauty does not color on bottom lands, and yet it is grown to a great extent on bottom lands along the river; but it does best on high land provided that soil is rich enough to get a good crop of apples. But as I said, the belt for apple culture is not well defined. You can find good apple sections in other parts of the state away from the river, but they have not been developed to the same extent. Eastern Ohio was the first large commercial apple-growing section, or at least in eastern Ohio for years they grew more apples than in any other part. That is not true now, but still they are growing a good many in that section. Northwestern Ohio, the black land, is not well adapted to the growth of apples, but there are certain sections here

and there that are excellent, although they must pick the varieties for that section.

The Grimes Golden does much better in southern Ohio than in the northern part, that is, as far as color and size are concerned. Perhaps the quality does not vary so much as the appearance and size. In northern Ohio I would not want to plant the Rome Beauty. Some do, but they cannot get the color. They can not grow as good Grimes in northern Ohio as in southern Ohio. But I would like some other members to take up this topic and particularly discuss the varieties.

There are a good many questions connected with apple culture that are giving us more or less trouble, but I do not know how much I had better go into that. We have from the very start been pretty well in the front in the matter of spraying for different things, and fortunately after the experiment stations had got this work thoroughly started and made a few demonstrations there were a number of men in the state who were public spirited enough to take hold of the matter and help along. The stations did not have the means to go into it extensively. They went as far as they could, and then such men as Miller and Cox and Farnsworth continued the work they had begun, and I am sure these men had more influence in getting spraying well on its feet than the experiment stations. We have always found that where there are good men like that, men with influence, they do more good in carrying on the work and getting it before the public than the stations themselves, and I say we have been very fortunate in getting help from these men. I do not say we were the first in Ohio to do spraying, but we were among the first, beginning the work early in the 1880's. I may say that the first work the station did in Ohio in spraying was with what we called the dilute Bordeaux mixture. Bordeaux mixture had been used in various strengths, mostly about six pounds to the barrel. We reduced that quantity and were extremely successful in doing so. We have always carried that on here, even up to the time we had to give up Bordeaux and take lime-sulphur in its place.

In regard to apple blotch, I simply want to say that I think we have blotch pretty well under control and we have not had very much trouble concerning it.

I know there are other members on this list who can make a much better talk that I can, so I will leave the field open for them.

THE CHAIRMAN: We have had this excellent introduction to the subject of Ohio Fruit Growing, and I will ask Mr. Yaple to continue it.

L. B. YAPLE (Ohio): *Mr. Chairman and Fruit Growers:* I do not need to tell anybody the situation we are in just now. We all know that production costs so much that the outlook is quite discouraging. I am frank to say that I expect it will be several years before we get that proper coordination between production and selling prices that will make the fruit growing industry entirely satisfactory. You all know the sudden drop in our product this fall and I do not anticipate there will be a return to the old time prices we have been getting during the war, at least not for several years. But, my friends, I am not discouraged as to the outlook. Most of you know that before the war, before this great inflation of prices for our products, the fruit growing game was a

good game and there certainly is every reason to expect that this condition will return. In looking forward I see nothing to discourage any man in fruit growing provided he has a good location and proper surroundings. The market will stabilize, labor and other costs are bound to come down, and when they do I see no reason why the fruit growing game will not be a very good one. In my own personal experience in fruit growing in southern Ohio I am expecting from year to year an increased trade among the farmers of my own community. I do not live in an exclusive fruit growing section, but in a mixed agricultural section where there are some farmers and some fruit growers, and I think we all feel that our trade among the farmers is increasing from year to year. We are getting quite a trade from that source that we did not formerly have. I think the reason is that in former times it was not considered as important to produce clean fruit as in these days. Spraying is now absolutely necessary to produce a usable grade of fruit and the farmer is finding that fruit growing and farming are entirely separate lines and he is becoming the customer of the commercial fruit grower. It seems to me this is to the advantage of the fruit grower. In my section of southern Ohio the farm orchard is more and more neglected. Very few farm orchards are planted, practically none of our farmers ever spray, with the result that they do not get apples that are usable from their own orchards, so they are becoming customers of the commercial apple growers in their vicinity. So it looks to me that when the adjustment period has come and we have gotten the right ratio between cost and selling price there is no reason that the apple growing game should not be as good as it has been in the past. True, we are now in a very discouraging position. It is hard to tell what is coming in the next few years, but there certainly will be an adjustment and things will be in a more normal condition, even better than the prewar condition.

I want to revert to a remark made by Mr. Green about Ohio as an apple producing state. I do not know whether you men from the other states realize that in Ohio fruit is produced under conditions that are diametrically opposite. This difference is between the northwestern and the southeastern parts of the state. One is the low river bottom land, a black, sandy loam soil, and the other is a clay soil. They are both remarkably successful in fruit growing. The soil conditions could not be more diverse than we have in this state. I have seen apples growing on the black river bottom soil as Mr. Farnsworth is doing, and I have seen them grown on the clay soil of southern Ohio and the older I get, ladies and gentlemen, and the more I see of apple growing in this state, the more I make up my mind that it is the man behind the gun that makes the orchard more than it is the difference of the soil and location. I apprehend that it is not true over the whole United States, but in this state of Ohio if a man wants to engage in fruit growing, if he is willing to work and will study conditions in his own neighborhood, I do not think it makes very much difference where he goes in this state to engage in that line of work.

So I say we ought not to be discouraged. By taking a broad-gauge view of the situation I think we may look into the future without any discouragement. I thank you.

THE CHAIRMAN: This most excellent symposium will be continued by Mr. U. T. Cox.

U. T. COX (Ohio): *Mr. Chairman, Ladies and Gentlemen:* Like all the rest of the speakers, I did not know I was on the program. We decided to make an exhibit up here and I thought I would haul my fruit for this exhibit on a truck. I live in southern Ohio about one hundred and fifty miles away. Unfortunately, I shipped the larger part of the fruit by freight. I started the freight shipment several days before the truck, and we were up here several days before it got here. That was not all that made me a little skeptical — we used to ship fruit at about thirty cents a barrel, but now it costs near seventy-five cents. If it were for exhibit purposes only it would not be so bad, but it is the same for the fruit that the consumer purchases. The consumer has to pay so much for the fruit that he is discouraged. The fruit growers down there sold some apples at $1.00 and $1.50 per hundred pounds; by the time these apples got to the city the grocer retailed them at eight and ten cents a pound. That is too much difference.

Mr. Yaple thinks we have a bright future. I am not entirely discouraged, but I think there should be some way worked out whereby this difference would be obviated and our growers could get more of it. The people in the city think the farmers are robbing them, that the fruit growers and farmers are getting rich. If you take statistics, they are; but take the pocketbook and they are not. I do not know what the solution is, but I do know that the consumer ought to have these apples for less than he is paying, and the fruit growers really ought to have more. It is a fact, according to statistics, that there are not as many apples in cold storage in the United States now as a year ago. Somebody will pay for apples before harvest in my opinion, and if the growers have any in storage instead of in barrels it may be they will get a little more out of them.

Mr. Green referred to varieties. We are down in southern Ohio, and the Rome Beauty is the great apple in that section as a producer, for quality, as well as keeping and selling. A few years ago a new apple, the Ensee, arrived on our place and we think a great deal of it because of its quality. I have some of them with me and if anyone wants to inspect them they can do so. The quality stays good all winter. In barrels they sell well and they usually sell for three dollars a barrel more than the Rome Beauty, so I think the fruit growers in the southern part of the state will do well to try them. I do not have the trees to sell, but some nurserymen do and I think it would be a good thing to try them. This new apple is a sport of the Rome Beauty. It seems to have a little finer grain, but has practically the same taste as the Rome Beauty.

In southern Ohio this year the main apple crop has been the Rome Beauty, and there have been hundreds of people who did not know what to do with their apples because the buyers did not want to pay for them. I do not know what discouraged the buyers, whether it was the money conditions or the railroad question, or what, but I know for a while our growers were at sea about their crop. Finally some wise people got

the upper hand and decided they would not sell, they would hold off for a while.

If there were only a few orchards it would not be a task to harvest the crop, but when there are two hundred and fifty thousand barrels in one county it is a big proposition. We just had to do the best we could. A few growers did not get all their apples picked. I know one farmer that still has something like a thousand bushels on the trees. That will, of course, hurt them, but it may be they will get more for the rest of the crop. It has been told that people are buying up apples and letting them rot rather than let prices go down. That is a mistake. I have never known anything like that in my life. I do not think there is anything in this but newspaper talk. But I do not think the growers are discouraged. We expect to go on and do the best we can with the labor we have. We are all growing better fruit and I think we will all go on with the labor we have and do the very best we can.

THE CHAIRMAN: It is very interesting for me to learn that in other countries the fruit growers have their troubles as well as in Canada. We have had our own troubles in the fruit growing game this year, but we hope there will be some solution before another year. I will now ask Mr. Riggs to continue this discussion.

E. J. RIGGS (Ohio): There seems to be a difference of opinion regarding the attitude of the fruit growers this year. Some are discouraged and some are not. A few minutes ago I was talking to a man from the South and he expressed his discouragement in a story. He said he felt like the young man who was very bashful and had never met very many people, but who finally fell in love with a young woman and when they were married she insisted on a church wedding. They sat up near the altar before the ceremony and the friends of the young woman began coming in such numbers that the young man was embarrassed. He began feeling through his pockets and looking around him from side to side and finally the best man said to him, "Have you lost the ring?" "No," said the young man, "I have not lost the ring." "Well, what have you lost?" "I am about to lose my enthusiasm."

I think a great many of us are in the situation of the young man. We have not already said that we have lost our enthusiasm and we are not entirely discouraged, but nevertheless the border line is pretty close for some.

When we talk in the Ohio State Horticultural meetings it is like a big family; we do not have any secrets among ourselves. But I hardly know how to talk to such an audience as this, with members from other states, because we usually have our little secrets and we tell them among ourselves and we do not like for them to get out. But I believe there is one subject we have not discussed that ought to be of interest not only to Ohio growers but to every grower in the United States and that subject is marketing. I do not propose to solve the problem, but I propose to raise one point. I think the solution lies in the future. We have been confronted for years with the threat that we are going to have a uniform standard for fruit, uniformity as to quality, uniformity as to packing, and uniformity as to everything concerning our products. We have been talking of that standardized product for years, but we have not

had the courage to adopt a standard, either by following one of our own volition, or by having this standard thrust upon us by some state law enactment. There is just one point along that line that worries some of us in southern Ohio and perhaps worries all of us in Ohio who have not at their command a ready market in some nearby city. If we do have this standardized product how are we going to meet it? As you well know the most of our fruit growers in Ohio are producing commercial crops, but we produce small crops—not commercial crops of the size they produce in the west where they have thousands of acres of orchards. In Southeastern Ohio a grower will have five or ten acres perhaps ten or fifteen miles from a shipping point. How are these fellows going to be able to standardize their product in a way that will be satisfactory to themselves, meet the requirements of the state law, meet the requirements of the market and put their product upon the market at a profit satisfactory to themselves. You say the large fruit grower can easily do this. How can he? By establishing on his farm what might be called a bureau in which he has his own experts, his own employees who are working in the orchard year after year. But for the small grower there is a larger problem. I do not mean to say that every community should have a centralized packing station, or that every shipping point should have a centralized packing station to take care of this proposition, but it does seem to me that before we can ever compete with the situation in the markets that we have here in Ohio, before we can compete with the western grower, we must solve the problem that is local among ourselves, not one universal throughout the country. So I raise that thought —how are we, the growers in the eastern United States, going to meet the situation? It is the foundation of successful marketing and until we do solve it I think we have still before us a great problem. I thank you.

THE CHAIRMAN: I will now call on Mr. Thayer, after which I hope we will have free discussion.

PAUL THAYER (Ohio): *Mr. Chairman, Ladies and Gentlemen*: I certainly thank you for putting me on the program today, although I did not know it until yesterday. I have been so busy that I was unable to hear the preceding speakers, so I am laboring under the difficulty of having my chief speak first and I do not dare to say a thing. If I did not agree with what he said that would make trouble, and as I did not hear what he said I will just say, thank you.

THE CHAIRMAN: Is there any other gentleman or lady here who would like to add something to this discussion, or are there any questions in regard to fruit-growing that you would like to ask?

A MEMBER: I would like to ask where that Ensee seedling started?

U. T. COX: It was just a chance sprout that came up over near some plum trees.

W. W. FARNSWORTH (Ohio): I would like to add a word in regard to the Ensee. They are altogether too modest. I saw the original tree, and while I sometimes think that the men who promote new varieties are selfish I think it would have been a blessing to the fruit growers of the United States if some promoter had gotten hold of the Ensee. It is a splendid apple. There is no comparison between it and the Rome

Beauty. Its color is superior, the climate of southern Ohio is adapted to it, and it has the good habit of hanging on until late in the season. It is a variety that we need to push and sell to our best friends. I think it is the best of any winter apple.

While I am on my feet I want to add a word in regard to the apple situation in Ohio. I sometimes think of a little conversation I overheard on the State Fairgrounds twenty years ago between two horsemen. About that time the horse industry seemed to be going down, and one of these men said to the other, "Well, I don't care, I like a horse and I will stick to it. I would rather handle horses and die in the poorhouse than to get rich raising hogs." So I would rather live in a horticultural region and die poor than to get rich in some questionable pursuit. We need to experience adversity to make us more thoroughgoing and to drive out those that would only stay in the business under favorable circumstances. In the last few years there have been more orchards planted, but yet, as some of the speakers have said, there are more fruit locations in this state than fruit men, and I agree with one speaker who said that it is more the man than the location.

Another thing is the labor situation and I think there we are partly to blame. We are too much like the western fruit growers. We plant a large acreage of one variety and we expect a large number of men to flock in to harvest that crop and then we have nothing for them to do for the rest of the year. I think we must look at the laborers' standpoint a little bit more. We should try to give them uniform work and keep them busy the year around. We have the soil, the location, the market facilities, and we can grow good fruit; now what we need is a corps of men to live on the place the year around, men who will say "We" when they speak of the work in the orchard. We have no trouble in keeping men from five to twenty-five years. I think if we work toward that as much as we can we will go a long way towards solving the labor problem. (Applause.)

Mr. Lawrence: I would like to ask about the Ensee apple. I sent to Mr. Cox for ten trees but they have not come into bearing, so I do not know what they will do in our latitude in Carroll county. I would like to know whether any other growers have grown the Ensee further north than that and if so with what success.

W. W. Farnsworth: I have not grown it to any great extent. Our trees were replants and planted in corners and that is not a fair test. We got color and quality but we have not had a fair test as to productiveness. We are within twenty miles of Lake Erie and most people say we can not get color on Rome Beauty, but we do. This year was an exception; the late apples did not show color as well as usual on account of the rainy season and the hot weather in October so we left a few on the inside of the trees to get color. We left them until about a week ago and they colored very nicely.

The Chairman: It is of much interest to this meeting of men from the different states and from Canada to know the varieties of fruit that succeed best in certain sections. We have had five speakers, but none of them have touched on the question of the best varieties. I thought it would be interesting to have some one from the north of the

State tell us the six or eight varieties he considers the best, and then someone from the south.

MR. ROBERTSON (Ohio): I do not want to contradict Mr. Green, but we do put color on Rome Beauties. There is no question in my mind but that my Rome Beauties have made me more dollars than any other trees. We are testing out a few varieties and when we get through we will have a pretty fair knowledge of what we like best. Perhaps Mr. Cox remembers that I suggested at Cleveland that we give away the Grimes Goldens because they did not know a Grimes Golden from a pumpkin. We gave away about thirty bushels. Now they are beginning to be known, thanks to that. The Rome Beauty is a splendid apple; it comes at a time when the market is short and they come out of storage fine. An apple does not have to be all red to be pretty, because red and yellow sometimes show a fine polish and color.

I do not think I am in a position to say much about varieties, except that we are finding out about them. Two years ago this winter I was in Vermont and Mr. Witherow, a Delicious grower who lives there, got me very much excited over them, and I might say that, barring this year, I am still enthusiastic about them because of the friends they make. I am inclined to raise something that the people all want, and they all want Delicious apples. The trees are young, and whether they will continue to bear heavily and regularly is hard to say, but it is an apple that makes friends without being advertised.

The Stayman with us is a wonderful apple the latter part of the winter. The quality is excellent and it is a good keeper. Some apples do not keep well under any conditions, but the Stayman seems to keep under almost any conditions and come out in good shape; at least that is my experience. We have no good storage. It is a cellar under an old farmhouse. I do not think I care to say anything further, except that all apples have their good points.

THE CHAIRMAN: Mr. F. H. Beach is one of the younger fruit growers in Ohio, and no doubt he searched diligently to find the best varieties for southern Ohio before going into the fruit business. I wish he would give us his conclusions as to the best varieties for southern Ohio.

PROF. F. H. BEACH (Ohio): I feel somewhat at a loss to discuss southern Ohio varieties, because some of you fruit growers have had more experience than I. Of course southern Ohio is noted for Rome Beauty. That apple is certainly the leading apple and probably always will be in that region. Mr. Cox mentioned the Ensee. I have seen that grow under his conditions and certainly they have a splendid apple there. I have seen the apple on the market in the various cities and it takes very well. It has not been as widely advertised as its merit justifies. It seems to me in southern Ohio if we are growing apples for a barrel trade we must grow an apple that will stand up in that package, and the Rome Beauty stands up as well as the Ben Davis. If we want to handle Jonathans and Grimes Goldens, in my opinion we should use a different package, because we must not put a tender-skinned variety in barrels. In southern Ohio the Rome Beauty, Ben Davis, Stayman Winesap, and

Delicious are the principal varieties. Newer varieties are coming, but I feel these are the prominent ones that are grown in that section.

THE CHAIRMAN: Is there anything further in regard to Ohio fruit growing before we pass to the next subject?

E. N. REEVES (IOWA): I want to ask a question and then I just want to say that in Iowa where the Delicious seedling is grown it is getting to be a settled conviction among horticulturists that if you want the trees to bear well you must prune heavily; that severe pruning throws them into bearing.

The question I want to ask was brought to mind by one of the speakers who mentioned competition with western growers. Has the time come when you really are competing with western growers? Is the market so well stabilized on apples that you are competing with the western growers, or is the question not rather one of finding the proper market? Does everybody have all the apples they want at hand, or is not a question of distribution? If your apples do not find a proper market is there not a place for them without competing with the western growers?

THE CHAIRMAN: We will now pass to "The Fruit Problems of the Missouri Valley." Is Mr. Irish here? Is there anyone here from Missouri who can give us a few words in regard to fruit growing in that State? I am told that Mr. Paul Stark is here, and if anybody is acquainted with the Missouri situation it is Mr. Stark.

PAUL STARK: I like the points that have been brought up about Ohio. I do not know what you want me to say about Missouri. One thing we are learning out there is that the fruit growing proposition is getting into the hands of specialists. Some years ago Missouri used to have a number of different varieties of trees and it was near the top in the number of bearing trees but a whole lot of these trees were in the orchards of farmers who thought it was a waste of time to spray. The rest of the story you probably know. These trees have gone out and the trees which are left at this time are being taken care of.

We have heard quite a lot this afternoon about the pessimistic talk that is going on. We have not made as much money out there this year as in other years, but I think a great many growers in the Ozarks think they have made good money. In the central west we have not been affected so much by the big New York crop as they have in the east, and I think the growers in southern Missouri where they are producing good fruit had good profits this year, although not what they had been getting in the last two or three years.

Our company has a good many orchards, but personally I have just recently broken into the fruit growing game myself. I planted about 150 acres last year and if I were easily discouraged I might be discouraged by hearing some people talk, but I look at this thing from a national viewpoint. I do not care what business you take up you will have some discouraging features once in a while, but we must look at the basic facts back of the fruit growing game. Take the central west for instance, in the last ten years millions of trees have died from neglect. Missouri has dropped about 200 per cent. I believe that is a good thing for the fruit growers who are taking

care of their stuff because these neglected trees produce cull apples and they hurt the man who produces good fruit. These trees have largely been eliminated. A great percentage of the trees in Illinois and Missouri planted eighteen or twenty years ago were Ben Davis. In central Illinois we have several thousand acres that have gone out through the canker. It takes a man on the job taking care of trees to produce good fruit and trees that over a period of years will make good money. I am putting my own money into my orchard and I will give that orchard everything it needs. I believe I will get good big interest on every dollar I put into it. We know our population has grown immensely in the last twenty years, and we know the American people are eating more apples than they ever did. If you go to the fruit stands you can see how many more apples are sold there than ten years ago. There is one little factor in that that I think is important. During the war the Federal Government talked up fruit; they said it was healthy, they recommended that the people use it on a large scale, and all these things kept piling up until I believe the outlook for fruit growing in the next ten or twenty years is as bright as any other lines of business in the country. I planted this orchard last year and I will add to it this year.

In regard to the situation in Missouri, we have two main orchard sections, one in the Ozarks, and then in southern Missouri they are going largely into fruit growing. That is not a grain producing country, but they do grow splendid fruit. I do not know whether you are familiar with the bulletins put out by the horticultural department of the Frisco road, but they are very illuminating as far as taking care of fruit is concerned. They get reports from sixty or seventy different fruit growers through the Ozarks where this railroad taps, and in this report they have four columns: one column shows the amount that was spent in producing that crop, the next column the gross amount received from the crop, and then the net amount. It brought out this very important point, that the men who are spending money to spray fruit, pack it well and care for it, are getting more money than the men who are spending just an average amount of money. For instance, the man that spends thirty or forty dollars an acre gets a fair profit, but the man that spends three times that much gets four times as much profit. It brought out the very important point that you have to spend money to make money, and I think that is more true in the fruit growing game than any other that I know of.

A MEMBER: Where is the other fruit belt besides the Ozarks?

PAUL STARK: That is up along the Missouri river towards St. Joe. My own county, Pike, used to be a great apple producing section. I have heard my father tell that when he was a little boy you could go along the Levee of the Missouri and see apples piled up ready to go down to the river by boat to St. Louis. You will see these apples piled up on the Levee each fall, but they are not good apples. The lack of care has turned our county from one of the big fruit growing counties twenty or thirty years ago to a county where there are hardly two or three good orchards. We are going to put in more orchards there, but those are the conditions, that millions of trees have gone out and it has left the men who are taking good care of their fruit and these men will make good money.

There were a number of factors which contributed to the condition this fall. For instance, the transportation factor. I think the apple buyers were frightened over the transportation question. It turned out so much better than during the war period. Then everybody knows that money has been tighter in the last nine months than in a long time before. The Federal Reserve Banks have shut down on a lot of speculation, and while the apple buyers may or may not be considered speculators, for some reason they did not buy the apples and that scared the people and a lot of fruit was sold cheap. My opinion is that the spring will show a much improved condition, and I think the fruit growers will be more optimistic in the spring than they are right now. I believe the man who thinks about this question, who looks back of the temporary conditions, will see better conditions in the fruit growing game and will therefore be enthusiastic.

A MEMBER: What varieties are you planting?

PAUL STARK: I have started out with summer apples, followed by fall apples; then early September varieties, then mid-September and the first of October. We have not a very plentiful supply of labor and we will use that system over a long period, and then we will use the local market. We have a large territory that we can reach with a truck and we will sell a lot that way, and by having the apples ripen over a period like that we can get them to these local markets and get good prices without so much packing.

As to varieties, we have started to use the Duchess as a filler, and some as permanent, followed by the Wealthy. Then for early September the Jonathan and Grimes Golden, and then the Delicious. We planted heavily in Delicious because we believe it will make good money. Anybody who eats a Delicious remembers it. We have also planted about 5,000 Golden Delicious. They will ripen after the Delicious in the latter part of September. We followed that with a planting of Black Ben and a moderate planting of Willow Twig. There is a local demand for these latter varieties. We have tried to follow the idea of having apples ripen over a long period both from the labor and the selling standpoint.

I made up a list of varieties and then I communicated with all of my fruit-growing friends, both orchardists and members of horticultural societies, in different states, and got their opinions, and after doing so I found that I did not want to change my list to any extent. I also have a moderate number of King David, both as a filler and some permanent. There are other good varieties I would like to include, but I think there is a limit to the number of varieties we ought to plant. Some people urge planting three or four varieties. That is all right for fall and winter apples, but if you want summer, late fall, and winter apples you have to have more varieties. That will help the labor situation a whole lot.

THE CHAIRMAN: Both the speakers from the Pacific Coast have disappointed us. They are not able to be here, so instead of having that part of the program Mr. C. J. Tyson from Pennsylvania, who was mentioned this morning as being interested in a fine co-operative system of growing apples, will talk to us for a few moments.

C. J. Tyson (Pennsylvania): This "spur of the moment" business seems to be characteristic of this meeting all through. I certainly had not thought of being called on to say anything and have nothing special in my mind to say to you.

Pennsylvania, as Mr. Fagan said this morning, produces a total of apples second only to New York of any State in the Union, and for that reason it must be reckoned with as one of the important apple states in the country. Our commercial apple-growing in Pennsylvania is rather confined to a few southern counties, and to two or three rather small sections in the northern part of the State. Pennsylvania, however, differs from a great many other states in that we have a good many consuming centers throughout the State. We have mining and manufacturing towns with large populations ready to consume a great amount of fruit, and we have around a good many of these towns fair-sized commercial orchards which are doing very well because their transportation difficulties are more or less eliminated. It seems to me more and more that the fruit grower situated in that way is a fortunate man. I see Mr. Farnsworth nodding his head and I know that has been his experience. This year one of our real problems in marketing has been the transportation problem. The actual supply of cars, the working out of refrigeration, has been somewhat better than during war time, although it is bad enough now. But the time consumed in moving our fruit to the principal markets when it has to go a long distance, the increase in freight rates, which were minimized during the war, has developed into a very real problem, and all this takes a big slice off the margin between what the fruit grower gets and what the consumer must pay for the fruit.

My home is in the southern part of Pennsylvania, and while the Ohio folks have been talking about the Rome Beauty my mind has been going back to our old friend, the York Imperial. I think you do not grow it very much in Ohio, and except in the Shenandoah Valley of Pennsylvania, in West Virginia, Maryland and Virginia, it is not grown very extensively anywhere. There is its home, its place of origin, and it has proven a most valuable commercial apple. It does very well for shipments through the South, and in seasons like this when crops are somewhat lighter through the Middle West, it has sold very well in the middle western cities.

The Chairman: Before we pass to the subject of Co-operation in its National Aspect, I will ask Professor J. W. Crow of Guelph, Ontario, to say a few words on the problems of fruit-growing up there. This is an international Society and so we want to hear suggestions from both the United States and Canada.

Prof. J. W. Crow (Guelph, Ontario):

*Mr. Chairman, Ladies and Gentlemen*: I would first of all to express my pleasure at being here, and also to say that I think your attendance is very good, although it is not really what it ought to be because there is surely a much larger body of the public interested in pomology in our countries than we have represented here today.

Your chairman has asked me to say something bearing upon the fruit situation as it exists in the Province of Ontario, and I will put what I have to say in this form. There are some things I might say about the Province of Ontario which I think would probably be applicable to many parts of the United States

as well and I would like to say it in this way. It seems to me that a society of this kind has a very important function to perform because the apple-growing public and the apple-consuming public over the United States and Canada have a logical right to look to the men of this society for statements that will serve as guide posts to those who are planting apples and also to those who are buying apples to eat. The convention of the American Pomological Society ought to express as nearly as may be the problems of the industry, and ought to sum up the best opinions we have at present to offer as to conditions and as to opportunities. Personally, I am quite convinced that this society ought to take the attitude that the present is the time in which we should plant orchards. On our side of the line, at least in Ontario, we did very little planting in 1911 and 1912 but we are beginning to get back now to an appreciation of more planting. I believe it is thought by all of us, by the growers and by the eating public, that this is the right time to begin to plant orchards because in the United States and Canada we need more commercial orchards and larger orchards than we have had up to the present time. I quite agree with some speakers that fruit growing on this continent is becoming a much more highly specialized business. I believe that we should recognize that as a fact and we should point out if necessary that specialization will in the future be almost compulsory, if a man expects to make a satisfactory profit out of it. We realize, as you have, that the farm orchard as we used to have it, is largely a thing of the past. I do not believe in commercial pomology at the present time there is much place for the old-style farm orchard. I believe a commercial orchard in order to justify the expense, and in order to encourage a man to stay in it year after year and take care of it, ought to be of good size. I would like to know, for my own information, just what the men here would say regarding the size of an orchard that would justify annual care and expenditure. I believe a five-acre orchard is too small. The apple industry in our country for years back has had its ups and downs, and it has been too much a business of ups and downs. We must specialize and have larger orchards. We must have orchards of twenty to fifty acres, and we should not encourage commercial planting in small orchards. If a man wants to plant an orchard let him plant enough to make it worth while. I think that is an important problem at the present time. We have a number of men who in a year when prices are high will plant perhaps four or five hundred trees, then if it still looks good in three or four years they will plant more. That is not what we want. We want more good-sized orchards, and the indications are pointing in that direction. I believe there is a minimum size below which an orchard will not pay in the long run. I would like to know just what that figure is and I would be much interested in discussing that feature.

Then we need to adopt a definite policy in regard to varieties. I quite appreciate the viewpoint of men who have advised us in the past to plant only red apples because they could be better handled and sold. Personally I do not ever remember of planting a variety such as the Ben Davis or any commercial variety simply because they have been money makers in the past. I believe that every Ben Davis apple sold discredits the selling of apples, and I also believe that every Delicious and McIntosh and Northern Spy sold materially and directly increases the market for apples, and I believe therefore that if we plant varieties like the Gravenstein and Ben Davis we are to a certain extent killing our own business. I believe we should encourage the planting of varieties which the public will buy again and again.

With respect to the lack of satisfactory varieties I think that is something that ought to be stated emphatically by this Society as representing the pomological interests of this continent. We all know that it is difficult business to intelligently work out new varieties. If we do not have satisfactory varieties, good in quality, good in color, good in bearing proclivities, we should maintain such work and develop them, and I believe that if the lack of suitable varieties were pointed out by this Society and emphasized it would greatly facilitate the work of developing new varieties as at present carried out by some of our colleges and stations. Your chairman today has been working a life-time in developing new varieties of apples, but I regret to say that a large number of these are not to be found in commercial orchards. There is something here that is sadly deficient. We need the means of getting hold of this knowledge and disseminating it, and we need to develop the work of improving new varieties.

I should like very much, Mr. Chairman, to know what this meeting would say with regard to certain of our problems. The problems I have mentioned are problems of Ontario, but they are not confined to us. It seems to me that we have learned pretty well how to grow orchards so as to get a fairly high-grade pack. We have commercial orchards which year after year turn out packs eighty to ninety per cent. salable as good fruit. We have in the past had too many second-grade or cull apples. With the knowledge we have of spraying and treatment for insects and disease we can turn out a much more satisfactory grade of fruit. It seems to me we have learned that, but I do not know that we are making full use of it.

There is one other matter which we have not learned quite so well, and that is how to get annual crops. One of our most important problems is right here. We have varieties which are characterized by the tendency to bear a crop of apples every other year. That is a problem which your experiment stations have probably tackled, and it is a problem which this Society ought definitely to put up to the experiment stations. We ought to say to them publicly and emphatically that we have not such information at the present time as to the proper treatment of our orchards that enables us to secure annual bearing. We need that information and we must have it.

These are some of the things this Society should promote. We as growers are interested in the development of our business, and these are some of the questions which this Society should officially voice to the fruit growers of Canada and the United States. I should like very much to know what this Society might contribute along the lines I have suggested.

THE CHAIRMAN: After we have had a discussion of Co-operation, which is really one of the greatest problems before us, I think it will be well to devote a little time to a discussion of the points that Professor Crow and other speakers have brought forward. But our next title will be "Cooperation in Its National Aspect," and I will call on Mr. Lincoln.

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## COOPERATION IN ITS NATIONAL ASPECT

**M. D. Lincoln, Ohio**

I do not want to burden you with Ohio's problems, but I would like to dwell upon something in regard to our State which may really be important to those from other States. First, I would like to ask how many Ohio farmers and growers are here? Well, a goodly number. I appreciate that, because I want to say something pretty plain to you. I do not know much about apple growing. I know more about cows and things like that, but I appreciate that many things can only be done through organization. You fellows are howling about your problems that seem to be hard to overcome. I am somewhat inclined to think that fifty per cent of these problems would be overcome if you had the right kind of organization. Some of our good friends from the West have shown us the value of organization. When western fellows can come here and sell Ben Davis apples and get ten or fifteen cents apiece for them it makes us wonder why we cannot sell Ohio apples at prices that will give us a little profit. I made an investigation here a few weeks ago. Away back in July we began to hear about the enormous apple crop coming on, but we did not hear much from the growers until the crop was ready to ship, and then they began to howl. I thought this problem was big enough to spend a little money to find out what was the trouble, so a few of us in Columbus took up the matter. I live up near the college and we are paying ten and fifteen cents a pound for apples, and most of them inferior apples. No one likes an apple better than I do. I would like to buy them by the barrel, but grocers do not know how to sell them in that quantity. Go into a store and ask them what they will take for a barrel of apples and they will tell you they do not sell them that way. I believe the average consumer would eat five times as many apples as he is eating if he could get them at a fair price. As I see it we will have to organize our business just the same as the manufacturer

does. We pay too much attention to production. Given fair prices the small farmer is a good producer, and he has all the expert advice he needs from colleges, county agents, etc. But we have never had a selling basis. What would you think of a manufacturer who produced his goods and set them down outside the door and said, "What will you give me for them?" We found that to be about the situation in Ohio. We said to the retail grocers, "Are you selling more apples this year than you have before?" They said, "No," and when we asked why they replied, "Because they cost too much." We asked them if they had not seen the reports in the papers that many farmers can not afford to pick their fruit, and they said, "Yes, but they thought the most of that was newspaper talk." Then we asked, "If you could get good apples at a fair price would you try to help to increase the consumption of apples?" They were tickled to death. When it came to the commission men, we said, "What is the matter with you fellows? Why are there not more apples used?" "Because the farmer wants too much and we cannot sell them." Mr. Miller, the Secretary of the Retail Grocers' Association, sat down by his telephone and called up a dozen grocers in Columbus and found they were paying from $5.00 to $7.50 for apples, and they were charging anywhere from eight to fifteen cents a pound. Then we went back to the commission men and asked how much they were charging for apples, and we found the most of them were selling at from $3.00 to $5.00 a barrel, and they were selling for $5.00 and $7.50 apples for which they had paid as low as $1.00 per hundred pounds. So we asked the commission men and the grocers to come together and talk this thing out. We showed them that the public was not eating the apples that they should, and that if they would get together and bring prices down the people would eat more. So they agreed to put on an "Apple Day." They finally agreed to sell apples to the consumer at $1.25 a bushel and not by the pound. The result was that we got the apples moving. The secretary of the Retail Grocers' Association told us that the average sale on Saturday was about a car. The first Saturday after they started this thing they sold six cars. One little grocer said that he had never sold more than fifty bushels a month, and in the month of October he sold 750 bushels. He put a price on them of $1.25 a bushel, or fifty cents a peck. When anyone would say they wanted a peck he would ask, "Why don't you take a bushel?" and in that way he got them to eating apples.

But the sad part of it was that after we had done all of that we found they were selling New York, West Virginia, and Michigan apples. Why? Because you fellows were not organized, you did not know what the prospective crop was, and when we tried to increase the consumption you had in mind last year's prices and therefore the buyers all through the State of Ohio had about ten times as many foreign apples as Ohio apples. You were sleeping there. That thing looked so good that we put a man on the road to go to all the big cities in Ohio — Cleveland, Akron, Youngstown, Toledo and Cincinnati. In all these places we got the grocers and the commission men together and got them to put on a campaign encouraging the use of apples, and it worked; and the big thing was that for the first time in history the farmers came into the city and showed the city business men how to sell goods. In Cleveland they attributed to our efforts the sale of 80,000 bushels of apples, and in practically every city except Akron (which is dead) the thing met with success.

Here is the great lesson. In ten days, at an expense of about $160.00, we did this. If you will get together, particularly you fellows in southeastern Ohio, and have your own association, grade your pack and then stand back of it, you will find a big difference in your sales. If I go down town now to buy a box of apples what do I buy? I buy a box of Skookum apples. Why? Because I can take that box home and without taking the cover off know that every apple in it will be sound and perfect. That ought to be true of the Ohio apples you buy, but I would not buy them until I dug down as far as I could, and then I am never satisfied until I get them home and see what is below. Success in business is based on confidence, and the way you put up your apples in Ohio does not make for confidence.

You will have to use the same tactics as busines men — organize your business in three departments. You take care of the production and the Farm Bureau will take care of the marketing problem. Individually we cannot hire high-class salesmen to market our goods; collectively we can. Collectively we can have a much higher pack. You fellows could not get cars this year, but the Farm Bureau got

cars for you. One group of men in Washington County said they got all the cars they needed except two. In other words, that organization commands the respect of our legislative and other public agencies, respect that you as individuals cannot obtain.

During the year, about in July, we ought to have data as to what the crop will be, and then we should get together through our State Association, you cooperating with the Farm Bureau, and put men on the road to sell your stuff just as other business men do. It can be done because the other fellows do it. Why can't we? We have too long let the other fellow handle our profit and he is interested in his commission, not the selling of a quantity of goods.

As to the Farm Bureau, we are going to have a voice in agriculture. We will have forty-two states by January first; we have 47,000 members in Ohio. Our principal lines of work are marketing, legislation and education. We want to help you fellows put a man on the road to organize, and to do some of these things that we know can be done. We have been talking cooperation for years, but most of the time we have just talked; we have done nothing.

In closing I want to tell you one of the best stories about cooperation I have ever heard. It illustrates the kind of cooperation we have been having. I am not as old as I might be, but during the first few months of our married life I got this story. We were placing our furniture in our home in Brookline, Massachusetts. I wanted some of the furniture in one place, and my wife wanted it in another. Finally she said, "Look here, you are talking about cooperation, why don't you practice what you preach and cooperate with me — and do it my way?" That has been the trouble with us in our county, state and national cooperation. Can we not look forward to a time when we will put on a national advertising campaign to increase the consumption of apples just as the walnut men and the raisin men are doing? The trouble has been that we are all willing to do it — as long as they do it our way. What we want to do is to raise a first-class product, grade it, and then hire expert men to sell it. It can be done, so let us see if we cannot get together and start something.

THE CHAIRMAN: Before we conclude this afternoon session the Secretary has some announcements to make, and then I believe Mr. Cranefield has something he wishes to say.

MR. FREDERIC CRANEFIELD: As I understand it, tomorrow afternoon at the Deshler Hotel there will be a conference. There will be a regular horticultural program. It is a conference of all interested in the work, and it will resolve itself into a committee of ways and means for the Pomological Society, to rejuvenate it if possible. In spite of its past history I think it is well understood now that it is necessary to bring into this Society some new life. The American Pomological Society if it is to exist must become a commercial organization and be organized through the country. What it becomes in the future will depend on this meeting tomorrow afternoon. We want every man and woman interested in the fruit business in the United States and Canada who are here to be at that conference. If something is not done the American Pomological Society, in spite of its honorable history, will lapse into a state even lower than it is at the present time. We feel that upon this meeting there depends in large measure the development of the fruit industry in the United States, because we have here represented nearly every fruit-growing section. Let us get together and do something. Let us try tomorrow afternoon to forget for an hour or two the culture of apples and other fruits, and get together as business men and business women and see what we can do to develop the fruit-growing industry in the United States. We have here an organization with seventy-five years of history, a going concern. Let us build up that organization. Let

everyone be present at that time. There are twenty or thirty men who have been invited to be present and every one should be there at two o'clock.

THE CHAIRMAN: Is there any further discussion of the subjects that have been brought up today?

H. P. SWEETSER (Maine): Are we going to have a Question Box before we close?

THE CHAIRMAN: Yes, we are always ready for the Question Box.

H. P. SWEETSER: I would like to ask Mr. Stark if he can give us any information as to when we are likely to get apple trees for planting at lower prices. I ask this simply because we have a great many growers who are saying that they would like to plant apple trees, but they do not feel they can plant heavily at the present prices. I am asking Mr. Stark because he is connected with the nursery business and perhaps can give us some information.

L. C. STARK: I think I can best answer that question by telling you a few of the factors back of the present conditions. During the war period it was almost impossible to get propagating stocks and it was recommended by the Department of Agriculture that all the nurserymen cut down their propagation and grow as much grain as possible. I know a great many nurserymen held their propagation away down and grew much less than under normal conditions. Then you know the conditions last year following the close of the war. There was a failure of apple stocks and other stocks and there was an infinitesimal amount of seedlings brought over from France and Holland. One reason that apple trees and other trees are high is that where we used to pay from $5.00 to $8.00 for seedlings we paid $100.00 last year, and could not get them at that price. The stock is still short, but there are more seedlings this year than last, although not near the normal crop. I believe that when the seedling cost and the labor cost comes down fruit trees will be somewhat cheaper, but the nurserymen have been up against a big shortage, have been up against a high propagating cost and high cost of everything that goes into fruit trees, and of course the nurserymen must make some profit. They are not in the business for pleasure. We look forward to a time when trees will be somewhat lower, but prices will never come back to what they were before. I do not believe we will ever see that condition again because it got to such a point that a lot of trees were sold below the cost of propagation, and no industry can be successful under those conditions. I do not believe the nurserymen will make that mistake in their propagation again. I think they will grow about as many trees as before, but they will sell them at a fair profit.

H. P. SWEETSER: Do you think if an organization, say a state co-operative organization, should place an order with a nursery that they would be able to get trees at lower prices than those quoted now? If an order should be placed next spring, for instance, by the Maine Fruit Exchange, do you believe that the nurserymen would be able to sell trees at less prices than they could make in three years?

L. C. STARK: If a large quantity is bought and the trees can be shipped in bulk and handled as one order, it can be handled cheaper by the nurseryman. This is a question of handling. But of course the

propagation cost up to the time the tree is dug would be the same. After the tree is dug there are a whole lot of costs that the grower does not realize. One tree may look like another, but perhaps one tree has been neglected and has been dried out or exposed to freezing and may die, while its fellow may make a successful tree. The point I am making is that the cost of handling the tree that is neglected compared with the cost of a tree that is taken care of is quite an item. And that is something that the growers do not realize. Trees bought in large quantities can be handled cheaper, but there is a certain overhead charge in connection with each order. If they buy in large quantities and ship in car-load lots, the orders can be handled considerably cheaper.

THE CHAIRMAN: Here is a question which I will ask Mr. Farnsworth to answer. It is: "What time and with what solution would you spray to prevent scab? Give full directions."

W. W. FARNSWORTH: This is hardly the time to take that up, for one reason because we are so little troubled with scab. We use commercial lime-sulphur and spray in the pink. Some might not succeed with it, but we did. One of the officials at our experiment station said that he succeeded in growing 99.53% of fruit without scab. These orchards have been sprayed thoroughly from their beginning and the scab has not secured a foothold. We spray when the blossoms show pink.

Another question is: "What will be the effect of the American Fruit Growers' Association on the individual growers, large or small, who are outside its walls?" I will ask Mr. Tyson to answer that.

C. J. TYSON (Pennsylvania): If the question refers to the company known as the American Fruit Growers, Incorporated, which is not an association in any sense of the word, but a corporation for producing and marketing fruit, I believe I will answer this way: One of the principal propositions from the very beginning of the organization of the American Fruit Growers was the development of a service to other growers, and at that time and undoubtedly in the future, probably throughout the life of that organization, a very large percentage of the fruit and produce handled will be for the account of other growers. I should say at this time perhaps seventy-five per cent of the total tonnage is handled for other growers. It seems to me that would answer the question. If the American Fruit Growers, Incorporated, is to continue to perform this service which it proposes to do, naturally at some profit to itself, because the men who have put up the capital expect a return on their money, then the company must continue to give the very best service that can be given in the distribution of fruit and produce. It seems to me that will answer the question.

ORLANDO HARRISON (Maryland): To my knowledge the American Fruit Growers has established in our State of Maryland a remarkable packing house that would be a very decided advantage to any of our states. In fact, we have nothing that equals it any place in the east, or any place that I know of.

W. W. FARNSWORTH: In other words, you feel their work would have a tendency to stabilize the industry?

ORLANDO HARRISON: Absolutely. That is our experience in a dozen orchards in which I am interested. In Keyser, West Virginia,

they have a packing shed where fifty growers can come in. I think it is doing exactly what West Virginia is doing at Inwood, where they have a State packing shed which cost them $25,000.00, and where men are learning to grade. The same thing is being done by this American Fruit Growers. It seems to me that the American Fruit Growers is really setting the pace for us in the east in the matter of putting up a better package and teaching us something about marketing.

A MEMBER: I would like to ask how far your average fruit grower has to haul his fruit to this packing shed?

C. J. TYSON: As far as twenty miles.

A MEMBER: What kind of a package?

C. J. TYSON: The most successful is the slatted box. They haul by truck.

W. W. FARNSWORTH: I visited last winter one of the leading growers in California, and one of the last statements he made to me was that the future of horticulture in the east and middle west was very promising, and he said, "If you people can not beat us to your own markets you do not deserve success."

The next question is: "What are the most practical packages in which to market our apples?" That's largely a local question, but I think Mr. Riggs can answer it.

E. J. RIGGS (Ohio): Under present market conditions the best package is the barrel. Although we may not agree that it is the ideal package, we must comply with the demands of the market, and the market at this time demands barrels.

A MEMBER: We use a bushel basket for summer apples which has an outer ring fastened to a center post to hold the cover on. For winter apples we use barrels.

W. W. FARNSWORTH: I think Ohio is using all sorts of packages. We use bushel baskets chiefly. It is largely a question of the market. We have tried boxes, but we have shipped apples to market in boxes and the men would take them out and put them in baskets.

A MEMBER: Is a bushel basket with a wooden cover satisfactory for shipping fruits?

W. W. FARNSWORTH: It does fairly well if you put a corrugated pad under it. The most of ours go by truck. If you load them with a little care it is all right.

E. J. RIGGS: What are you going to do about cold storage? They will charge a higher rate for baskets than for barrels.

A MEMBER: But you save enough on the package to make that up. We get baskets at 75c, and we have to pay $1.50 for barrels, and the difference in the cost of cold storage is a very few cents.

W. W. FARNSWORTH: I believe we would increase the consumption of apples by putting them in bushel baskets. Of course for the high grade fancy apples we should have a distinctive package. Really, I should like to see our eastern growers adopt a little different package. The boxes are copied after the west. We are putting up a better apple than the west, and we should put it in a distinctive package. I think when we sell the consumer a box or basket of Ohio or Maine or any

eastern apples — apples of fine quality, we should not sell them under the label of western fruit, but we should have a distinctive package so they will realize what they are getting and call for it again.

W. M. Scott (Maryland): We have been using a bushel basket in Maryland and West Virginia for several years, and during the past season we shipped from one orchard in Hancock, Maryland, 25,000 bushels of apples in car-loads, beginning with Yellow Transparents and going through Jonathans. These apples travelled from Maryland as far west as Chicago and Detroit. The fruit carries through to market in very satisfactory condition so far as the package is concerned. We use a corrugated cap, and we ship four tiers in a car.

Howard F. Decou (New Jersey): Philadelphia is our market and we use a five-eighths basket. It is a free package. The commission man sells the apples and charges extra for the package, and we either get our package back or the money. At the present time we are getting $1.00 and $1.25 for stayman Winesaps and Rome Beauties and no cost for package, either barrel or box.

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## WEDNESDAY EVENING SESSION

The Wednesday evening session was held in the Home Economics Building on the campus of the Ohio State University. It was called to order at eight o'clock by the Vice-President, Mr. W. T. Macoun.

W. T. Macoun: I am sorry to say that there are two or three men absent who were to appear on our program this evening so that we really have to make a new program, with the exception of Miss White's address. Miss White evidently has lost her way but as she is in the city we know that she will come in later.

I thought before Miss White began her address it would be interesting to hear a few words in regard to the possibilities of the development of our native fruit and what has been done in the past. The blueberry, which Miss White will speak about, is the most recent development in our native fruits. Some of our other native fruits which are probably of value in this country have been developed to some extent up to the time the blueberry was found to be a subject for cultivation. For instance, the strawberry was probably one of the first fruits which the settlers in this country brought under cultivation. It is true it was not until the early part of the nineteenth century that the strawberry increased in size by some means, probably a certain cross breeding, became of much greater value than the wild berry. Indeed a wonderful development has taken place in the strawberry during the last eighty or ninety years. The raspberry has been cultivated to some extent and I believe there are wonderful possibilities in the development of our native raspberry. The gooseberry has been wonderfully improved by crossing the wild berry with the English berry, so that we have a much larger gooseberry in our gardens today, and the possibilities in gooseberry culture by the use of Old Country varieties combined with our hybirds are that we may have gooseberries as large as plums. Some of the gooseberries you see in England are of enormous size.

We know what has been done with grapes and the great work that Rogers and others did showed that by combining our wild species with cultivated grapes that have been improved from many generations we have been able to bring into our cultivated varieties certain qualities which we are anxious to get. Our native plums have been very much improved not only by selecting the best of the wild plums but by combining them with other species. For instance, we find in our work that crossing the wild plum with the Japanese has made a wonderful change in the quality of our plum. The work that Williams did in Nebraska with the Japanese plum and the American plum, producing such varieties as the Omaha and Emerald is a great step in advance.

Then our blackberries have been greatly improved and there is still great opportunity for the development of blackberries by crossing our wild berries with the larger cultivated berries. I might also refer to the cranberry which has not been improved so much as most other fruits, but at the same time has been improved very much indeed by specialists.

There are few other native fruits which I think are worthy of special work, for instance, the service berry or, as it is called on the prairies, the Saskatoon berry. They are almost like the cultivated blueberries. I was in the Peace River country last year and saw this berry growing, and really it is a wonderful berry. This berry has awakened interest among the fruit growers of the Eastern states where the currant and gooseberry has been put under the ban on account of disease, and the growers are discussing the improving of this berry for jelly purposes. It seems a great opportunity for that fruit. On our own prairies this fruit has been used by the settlers for cooking and for making jelly and also for drying and it is found very palatable indeed. I think there will be many improved forms of this berry within the next few years. It bears well and the fruit hangs on well. I think it may offer a solution for the eradication of the currant plantations in the east if it is necessary to destroy them. No doubt there are other native fruits which in time will be made quite palatable and much larger than in their wild state, and thus give us a greater variety among our fruits. I hope there are some here tonight who will assist in the improvement of our native fruits. In a few minutes Miss White will tell us about the blueberry, but I see Mr. Sweetser of Maine is here and if he will say a few words we will be glad.

H. P. Sweetser (Maine): I was not expecting to say anything to this audience but we are immensely interested in the improvement of some of our native fruits. We have the cranberry which has been just mentioned and we are working on that in Maine. Probably some of you know that they are doing a great deal of this work in East Lee, Massachusetts. They have been designated as distributors to all parts of the United States by the Department of Plant Industry and we are undertaking an experiment at Orono next year. You will be interested to know that the European variety which we have been using so much for decorative work is subject to aphis injury and unless the plants are carefully sprayed the berry is very dark color. But the American type of this berry is a very fine type, the foliage is not affected by aphis in any

way, although grown alongside of the European type, and the berries are highly desirable for jellies, jams and other purposes.

In regard to the blueberry, possibly some of you will be interested to know a little about the blueberry in Maine. We have the largest natural blueberry barrens in the United States. It is not known just how many acres there are but somewhere between 300,000 and 600,000 acres of blueberries. It is not definitely known just how it happened that these blueberries grew in that area where there were great forests, but it is supposed that a great fire swept that area free from forests, and that nothing came up but blueberry bushes. This area of blueberries is called blueberry "barrens". These barrens form a plateau in Washington county, and most of it is owned by companies rather than by individuals. The way of picking these blueberries is rather interesting. Blueberries are sold for the most part by stumpage. That is, they are sold on the plant at so much a quart and whole families go to these fields and take a certain area, stake it out, and there they stay until the picking season is over. They may erect a little shelter to protect them, but there they live and manage to cook until the season is over, which may last two months. These pickers look as if they were having a big camping party. You can see their tents and shacks all during the summer time. I do not know what we will be able to do with these big blueberry areas. Washington county is not the only section that has these blueberry barrens. It is a low bush similar in type to the cranberry. The only method of cultivation is to burn the area once in three years. We plan to burn it early in the summer before it gets dry. The plants that come up in the two years we cut. To give you some idea of the enormous size of these barrens I will tell you how they work the burning. They have a torch made of a pipe with a wick about six inches long in the end of it. This pipe is filled with oil and the man in charge of the burning starts one morning as soon as the dew is off with this torch trailing behind him. It would make a story to tell how this man walks all day leaving his trail of fire behind him. And that is all there is to the cultivation of the blueberries. This man cannot go too fast, he must walk fairly slowly, and he must go back about every hundred yards to put out the back fire. So he does not travel so far as you would think. That is practically the way it is handled. The blueberries are for the most part canned and shipped in gallon cans to all parts of the country. I thank you, Mr. Chairman.

THE CHAIRMAN: Is there anyone else here who can add anything in regard to blueberry culture?

A MEMBER: How do you get the seed of the high bush cranberries to grow?

THE CHAIRMAN: As far as I know it is done from cuttings. Of course at East Lee the work is done under the direction of Doctor Morgan and they actually produce seedlings, but I do not know how it is done.

MR. SWEETSER: I would like to know how to get these seeds to grow. I have planted them over and over. We have an excellent type of high bush cranberries and I would like to know how to get the seeds to grow.

THE CHAIRMAN: We find that it takes two years before the high bush cranberry germinates. A great deal depends upon the amount of moisture in the seed before winter sets in. If you hold the seed any length of time before planting, then the outer coat is not cracked with the frost before spring and in the summer it hardens again and it is probably the next year before it germinates. But with us the high bush cranberry, the mountain ash, the basswood and things of that kind, if you have a good deal of moisture in the seed before the winter, will crack open and germinate very readily in the spring. If they are very dry they will not do that. It is better to soak them for a couple of days.

C. P. CLOSE (Maryland): About six months ago I saw an article in the *Country Gentleman* on blueberry culture in Maine and it made me want to give up my position and all my work with home fruits and go there and grow blueberries. According to this article it is a lazy man's job and more profitable than apple growing or any other kind of fruit growing. As I recall the figures the expense was anywhere from $300 to $700 to an acre a year and the profit was up in the thousands of dollars. All that is necessary to do, as Prof. Sweetser has said, is to burn off the beds once in three years. Probably the figures were a little high, but anyway it is an easy life and if we get hard up it would be a nice place to spend the summer and make as much money as we cared for in growing fruit.

With reference to the development of native fruits I had the pleasure of visiting the Minnesota plant-breeding station this summer and I saw there some of their hybrid plums. I think the parents were the Japanese plum for one and the sand cherry for the other. I was wonderfully surprised to see the size, the beauty of color, the taste and the fine quality of these hybrids and the best thing about it all was that these trees are hardy. That is what they are working for up there; they must have hardiness first. The trees were as large as the ordinary Japanese plum, they were as heavily loaded and they did not rot. The summer had been very dry and the ground had cracked two or three inches wide. But all these trees had full crops of fruit. Prof. Hauser of South Dakota has been doing some promising things with these sand cherry hybrids but I did not see any trees as large as those in Minnesota.

There is one fruit that has not been mentioned that really should have something done with it and that is the native pawpaw. It is mostly seed, that is true, but there is more or less good rich pulp in pawpaws. I have tasted some from southern Indiana and one from Maryland that were really very fine. Some Indiana people are growing them, not improving them more than to move the trees into their yards and gardens. In some of the markets the pawpaw is one of the regular fruits.

I feel that we ought to pay more attention to the development of native nuts. We have a good many native nuts that should be improved, the hickory, the black walnut, the butternut and others. I was very much surprised to see the pecans that grow in Kansas. They are not so large but a very good quality. The best thing I have heard in regard to the pecans is that in south-western Illinois there is one very much better than anything we have. Men who are interested have seen the nuts and they will propogate the nut as soon as possible. I have tried to

interest the fruit extension men in doing what they can in the development of native nuts. I have also tried to interest the boys' and girls' clubs in making displays at the county and state fairs. It seems to me it will be a good thing to offer prizes for collections of native nuts. In that way we ought to be able to locate even better wild nuts than we have already found and named. I was surprised yesterday to hear the statement that on two farms in Michigan there were as much as one hundred bushels of hickory nuts and that unfortunately they have nearly all gone to waste — that none of them have been gathered — and that with hickory nuts selling now on the market at fifteen cents a pound. There are also black walnuts up there and in the Chicago markets they sell for seventy-five cents a pound. They have been higher than that, so they are worth taking care of. They are a good substitute for meat used in the right way, but usually we use nuts for dessert; after we have eaten all the meat we can afford to buy as well as other things, then we finish off with nuts, raisins and such things as that. I wish this Society would take a deeper interest in native nuts and try to locate especially fine seedlings of the black walnut. It is not the size that counts in these nuts, it is the cracking quality that is necessary in order to have a good commercial crop. Some varieties will crack out eighty per cent halves; some of them will crack out whole and these meats are seldom less than eighty cents a pound. Last winter in Washington they sold at a dollar thirty-five. We would not have them if they were broken up into crumbs, but they were bringing a dollar thirty-five cents a pound for good meats. Now when we realize that from a bushel of nuts cracked you can get eight pounds of meat it means that you are getting a great big price for walnuts. Eight pounds to a bushel at 80c would be $6.40. Of course it means cracking them, but in the winter there is usually time when this could be done.

J. W. Crow (Ontario): I want to add a word in regard to the possibilities in blueberries. Mr. Close referred to the pickers who seem to have such a good time picking blue berries. A friend of mine went across through Vermont and visited these blueberry barrens. He came upon the blueberry pickers just at the top of a hill. He stopped there and was giving expression to his admiration of the landscape. One woman who was engaged in picking blueberries said, "You would not think so much of it if you had to stay here and make your living picking blueberries."

I would like to ask this question with reference to the possibility of picking up valuable new varieties of nuts and fruits. I would like to ask if the American Pomological Society would think of offering special prizes in the prize lists of state horticultural societies, fruit growers' associations, state fairs and other shows, for new varieties of fruit and nuts. The American Pomological Society is very anxious to get in touch with new varieties of fruits and nuts. The State fair premium lists and other such lists are circulating among a large majority of the people who are interested in varieties and who know these things locally. If we could find funds to offer such prizes it seems to me we might get in touch with a lot of these things we are looking for.

C. P. Close: I had the pleasure of attending the mid-West Horticultural Exhibit at Council Bluffs. There was one of the best exhibits of native nuts I have seen; it was certainly worth while. It comprised a number of varieties of hickory nuts, black walnuts, butternuts, etc., that are grown in Iowa, and if state organizations could be interested in the way that the Mid-West is interested it would be well worth while.

I once went through the Yellowstone National Park and saw thousands of acres of blueberries and no one to pick them. They were going to waste year after year. They were the small plants and looked like those we had seen in Maine. They grew in the woods. In Maine they do not do so well in the woods I believe, but there they seem to do very well indeed.

The Chairman: I will call on Prof. Lake to tell us something about the improvement in pecans. He has just come from Georgia and can give us a very interesting talk about the development of the pecan industry.

Prof. E. R. Lake: This is a big subject and it is mighty interesting. It would not be particularly interesting to you unless you had some samples, but I will furnish these tomorrow at the dinner. I can tell you now they are good.

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## DEVELOPMENT OF THE CULTIVATED BLUEBERRY

**Elizabeth C. White, New Lisbon, New Jersey**

Millions of dollars worth of blueberries are sold every year. Practically all of these are gathered from swamps, hillsides and wild pastures, where they grow without human aid. May we not count the commercial importance of this unimproved fruit as an indication of the immense popularity that awaits the better blueberries which are now being developed?

Blueberries have been cultivated in a few places for several years. There are small fields in Indiana. Florida and other states.

### Requirements of Growth

Attempts to cultivate blueberries have most frequently failed however because the plants were set in soil of neutral or alkaline reaction which is best suited to most garden crops.

Blueberries require an acid soil, preferably one composed of peat and sand. This is the most important discovery made by Mr. Frederick V. Coville of the U. S. Department of Agriculture, who has made a careful study of the laws governing the growth of blueberries.

Of equal importance to their welfare is a well controlled supply of water. The blueberry roots must have a continual supply of both moisture and air. It is easy to understand that blueberries need plenty of water — we see them growing in swamps and very wet places; but under New Jersey conditions at least, their need of good drainage is less apparent. Every thriving wild blueberry bush, however, no matter how watery its environment, has access to some tussock of moss or heap of loose partially decayed vegetation through which both air and blueberry rootlets freely penetrate.

A third important law explained by Mr. Coville is the need of cross pollination. Many blueberry plants are entirely sterile to their own pollen; on others berries may set when self-pollinated but if so they are slow in developing, never reach full size, and the seeds and resulting plants lack vitality.

Another fact not generally realized is that low temperatures are necessary to stimulate various phases of the development of the blueberry. For successful

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A cluster, natural size, of a Coville hybrid blueberry which Dr. Coville has given the variety name Katharine. In the breeding records it is known as 830-C. This is a first generation hybrid betwen two selected wild parents of the high bush blueberry, Vaccinium corymbosum. One of these parents, known as Brooks, was from Greenfield, New Hampshire. The other parent, known as Sooy, was from Browns Mills, New Jersey. About three thousand hybrids of this parentage, from pollinations made in the green-house at Washington in 1912 and 1913, have been fruited at the blueberry testing plantation at Whitesbog, New Jersey. The best hybrid among these three thousand is the one here illustrated. The berries have a light blue color, delicious flavor and firm texture, and the seeds are so small as to be scarcely noticeable when the berries are eaten.

breeding and propagating it is important to know the amount of chilling a plant or cutting must experience before it will start normally. Blueberry seeds will not germinate till the nights attain a certain low temperature or they are given artificial refrigeration and pollination of the flowers cannot be successfully accomplished if the night temperatures are too high. In outdoor culture, of course, normal seasonal temperatures provide these conditions.

### Co-operation in Developing Blueberry Culture

After reading Mr. Coville's bulletin "Experiments in Blueberry Culture" I wrote the Department of Agriculture offering to co-operate in further experiments. The letter was based on the idea that my father and I could contribute experience that would be valuable in the development of this new culture, and that, when tamed blueberries would make for us a valuable secondary crop. Our primary crop is cranberries — for three generations we have grown them at Whitesbog, New Jersey. All along the dams and about the margins of the cranberry bogs the high bush blueberry or swamp huckleberry as we call it in New Jersey grows wild. Blueberries and cranberries are close kin.

For ten years we have worked in close cooperation with Mr. Coville. When his breeding work developed so that it was desirable to try the seedling plants in the field, the trial grounds were rented at Whitesbog. I believe the cooperation of science with experience in commercial culture of a closely allied fruit has hastened the development of better blueberries.

In this cooperative development my part has consisted chiefly in the selection of fine wild plants; and in developing methods of field culture and of propagation on a commercial scale.

### Wild Stocks

In locating good bushes I have depended almost entirely on the people who pick wild berries for market, and large size of the berry was the only point considered in making the first selection. To begin with we accepted plants with berries half an inch in diameter but they were so easily found that we quickly raised our standard to 16 mm. or about 5/8 of an inch. Over a hundred plants were located within twenty miles of my home in New Jersey. Two of them bore some berries over 19 mm. or 3/4 of an inch in diameter.

We made an effort last year to locate in other parts of the country plants with berries 3/4 of an inch in diameter, or just the size of a cent. We offered $50.00 each for such plants, packed according to directions and delivered to the nearest express office — we to pay the transportation. The offer was advertised widely and I received hundreds of samples, none of which approached the best New Jersey berries in size. Surely little New Jersey has no monopoly of blueberries as large as a cent, and I hope members of this Society will interest themselves in locating such bushes. Our $50.00 offer still holds good and the plants would be of great value in the breeding work, especially if they came from New England, about the Great Lakes, from North Carolina or from some other blueberry center, the climate of which differs appreciably from that of New Jersey. If you are inclined to help in this search please remember that only plants with berries nearly or quite 3/4 of an inch in diameter are wanted; and don't, oh! please don't! inspire *all* your friends with an ambition to send samples of the best berries *they* ever saw; even when said berries are less than 1/4 inch across; — it takes too much time to carry out the remains.

### Characteristics of Individual Plants

I visited in their original location most of the hundred odd plants selected between 1912 and 1916, either while in fruit or when dug during the dormant season. Each was divided into many pieces which were used for propagating. From each original plant there were thus obtained from five to five hundred little new plants. The young plants from each original bush have been kept entirely separate and each lot has its own peculiar set of characteristics, entirely distinct from those of any other lot. In very many cases the young plants show characteristics which explain peculiarities attributed to accident when observed in the original plant. Thus: Earlin was the tallest plant I ever dug, over 12 feet

high, and the youngsters are a leggy, gawky lot. Haines No. 9 though gnarly and seemingly very old had an appearance of vigor which led me to believe the young plants would be clean cut and aristocratic; but no! every one, as soon as it is past its infancy, looks old and gnarly. The original Adams plant grew on the bank of a brown stream which at high water had washed bare several large roots which were bent at right angles on themselves; a mere accident of circumstance apparently, and yet every Adams plant of two years old or over that I have dug, unlike other blueberry plants, has had a number of its larger roots bent at right angles. Rubel was a large plant, beautifully symmetrical, with smooth bark and a fine well balanced appearance, and under cultivation Rubel plants have proven uniformly fine, well balanced and vigorous.

The individual characteristics which make every seedling blueberry plant distinct from every other are innumerable. In connection with the fruit the important differences include size, color, flavor, texture and time of ripening. The berries on one plant may be gone before those on another begin to ripen.

Of greatest importance is the varying ability of plants to resist injury by frost. A remarkable example of this was observed early in my blueberry work. It was past the middle of May when a hard freeze came. Such an event spells disaster for cranberry growers, and the following day my father and I were investigating the extent of the damage and we observed two large blueberry bushes growing so close together that their branches intermingled. On one the young leaves, flowers and buds were uninjured; while on the other they were completely blackened as by fire.

Our selected plants varied in their resistance to frost injury, and the most tender have been discarded. None of them however were very susceptible — we unwittingly secured resistant plants because most of them were located in years when wild blueberries were seriously injured by frost.

Of the hundred odd plants originally selected for the size of their berries, only six proved worthy of propagation for commercial fruit production. These are known as the Rubel, Harding, Sam, Dunfee, Adams and Grover; each name perpetuating that of the discoverer of the original plant.

### Breeding

Mr. Coville is using these selected plants as parents in his breeding work. Besides those from New Jersey he has a few from other states. His methods of carrying on this work in the greenhouses at Washington are very interesting. The plants which he desires to cross are chilled, either in a refrigerator or out of doors in winter. They are then forced in a house where the temperatures are carefully regulated. If a plant develops faster than its destined mate it is held back by being placed in a frame where the temperature is kept slightly above freezing by an electrically controlled refrigerating machine.

The flowers are hand pollinated. A careful record of date, pollen parent, etc., is written on a tiny tag which is attached to each pollinated flower.

The seedlings resulting from this tedious work are cared for in Washington till a year old. They are then sent to the trial grounds and set in a field about September first. The second summer in the field they usually produce a few berries, and the third summer a crop worth picking for its commercial value.

Low bush hybrids resulting from a cross of Brooks, a high bush (Vaccinium corymbosum) from New Hampshire, with a selected low bush blueberry (Vaccinium angustifolium) from the same state have been carried to the second generation. The very interesting results, from the breeder's standpoint, Mr. Coville will discuss in a future publication.

From a practical standpoint these low bush hybrids promise to be very valuable. Among them are plants yielding fruit which ripens in New Jersey as early as that of the native wild low bushes. There berries of the latter are small and insipid, but the berries of some of the early low bush hybrids are large and of fine flavor. For New Jersey they promise excellent berries ready for market from June 15th to 20th.

Among other hybrids, plants can be selected which will carry the blueberry season, in New Jersey, up to or beyond the first of September.

What are probably the best of the hybrids produced so far are known as 620 A and 830 C. They were selected from upwards of 3000 seedlings of the

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A Rubel cluster, natural size. The Rubel is a late variety of wild origin. The original plant was found near Chatsworth, N. J. Note that the ripe berries are about the same size as those of the hybrid blueberry Katharine. In recent breeding work, Dr. Coville has made extensive use of Rubel as a parent, but the seedlings are yet too young to show the results.

Brooks-Sooy cross. Brooks, I have already explained, is a New Hampshire high bush. Its largest berries are 14 mm. or more than ½ inch in diameter. Sooy is a high bush from New Jersey, the largest berries of which reach 16 mm. or about ⅝ of an inch. On the two seedlings the largest berries reach a diameter of 18 mm. The berries of 830 C are later and average a little larger than those of 620 A. Since the parents of these hybrids were crossed the better wild plants have been found. Some of the plants resulting from crosses of these produced their first berries last summer. Among these one berry 20 mm. in diameter, was found. With this satisfactory progress we believe that the best results of the breeding work rest in the future and look forward to blueberries an inch in diameter.

### Cultural Methods

We now have at Whitesbog about twenty-five acres set with blueberries,—twenty with seedlings from the Department and five with plants raised from cuttings of the wild bushes.

The land we are using is in the so-called Pine Barren region of New Jersey, and has never been cultivated before. It was considered useless. It is sandy, and the sand is overlaid with a peaty layer from two to six inches thick. Before plowing it is occupied by a variety of bushes, many of them of the heath family, including several species of blueberries and huckleberries.

In preparing this land for cultivation we cut and burn the brush and plow under the peaty turf, leaving the white sand on top. It is desirable to plow the land a year or more before planting and work it occasionally with a disk harrow in order to thoroughly kill the original growth. So much of this consists of unselected blueberries that they come up close to the better plants and get overlooked by the men who hoe.

The plants from the Department, when set in the field, have mostly been as large as they could be grown, in a two-inch pot. They are set 4 feet apart in rows of 8 feet apart. There is little doubt that this spacing is too close for some varieties and too wide for others—but all our plants so far are on trial.

We practice clean culture so far as the shortage of labor permits. The new land on which manure has never been used is not very weedy, but the young plants need hoeing two or three times during the summer, and frequent use of the cultivator helps maintain good areaition of the soil, so essential to vigorous growth.

### Irrigation and Drainage

One important fact which makes blueberries an especially good auxiliary crop for us is that we have developed an elaborate irrigation and drainage system for our cranberries, much of which can be used for the blueberries with but little additional expense. The cranberry bogs and blueberry fields are underlaid with a hard pan two feet or so below the lower level of the peat. Irrigation is provided by the percolation of water through the soil above this hard pan from reservoirs, which are maintained at a level some feet higher than the bogs and fields. These reservoirs influence the water content of the soil for a mile or more below them. In the cranberry bogs drainage is cared for by open ditches but in the cleanly cultivated blueberry fields open ditches have not proved practical. Every shower washes in sand and stops the flow of water. We have therefore installed tile drains. These are mostly satisfactory but in periods of heavy rain during the growing season there is too much surface water. This checks the growth of the plants and we must find some way of caring for it.

### Fertilizing

For each of the past two years our cranberry fertilizer has been applied to the blueberries at the rate of 500 pounds per acre and the results have been excellent.

For eight years the New Jersey Agricultural Experiment Station has carried on, at Whitesbog, experiments in fertilizing cranberries. The results show that applications of fertilizer are desirable on certain kinds of cranberry land, while on other kinds of cranberry land even small amounts produce too much vine growth and decreases the yield of fruit.

I suspect that, with blueberries as with cranberries, on deep peat soils fertilization could easily do damage.

### Pruning

Our knowledge of pruning blueberries is rudimentary; but we are very sure it is desirable. We remove some of the older branches thus giving more light, air and root service to the new shoots which start every year from the base of vigorous blueberry plants.

Last summer I tried a short cut in pruning some low bush hybrids which promises well for this class of plants. As soon as the berries were picked we mowed off the plants with an old horse mower, plowed and cultivated close to them and gave them a liberal application of fertilizer. This was done about the third week of July and now the plants have a nice lot of new sprouts with fruit buds for a fair crop next summer.

### Insects and Diseases

The great quantities of wild blueberries which are produced in many parts of the country are proof of the comparative freedom of these plants from the ravages of insects or disease. This does not mean that blueberries have not a multitude of enemies, but that in their natural environment the balance of power favors the blueberries. As we bring them under cultivation we make conditions more or less artificial. It is not natural to have great fields of blueberries only. Then they will undoubtedly be planted on soil and in situations that are not so perfectly suited to their needs as those which the wild plants occupy as the result of their successful struggle with other vegetation. This changing of the balance of nature will in time probably result in giving advantage to some one of the insects or diseases to which blueberries are subject.

In the plantation at Whitesbog, where we are working with native plants under almost natural conditions, we have had very little trouble with either insects or disease.

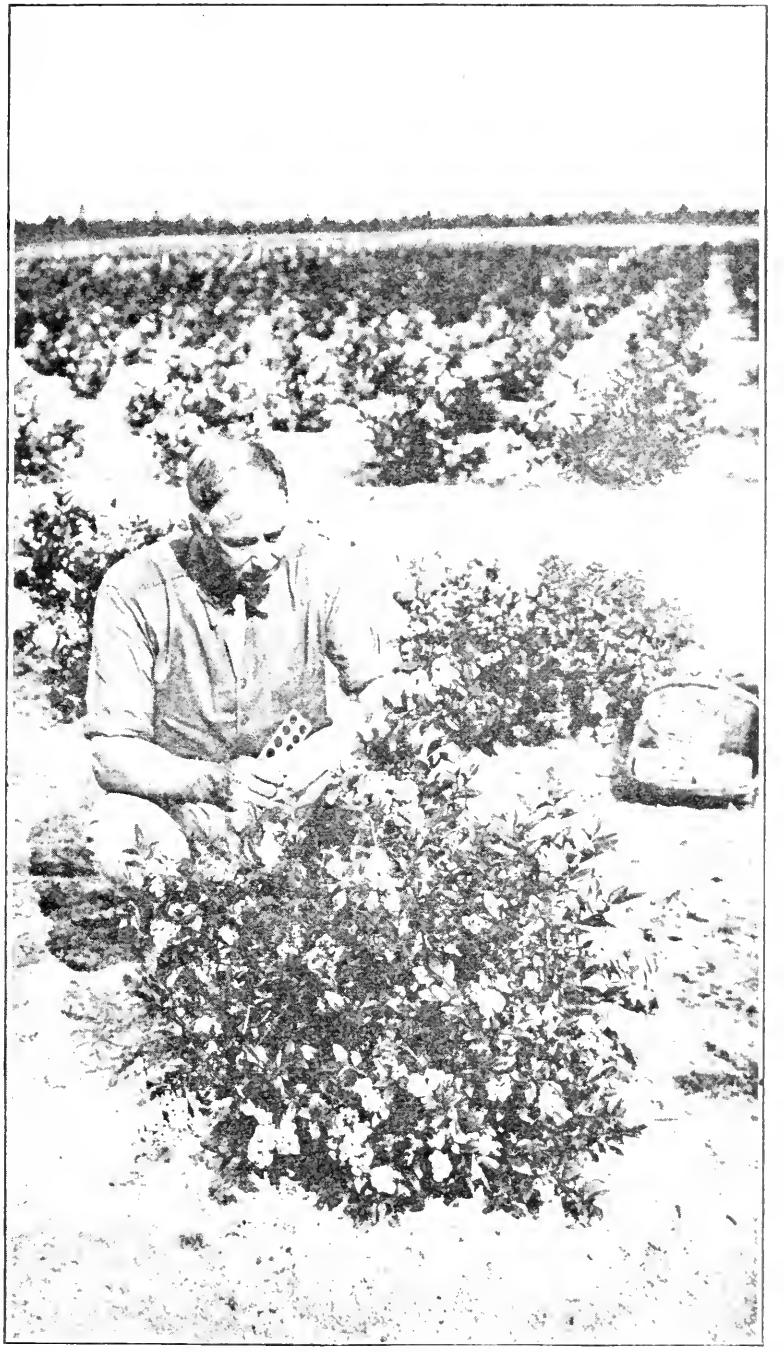
The only thing against which we are taking specific preventive measure is a borer, the life history of which is much the same as that of the raspberry borer. The adult beetle, during July, girdles a new shoot from one to four inches below the tip. She scarifies the bark in two irregular bands, approximately one-quarter inch apart, and between them deposits an egg, the shape and color of a miniature banana an eighth of an inch long. This soon hatches a minute larva which proceeds to bore its way down the stem. The first summer it only goes two or three inches, but the following summer it grows and travels much faster, making holes at intervals through which the frass is discarded. The stem dies, frequently with fruit ready to ripen. The borer grows to be an inch or more long and continues down into the base of the plant below the ground level, neatly cutting off the stem which it has killed two or three inches above the surface.

We guard against this damage by breaking off the wilting tips several inches below the girdle. We have been doing this for several years and it is interesting to note that now the larger percentage of wilted tips is found on the margins of the fields. This is probably because the margins are subject to infestation from the uncared for wild plants in the neighborhood, while our work has protected most of the field.

The infant blueberry industry has two great safeguards against the development of any insect or disease to the point of being a pest.

One is the interest with which the potential pests are being studied by the men who have helped solve so many disease and insect problems for cranberry growers. Of these men Dr. C. L. Shear of the United States Department of Agriculture is most notable among the pathologists, and chief among the entomologists is Mr. H. B. Scammell, who made a study of cranberry insects for the United States Department of Agriculture. While stationed at Whitesbog Mr. Scammell caught the blueberry fever. He is now in commercial cranberry work and is preparing to become one of the pioneer blueberry growers.

The second safeguard is the fact that individual blueberry plants vary in their power to resist the attacks of some, if not all kinds, of both insects and disease, and this is taken into consideration in the selection of varieties.





W 20-48

The blueberry trial field of the U. S. Department of Agriculture at Whitesbog. The bush on which the berries are being measured with a blueberry gauge is five years old from seed. It is carrying its second commercial crop, which amounted to three quarts, or at the rate of over 100 bushels per acre with the plants set 4 ft. x 8 ft. This plant, like most other seedlings from the Department, was set in the field when one year old. It was then about six inches high with a root ball that filled a two-inch pot.

Among the insects which attack the blueberry is one which deposits its eggs in the stems. Galls thereupon grow in which the larvae develop. Year after year I have noted individual wild blueberry plants covered with these galls, while the other plants in the same thicket remained clean or with but very few galls.

Among the blueberry diseases which are under observation is one which transforms nearly mature fruit into shriveled mummies instead of the luscious berries they would normally become. Certain plants whose other good points led us to consider them as a start for future varieties were found especially susceptible to this mummy berry disease and were discarded.

### Harvesting and Marketing

In addition to cultural problems we have had to consider those of picking, packing and marketing blueberries. The picking is mostly done by the wives and children of our Italian laborers, who are paid six cents a quart. The berries are picked directly into ordinary quart berry boxes. The boxes are then roughly graded according to the size and color of the berries on top. Each box is covered with paper. For the poorer berries this is plain, but the covers for the better grade carry our name and brand. The boxes are packed in the ordinary 32 quart crates.

We have not as yet picked at one time a whole crate of any one of the varieties of blueberries selected for commercial fruit production. The majority of the berries marketed have been from the seedling plants under trial. These, being from selected parents, are much above wild berries in average size and quality. The fruit from each bush, however, is different from that of every other bush, and much of it is very ordinary. In considering the marketing problems we have tried to look forward to the day when we could furnish thousands of crates of blueberries, thoroughly dependable in their superior size and quality.

Last summer about half of the crop of 500 crates went to hotels, restaurants, steamboat lines, etc., which ordered regular shipments, once or twice a week, at a flat price per crate for the season. These regular customers received the best of the berries, and the others were sent to a commission house in New York. For the latter we averaged nearly or quite as good a price as from the regular customers. The average price received last summer was approximately $12.00 per bushel F. O. B.

It is encouraging that the regular customers who have been buying cultivated blueberries for several years are constantly increasing their orders. They tell us that even at last year's high prices blueberries were the most economical fruit they served. There is no waste — no hulls, no seeds of appreciable size, and blueberries keep well. One customer who two years ago took two crates twice a week last summer took eight crates once a week. He says that our blueberries keep so well that the saving in transportation charges of one shipment per week over two is well worth while.

### Future Prospects

We believe that commercial blueberry culture has a great future — that in a few years it will be yielding large revenues from thousands of acres that are now waste land.

The most serious check on the rapidity of this development will probably be the difficulty of securing plants of the better varieties. You know ten years ago "they" said blueberries could not be started from cuttings. Mr. Coville's careful work has proven that "they" were wrong. We have proven that blueberry cuttings can be started with less elaborate equipment than that employed by Mr. Coville, but it is not yet plain sailing by any means, and our losses are heavy. Last year they were 75 per cent of all the cuttings put in.

With this handicap it is a slow process to work up a considerable stock of plants from a single fine wild bush or a single selected pedigreed seedling. This is true even though we bud extensively to provide a large amount of cutting material. By the way — these budded plants are not practical for commercial fruit production. Even when set with the union well under the surface of the ground they continually send up sprouts from below it. This necessitates removal of the

sprouts two or three times during the season, which, for a considerable area is impractical.

This year we are making nearly our whole stock of better plants into cuttings. There will be approximately 100,000 of them, and we believe we can avoid many of last year's pitfalls. We are confident that there are no insuperable difficulties in the way of producing large quantities of the best plants; but while these difficulties are being overcome there will, for a few years certainly, be a shortage of plants.

### Home Gardens

These better blueberries are very desirable in the home garden both for their berries and their beauty.

It is a comparatively simple matter to provide comfortable quarters for blueberries in most home gardens. The requisites you remember are an acid peaty soil, good drainage and a constant supply of moisture. Peat may be defined as vegetable matter decomposing under conditions which arrest the decomposition at a comparatively incomplete stage. For providing peaty conditions in the home garden partially rotted sawdust may be used, or partially rotted oak leaves or pine needles or other leaves which rot slowly. Leaves, such as maple, which rot quickly will not answer the purpose.

In lighter well drained soils the addition of six or eight inches of this partially decomposed vegetable matter dug into the soil is sufficient preparation. The peaty material provides both plant food and the required acidity. In heavy soils it is safer to dig a trench three or four feet wide and about a foot deep and fill with a mixture of two-thirds sand to one-third of the peaty material. The after care consists of the maintenance of a mulch of leaves about the plants and adequate watering.

### Beauty

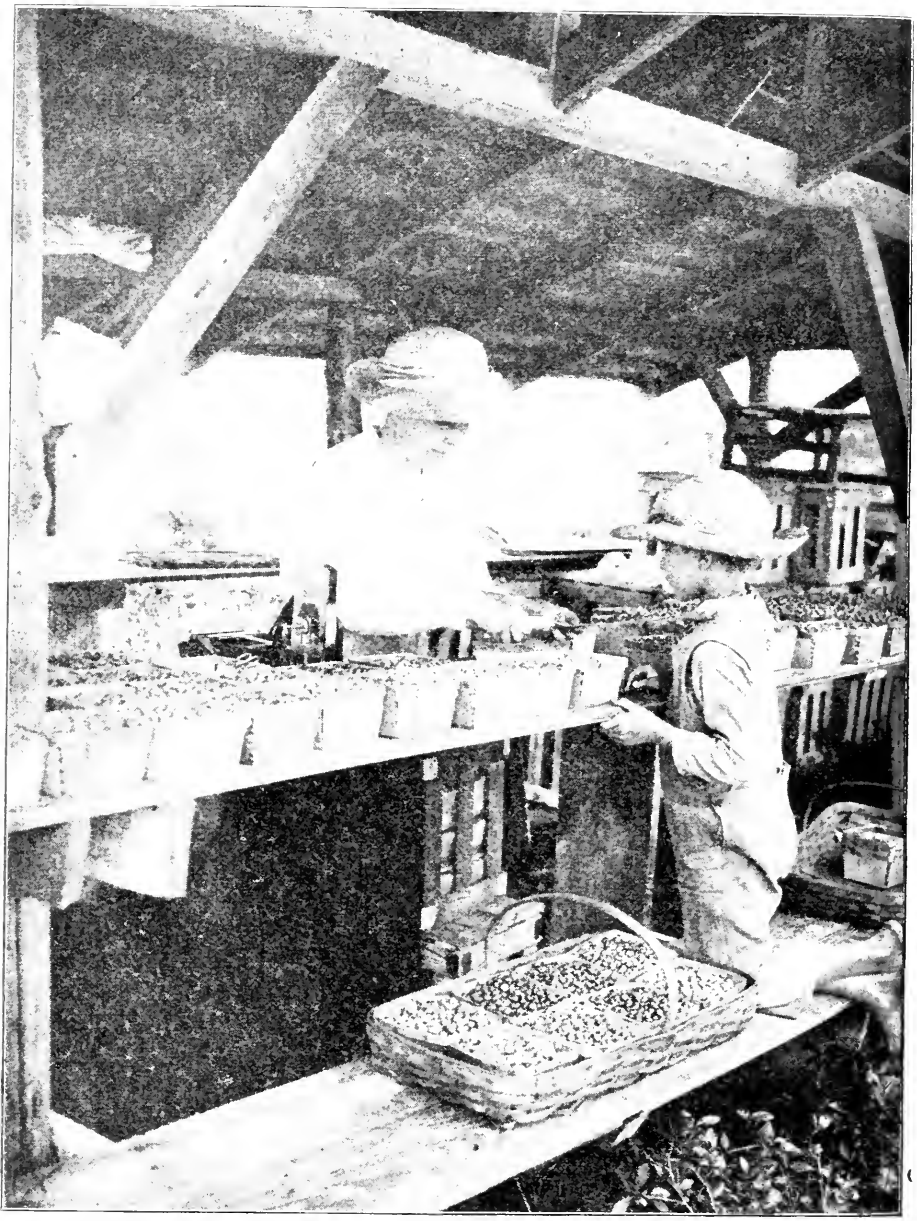
Blueberries have no thorns and for all the year round beauty few plants can compare with them.

In the spring the young shoots and leaves of many blueberry plants are a rich bronzy red. At this season the trial fields and the hedges of wild bushes along our dams show the greatest variety of rich and delicate tintings. One plant has dark bronzy leaves and white flowers, the next displays its clusters of pink buds against the daintiest green. Other plants show a harmony of pink buds with ruddy leaves or a contrast of green and white. A cold spring brings the greatest variation of color. Then, in early May perhaps, comes a day as warm as midsummer, which as with a touch of magic causes all the blueberry plants to assume their work-aday dress of green. For a few days longer the air is filled with an elusive spicy fragrance and the fine high orchestra of the bees; then the plants settle down to the serious business of perfecting their fruit.

The blueberry fields are never more lovely than just before the berries are ready to pick. The blue of the ripe berries and the pink of those that are ripening contrast charmingly with the rich green foliage. Before the berries are all picked the year's sprouts begin to show above the tops of the plants. These start at or near the ground, and on well established vigorous plants grow from three to four feet in a season. Through August and early September these nodding plumes are the most conspicuous feature of the blueberry fields.

With the first frost the reds flame up again. Most of the plants are brilliant in autumn coloring, some astonishingly so. As the same plants hold the same place each year in the autumnal color scale there is great possibility of choice for ornamental purposes.

In winter the color charm of the blueberry fields does not fail. The young wood of most of the plants has red bark, varying in intensity of color with the individual plant. All our fields of blueberries are irregularly set about with rather scrubby Jersey Pines. Though not fine specimens, they are richly, softly green as they rise in groups, measuring degrees of blue distance in this flat country as do hills elsewhere, they are charming. The blueberries contribute a tracery of red twigs against the snow which in the distance softens to a rosy haze. Stretch of tawny Indiana grass and a few small oaks still holding their brown leaves add more warm tones and with a perfect dome of azure sky complete a rarely colored winter landscape.



W 20-63 *Copyrighted by Joseph J. White, Inc.*

Whitesbog Blueberries are carefully inspected. Each quart basket is then covered with a paper cap before being packed in 32-quart crates for shipment. Note how much darker some quarts of berries are than others. This is because they were picked in the trial field from seedling plants, each of which produces a different kind of berry. The quarts in a crate of one variety are of uniform color.

### Conclusion

Blueberries are found from the Gulf Coast to Labrador and Alaska; in swamps and high on mountain sides. The better varieties we are developing in New Jersey may not be well suited to all localities. The methods employed at Whitesbog, however, I am sure are well suited to developing better blueberries for every locality where they are already found. These methods include selection of the best local bushes, and testing them under cultivation with Mr. Coville's underlying principles well in mind. Then if they prove worthy he will be glad to cross the best of them with the best plants from other localities.

I trust that what I have said may attract some pioneers to this new branch of horticulture and that you will remember we are in the market for wild blueberry plants with berries as large as a cent.

THE CHAIRMAN: I am sure we have listened with a great deal of interest to this wonderful talk by Miss White. It is easy to see that she is an enthusiast as well as a very practical woman, and I am sure there are yet many things about blueberry culture which she could tell us. If any one wishes to ask her any questions or inquire about any fine points I think she will be glad to answer.

A MEMBER: Some people call them huckleberries and some blueberries. What is the difference?

MISS WHITE: I think it is largely a matter of local nomenclature. In New Jersey we call everything huckleberries. We talk about swamp huckleberries and upland huckleberries. The swamp varieties are vaccinium angustifolium, and the upland huckleberries are vaccinium corymbosum; but in New England and in the northern states they make a clear-cut distinction and the vaccinium corymbosum are known as blueberries while the others are known as huckleberries. Mr. Coville has agreed to our calling the cultivated berries "blueberries", but I think from New Jersey south the name "huckleberries" is universally used for both plants.

A MEMBER: Do the cultivated berries show that blue bloom?

MISS WHITE: Not all, but we do not sell the black ones. We have some that are as black and shiny as a shoe button but we can them; we did not send them to market.

A MEMBER: We have a variety in Chautauqua county, a cultivated variety, but they do not look like the native huckleberry; they are three or four times as large and they have a little stem like a currant.

MISS WHITE: Do the berries grow in clusters?

A MEMBER: Not clusters, but one or two together.

MISS WHITE: Do they have a calyx at the end of the berry?

A MEMBER: Not like those on the screen.

MISS WHITE: There has been an herbaceous plant grown in some sections called the American huckleberry, which is not the vaccinium corymbosum, it is of the nightshade family. I had some sent to me as huckleberries a few months ago. I refer all these things to Mr. Coville. They are not really huckleberries.

A MEMBER: The Burbank wonder berry is sometimes referred to as a huckleberry.

A MEMBER: Miss White has not told us what they are worth apiece.

MISS WHITE: Just at present there are none to sell; we are sold out. My ambition is to have the plants a year in the nursery and sell

them at a dollar apiece in lots of several hundred at a time. I do not think they will go lower than that because of the tremendous loss.

A MEMBER: What is your yield per acre?

MISS WHITE: Our yield per acre we can only guess at. Our fields are all trial fields and the plants are young. We have no acre of a uniform variety, but I think there is no doubt that when we have a field five or six years old and uniform that we ought to get one hundred bushels per acre without difficulty. But I cannot give positive information. The whole work is too new and our fields are too irregular. We only have a very small part of an acre uniformly planted.

A MEMBER: Must these berries be picked by hand or can you use a picker?

MISS WHITE: These are all picked by hand. While the quality is very irregular, the fact that they are picked by hand directly into the quart baskets and covered immediately means a great deal in the market, independent of the quality of the fruit itself.

A MEMBER: Have you not pictures of some larger than you showed this evening? I saw some in Mr. Coville's office — pictures of some larger than these.

MISS WHITE: They are the same pictures. The basket of berries is one that is in his office. He has nothing larger than those you have seen this evening.

A MEMBER: What pruning do you do, if any?

MISS WHITE: We tried mowing down the low bush hybrids last summer. We did it on about one-sixth of an acre and the others we just cut out some of the older stems. It is more or less irregularly done because we have had such a shortage of labor. I do not think we need to prune every year as we do with the raspberry. My impression is that where they are well established if they are pruned every two or three years it will serve every purpose, but our knowledge of pruning is very rudimentary. We can only guess at what will be the ultimate commercial practice from the few experiments we have made.

A MEMBER: In the northern part of the province of Ontario we have a few acres of these berries and my impression is that the natives there prefer the black huckleberries for table use or canning on account of their quality. They say they are sweeter and bear more heavily.

MISS WHITE: I think a good many people have that same impression, and I used to feel that way myself from sampling the berries from hybrid bushes in our bogs before we began this work. But I think we can change the blueberry. Some of the very best berries are rather too dark; they are not really black but very dark blue, but all these things vary so that the impression gained from the general run of wild bushes in our locality will not necessarily carry over to the varieties selected. You can through selection and breeding work modify these things. I think there is very little doubt that we can get the quality and the color we desire ultimately.

A MEMBER: Do you think the black blueberry would be undesirable?

MISS WHITE: I think some people rather prefer it for their own use, but it is not the best for market. The black berries have a messy appearance in shipping, consequently we prefer the blue ones that bring better prices on the market.

A MEMBER: Is it necessary to make more than one picking of some of the varieties?

MISS WHITE: Yes, I think it will always be necessary to make more than one picking of all varieties. At present out fields are so mixed that we have to go over a whole field four or five times; but that does not mean that we go over the same bushes four or five times. The first time there will be a lot of bushes that will not be touched because the berries are not ripe, and the last time a lot of bushes will not be touched because the berries will have been already picked. There may be some bushes that you will be able to pick just once, but I think in the majority of cases they will have to be picked two or three times.

A MEMBER: What date do you start picking?

MISS WHITE: It has varied very much. Some years we are not able to begin before June 28th. We have had certain bushes, young bushes, where the berries were ready on June 10th. You see we have such a mixed lot that the very early ones are in the minority and we do not begin very early. The season for the most of them does not begin before July 1st.

A MEMBER: Can you let them stand?

MISS WHITE: Not too long, or the berries will be messy and in bad condition. That is the advantage of cultivated berries, we can watch them and pick them before they get too ripe and soft to carry.

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### THURSDAY MORNING SESSION

The Thursday morning session was called to order at ten fifteen by the Chairman, W. T. Macoun.

THE CHAIRMAN: It has been necessary to rearrange our program a little and we will open this morning with an address by Dean Vivian of Ohio State University. His subject is one in which you will all be interested, "The Fruit Crop in Its Relation to the National Diet."

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## THE FRUIT CROP IN ITS RELATION TO THE NATIONAL DIET.

**Dean Alfred Vivian, Ohio State University.**

*Mr. Chairman, Ladies, and Gentlemen:* I come before this group of men with a good deal of diffidence. I feel it is a good deal like "carrying coals to Newcastle", that doubtless there are many people in my audience who can speak with more authority on the subject assigned to me than I am able to speak myself. I appreciate the fact that I am on the program as a mark of courtesy The fact that I am the Dean of the local College of Agriculture, that I have exhibited a great interest in Horticulture, that I consume myself as many horticultural products as possible, is probably the thing that got me the invitation to speak before you.

This subject, however, is one that is deserving of some serious thought. I do not know whether it has occurred to you that we have never before thought so much about food as we have in the last two or three years. This is partly due to the fact that food prices have been so high that the matter has been a constant source of irritation to the housewife. Coming every day to buy food and paying what she thinks are exorbitant prices for the food, she has come to think food and to talk food more than ever before, and incidentally she has come to think that the farmer and the horticulturist are the worst outstanding

examples of the profiteer, an impression which it is up to a society like this to correct before the matter becomes too serious.

This war through which we have just passed has probably done more than anything else to emphasize to the American people the importance of food production. We used to think, when we thought of food at all, in a purely selfish and local way. It did not occur to us that we had any particular relation to the food supply of the whole world, and it was only when we found out what a vital factor food was in the carrying on of the war that we began to think in world-wide terms on the subject of food. When word came to us from our Allies that without America's help in the food question the war would be lost, when we got such messages as we got from the British food administrator at that time, when he cabled to America: "The Allies are still hungry. If you can supply any more wheat, for God's sake send it over," we began to realize that food had a very important place in our economy. The European armies demanded wheat because that was the thing which best could be transported and was the food that they knew best how to use. Owing to transportation difficulties America was the only country that could supply that wheat because boats could not be spared to go to the Argentine, to Australia or to India. We did not have an extra supply of wheat enough to supply their needs, and so we were asked to take out of our own mouths, as you might say, take from our own supply enough wheat to send abroad and it was then that we began seriously to think of substitutes for wheat, and I think one of the finest things that we did during the whole war was the way in which we sacrificed those foods to which we were accustomed and learned to eat other foods.

Naturally when we were looking for other things to supply the place of wheat we turned very largely to the perishable food products, to vegetables and the fruits which we could produce and we were able to take out of our own normal supply of wheat enough to save the situation on the other side.

The food agitation incident to the war has made us look at the whole question of food in a larger, broader way. We are getting a higher vision and we know that we of the United States are only a small part of the whole world. Now that Europe is settling down slowly to normal it is reasonable to suppose that within a comparatively short time she will again be able to take care of herself so far as the food supply is concerned. That particular urge of the war to send food to Europe will not then prevail, but let us hope that we will never lose the world vision that we got during that time. While we hope that within a reasonably short number of years starvation conditions will no longer exist in Europe, let us not lose sight of the fact that even before the war there were five hundred million people in this world on the verge of starvation all the time, and these people are still in that condition. Just across on the opposite side of the ball from where we are sitting, in India, one hundred million people will go to bed tonight without supper and without having had anything to eat all day long. There are two hundred million people in that comparatively small country that have never in their lives known what it was to have their appetite completely satisfied, and added to that are two hundred million more who have been on the very margin of starvation. That problem that was with us before the war is still with us, but we now see it more clearly than we did before, and America, blessed as she is, must never lose her world vision.

Now the pity of the whole situation is that there is no need for starvation in this world. The world can easily produce enough food to feed three times its present population, and that without effort. I have no patience whatever with those people who predict that within a rather small number of years the population will be so dense that we will no longer be able to support it.

Anyone who has ever visited the tropics and knows anything about the unworked possibilities of tropical fruits in food production can easily understand that there is no likelihood of the world ever being over populated so far as food supply is concerned. In the future feeding of the world, however, vegetables and fruits will take a much more important part than they have in the past. We have in the past thought of fruits simply as pleasant adjuncts to our diet. We have never considered them seriously as foods, that is, as supplying protein and the energy-producing materials necessary to sustain life. We know that they add pleasure to the diet, that they give a pleasing variety to the menu. Meat, bread and potatoes we have thought of as food, and the other things as simply pleasant adjuncts. Not long ago one eminent authority speaking of fruits made this

statement: "They do not add greatly to the total food value, but they do increase the wholesomeness of the diet in three ways—they supply the necessary mineral matter, they provide the bulk desirable for digestion for the more concentrated food materials, and they make the diet more varied and attractive.
large amounts as food.

The last is a most important point in the ordinary mixed diet of a person in normal health living under usual conditions." In other words we have gotten into the habit of thinking of fruit as something which should be produced in

In order to bring the matter before you and show you the food producing possibilities of fruit I have placed on the chart here six fruits and three vegetables for comparison, and then because wheat seems to be our standard of food comparison the world over I have placed that on this chart also as well as corn. In this first column I have given the average yields per acre which are compiled for me by Professor Paddock; in this column the pounds of protein produced per acre, and then in this column the number of calories, that is the energy-producing value, and in the last two columns I have put the equivalent values in round steak so you may find out what it means in terms of meat. Take apples —an acre of apples will give 32.4 pounds of protein, and 2,376,000 calories of energy-producing value. Let us compare that with wheat and you will notice an acre of wheat, twenty bushels, only gives 1,708,000 calories against 2,376,000 for apples. Peaches give 2,640,000; cherries 3,105,000; oranges 2,268,000; grapes 1,675,000, and strawberries 560,000, compared with wheat, 1,708,000. Corn is after all one of our best food producing crops and gives 3,287,760 calories. We have not learned anywhere near the real food value of corn, and even cherries are next in food producing value to corn, so we have here great food producing crops if we only knew how to use them.

**Food Value Per Acre.**

| | Lbs. per Acre | Total Protein | Total Calories | Equivalent in terms of Round Steak based upon | |
|---|---|---|---|---|---|
| | | | | Protein content lbs. | Calory Content Calories |
| Apples | 10,800 | 32.4 | 2,376,000 | 169 | 3,189 |
| Peaches | 12,000 | 84. | 2,640,000 | 138 | 3,544 |
| Cherries | 9,000 | 81. | 3,105,000 | 422 | 4,168 |
| Oranges | 13,345 | 80.07 | 2,268,650 | 117 | 3,045 |
| Grapes | 5,000 | 50. | 1,675,000 | 260 | 2,248 |
| Strawberries | 3,200 | 28.8 | 560,000 | 119 | 752 |
| Cabbage | 24,000 | 336. | 3,000,000 | 1,756 | 4,027 |
| Tomatoes | 14,000 | 126. | 1,470,000 | 656 | 1,973 |
| Turnips | 16,000 | 208. | 2,960,000 | 1,083 | 3,973 |
| Wheat | 1,020 | 140.76 | 1,708,500 | 733 | 2,293 |
| Corn | 2,128 | 159.6 | 3,287,760 | 831 | 4,411 |

In this column we find that to produce as much protein as an acre of apples we have to buy 169 pounds of round steak, and to produce as many calories we have to buy one and a half tons of round steak. And take cherries, it takes 422 pounds of steak to produce the protein value, and two tons to produce as many calories as cherries produce. Another interesting thing comes in there and that is that to produce a pound of round steak the animal eats about thirteen pounds of dry matter. In other words, to produce a pound of meat a large amount of food is fed to the animal which that animal reconstructs. So that if we had reached the point where we would have to produce our food on the smallest possible

number of acres we would have to cut down on the meat supply and increase the supply of fruit and cereals.

I put in three vegetables for comparison and anyone who looks into this I think would be surprised to see the food value per acre even of tomatoes. We think of tomatoes as a vegetable with very little food value, and yet the food value per acre of tomatoes will reach 1,470,000 calories, which compares favorably with wheat. That is, an acre of tomatoes produces almost as much food value as an acre of wheat, and these standard fruits produce one and a half to twice as much as wheat.

So you see we can consider fruits and cereals from the standpoint of the actual food value or caloric value produced per acre, and if we were undertaking to feed the people on the smallest number of acres it seems to me that fruit would have to become a very important part of that diet. That fruit will produce everything necessary for life is shown by the small class of people known as "fruitarians" who live entirely upon fruit, and these people are able to produce normal growth and ability to work.

An interesting thing which has been brought out by our latest investigations of food is that our old way of counting food by calories and protein is not sufficient. There are other very important factors. While we must have a certain amount of protein to enable our muscles to do their work, while we must have a certain amount of energy-producing material so we can carry on that work, there are other important factors which up to the last few years have been ignored and one of those important factors is the reaction of the ash material left behind when the food is consumed. You know of course that when we eat food it is burned in the body just as surely as if it were put into a furnace and burned, and that there is left behind in the body the ashes of the food just as the ashes of coal and wood are left in the furnace. Now it happens that when some foods are burned to ash, the ash has an excess of alkaline materials, and our recent studies show very clearly that unless the foods as we eat them contain an excess of alkaline ash they will bring about a condition in the body known as acidosis, which is dangerous to health. If we were to live on bread and meat alone, for instance, two substances which have an acid ash, we would soon bring about the condition which doctors call acidosis, which would be dangerous to our health, and we must have in the diet something to overcome that acid condition. Now an interesting thing is that the ash of the fruits in every case as far as we know is alkaline so that fruit corrects the acid ash of bread and meat.

**Excess of Acid or Base-Forming Elements in the Ash.**

Excess acid or base in terms of normal solutions per 100 calories.

| Article of Food. | Excess acid or base in terms of normal solutions per 100 calories. | |
|---|---|---|
| | Acid c c | Base c c |
| Apples | ..... | 5.98 |
| Peaches | ..... | 12.20 |
| Cherries | ..... | 3.43 |
| Oranges | ..... | 10.94 |
| Grapes | ..... | 5.34 |
| Strawberries | ..... | 3.00 |
| Cabbage | ..... | 13.76 |
| Corn (Sweet, dried) | 1.77 | ..... |
| Turnips | ..... | 6.86 |
| Wheat | 3.25 | ..... |
| Meat (Lean beef) | 12.10 | ..... |

In this table I have undertaken to show the relation between these different foods, that is, the ash from one hundred calories of corn produces an amount of acid which it would take 1.77 cc. of alkaline material to neutralize. These figures do not mean much to you, but I wanted to show corn, wheat and meat, which contain acid in their ash, meat being the most acid of all; fruit, on the other hand, has a very strong alkaline ash. Peaches and oranges especially are very high in alkaline material; apples and cherries are reasonably high; strawberries and all the other fruits produce alkaline ash, and practically all the vegetables do also. Fruits and vegetables then correct the acid condition that the cereals and meats leave in the body.

Now in addition to that we have found that in foods there are other substances too minute in quantity for us to measure, known by the general name of vitamines, substances which are absolutely necessary for growth but that we have never been able to measure in our old way of analyzing foods. These vitamines the food chemists divide into three different classes; those which are soluble in fats, found in milk and green vegetables, and which are absolutely necessary for the growth of young children. That is, normal growth will not take place without either milk or green vegetables. Then there are the water soluble vitamines which are necessary to enable the body to carry on its functions in proper condition. If these are cut out the individual soon becomes sick. And then another class of vitamines prevent scurvy and are known as anti-scorbutic vitamines, —and these all are obtained in fruit. So fruit has not only a food value, and a value in correcting acid ash of meats and cereals, but in addition to that it supplies these vitamines which prevent scurvy and other diseases of that class. The more we study the matter the more we are impressed with the importance of fruit in the normal diet, and the more we realize the possibilities of fruit in increasing the total food supply of the world. I am satisfied in my own mind that if the time comes that we shall be pushed to produce enough food, we will find vegetable, fruits, and nuts taking a very large and important place in food supply, more than we think at the present time, largely because of the tremendous possibilities of the tropics, when we have conquered disease and made it possible for the white man to work and live there--but that of course is only my dream. We have shown in the Panama Canal zone that tropical diseases can be controlled, so perhaps this is not merely a dream after all.

To summarize briefly the points in favor of fruit in the diet let me give you nine points:

1. *Fruits supply necessary minerals:* Fruits are an important source of the mineral iron, potassium and calcium. These elements are necessary for the proper functioning of the organs of the body.

2. *Fruits prevent acidosis:* The potassium and calcium supplied by fruits act as neutralizers and prevent the accumulation of acid products in the body.

3. *Fruits prevent scurvy:* Fresh fruits are the most important source of antiscorbutic vitamine. A person who uses fruit generously never suffers from scurvy.

4. *Fruits promote growth of infants and children:* It has been demonstrated by Hess and others that the antiscorbutic vitamine or other constituents of fruits is an essential for normal growth. Orange juice or tomato juice are commonly used as supplements to the diet of infants when pasteurized or sterilized milk is fed.

5. *Fruits prevent constipation:* Most fruits contain considerable amounts of a carbohydrate called pectin, a substance of low digestibility but of very desirable properties. By forming a voluminous gelatinous mass in the intestine constipation is prevented.

6. *Fruits improve sanitary conditions in the bowel:* By supplying fermentable material in the lower bowel the acid forming type of organism is encouraged in the large intestine rather than the putrefying type.

7. *Fruits add flavor to the diet and increase the joy of eating:* These factors have a favorable effect on digestion (psychic factors). Fruit flavors, strawberry and lemon the ones studied, seem to be chemical excitants for the gastric juice (Hawk). Fruits may have other specific effects. Mendel discovered that strawberries accelerate the flow of lymph.

8. *The cheaper fruits are economical foods in that they supply fuel to the body at moderate cost*

9. *In the ideal diet as much should be expended for fruits and vegetables together as for bread and cereals,* and more than is spent for meat, or for butter and other fats. The only article of diet for which one is justified in spending more is milk.

I am afraid I have not been able to bring you very much after all but I think I have said about as much as could be said with our present knowledge of the subject. You as fruit growers have reason to believe that your position in the world is to be one of increasing importance. You ought to have a vision that would carry you on to greater effort in fruit production and fruit improvement. And certainly you have learned in this last year if you have never learned before that you have great need of better methods and greater co-operation. In my opinion the fruit situation will never be solved until we in the east have seriously learned our lesson as the apple and orange growers of the west have done. Never until we develop a regional agriculture where we have areas devoted to one kind of product with a selling organization on a large enough scale so that we can attract the largest buyers, — never until we do this will we put horticulture or agriculture in any of its phases on the proper basis. We have need therefore of a great national organization which will represent in a general way every phase of agriculture and will encourage the separate units in their organization and in their buying and selling operations. Not until we make a more serious study of the market demands, not until we learn how to place on the market the things that the market demands, not until we know more about methods of distribution and how to control them are we going to put this work of horticulture upon the basis which it deserves. Have we not learned our lesson in the last few years? Is it not time that we realize that it is not enough simply to grow fruit but we must make a serious study of how to distribute that fruit after it is grown, and that can be done only through large organizations heavily enough financed to make possible the study and propaganda that is necessary. As long as we of the eastern United States, Ohio, New York, West Virginia, and other adjacent states un[illegible] take to run our fruit business on the individual plan that we have been following we will occasionally run up against what we have this year — an abundance of product but no way to get it on the market.

Do you mind my taking a moment to tell you about an experience I had last Saturday? I took occasion to get this experience partly because I knew I was going to speak to you today. I went from one end of Columbus to the other and tried to get a bushel of graded Ohio apples, but I did not succeed in getting them. I was not quibbling about the price, I would have paid any price they asked me if they had had graded, first class Ohio apples; but there was not a bushel to be found anywhere. I found western apples there by hundreds and hundreds of boxes. Do I need to say any more? I wanted Ohio apples because I am loyal to Ohio and I would buy Ohio products first of all, but there were none to be found. I could find run-of-the-orchard apples at a $1 to a $1.25 a bushel, but they were no good to me and they were no good to three-fourths of the families in the city who wished to buy apples. They want a small amount of perfect apples and in most cases are willing to pay fair prices for that product.

Three years ago I was in New York and at a hotel I became acquainted with the manager. They had some beautiful apples on the table, apples from a group of men that know how to advertise their product. The word "Skookum" appeared in great big letters on each apple. I said to this manager: "Why is it you buy these apples when right at your back door there are any amount of apples?" He said to me, "Come with me a minute," and we went down stairs to a big cold storage plant where there were hundreds of boxes of apples piled in the corner. The manager said, "The answer is this: I can go anywhere and pick out any box and I know exactly what I will lay my hands on, and I know that every apple in these hundreds of boxes is exactly the same as any other apple there. Now if my New York friends would do that same thing I would be glad to buy apples from them".

We are inclined to sit back and complain of the condition of affairs that we have at the present time in the east. Let us take a little of the blame ourselves. If we are willing to meet conditions that the market demands we would not have any trouble this year in getting rid of our apples at a profit. I hope to see the time — I hope I will be allowed to stay long enough in this world — to see the time when we will develop, or will be on the way to develop, this regional agri-

culture of which I spoke, where every locality will be noted the country over for some product, where that product will be produced in large enough quantities so that the biggest buyers will be attracted to the locality, and where every grower in that locality will be so proud of the name that he will never put on the market anything that will bring disgrace to his local trade name.

THE CHAIRMAN: This excellent address is one of the most cheering that we have had at this convention. It seems to me if every consumer knew the great food value of fruits and vegetables there would be a much greater demand for these products in our households and we would soon have a solution for our problem of distribution. As he pointed out in the latter part of his address, the difficulty is in the marketing and distribution of these products. But we hope the solution is coming soon.

Our next address is to be by Doctor C. L. Marlatt of Washington, D. C. As you all know Dr. Marlatt has had much to do with the regulations that are now in force in regard to plant quarantine and he is the best man to give us reliable information about this matter.

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## QUARANTINE LAWS AND REGULATIONS, STATE AND NATIONAL

**Dr. C. L. Marlatt, Washington, D. C.**

*Mr. Chairman, Ladies and Gentlemen:* I am here representing the Federal Horticultural Board of the Department of Agriculture at Washington, but I fear that means absolutely nothing to most of you.

The Federal Horticultural Board, briefly, has charge of all the plant quarantine of the Federal Government. Our work is to exclude foreign plant enemies and to control such enemies as may have gained some foothold in this country. The Board was created under an Act of Congress of 1912 giving it quarantine powers. Prior to that time there was no authority of the Federal Government under which any control could be exercised over foreign importations to prevent the entry of new plant pests. The result was that in the one hundred and thirty years since this government was established there has been free entry of every foreign pest into this country up to 1912. If we look over the list of our pests we find that practically fifty per cent are of foreign origin. You know most of these — the Hessian fly, boll worm, potato wart, take-all, Japanese beetle, gypsy and brown-tail moth, and perhaps a hundred and fifty others that I could mention. These are pests that have come in with plants, most of them from foreign countries. They occasion a loss to our fruit crops and others of about one billion dollars a year reckoned on the old basis. Under the prices last year that would be two billion dollars. One-half of that is due to these foreign pests.

The persons interested in plant control, or pest control, have been impressed with the necessity of excluding these pests. Both the state men and the Federal men, associations like this and many others interested in fruit culture and general agriculture, have been much interested, and an effort was made years ago to get a law through Congress. That was opposed by various interests and the effort failed. About ten years ago a new menace came up when it was found that in the importation of nursery stock and other plants from abroad vast numbers of the gypsy moth and the brown-tail moth were coming into this country in thousands of nests. There was no law to prevent it, no law to protect the country from that sort of thing. An effort to get a law had failed. The people who had tried to get this law through had worked for eight years and then they got tired and dropped the matter. Impressed with the necessity of such a law I was bold enough to bring this matter up again, and to make a long story short, after four years of effort I succeeded, with the aid of the Department of Agriculture and the then secretary, Mr. Wilson, and with the backing of state men throughout

the country, in getting the law that we now have known as the Plant Quarantine Act. I am not a police officer and have no such intention, and I made a bargain that when this law was secured I should be released from its administration. But I was unfortunate, for as soon as it was passed the Secretary of Agriculture insisted that I take charge and I have been in charge of the enforcement of that law.

The law provides for a board of five men from the Department of Agriculture: the chairman (myself) and four others taken from different bureaus of the Department. Five of the best men of the Department (leaving out myself) are on that board. The present membership is Karl F. Kellerman of the Bureau of Plant Industry; W. A. Orton, of the same Bureau, who is one of the finest specialists on plant diseases in the world; W. D. Hunter, of the Bureau of Entomology; George B. Sudworth, of the Forest Service, who knows most about the forest trees of this country and of the world. These men constitute the Federal Horticultural Board for the enforcement of that law. There has been a good deal of criticism because that Board is only five men. I want to say that that Board is simply the mouth piece of the Department of Agriculture, and that in everything the Board does it is simply announcing the actions and thought of the Department of Agriculture as a whole. Men like Doctor Taylor and Dr. Corbett and others interested in fruit culture have a chance to give the Board advice and do give advice on every matter. So while this is a Board that has absolute control of plant entry into the United States and of interstate traffic in plants, its action is always tempered and guided by the Department of Agriculture as a whole.

The control of plants is a very broad subject and this board has a very wide range. If there is no need of control none is enforced, but any plant that comes into this country from abroad that may prove or is proving a pest or danger will be placed under regulation, even under prohibitive quarantine, until that danger is removed. Under that provision of the quarantine we are now administering some eighteen foreign quarantines, that is quarantine against eighteen foreign plant products. These include potato disease and citrus pests like the citrus canker which the government is spending millions of dollars to exterminate. Then there was a corn disease in the Orient, and there are mildew and other diseases destroying corn at a terrific rate.

The good which is being accomplished under this quarantine is tremendous. Under its power of control interstate movements for the prevention of pests have been established and we are now administering some thirteen domestic quarantines. These have relation to the Japanese beetle which got a foothold in New Jersey, and which will be one of the most serious things you have to reckon with in future years because we can not exterminate it; it is too well established. It got in about 1911, a year or two before the quarantine came into effect. The European corn borer is another pest we have under quarantine. What the corn borer will do for the corn crop of the country remains to be seen. Personally, I do not believe it will be a disastrous enemy but it will take its toll from the crops and a five per cent. toll of the corn crop is a very large item in millions of dollars. The barberry, which has its relation to black stem rust of wheat, is another. You are perhaps familiar with the effort to wipe out black stem rust by the control of the barberry in the Northwest. In addition we have a number of what we call orders, which are quarantine regulations over foreign products.

But this keeping out of pests and destroying them is only one phase of the work of the Board. The Board is given large sums of money by Congress for the extermination of various pests. These are the practical problems which the Board has taken hold of. We are expending through this Board and the Bureaus of Entomology and Plant Industry a total of some two million dollars annually. This includes an effort to exterminate the citrus canker, the boll worm of cotton, the control of the gypsy and brown-tail moth in New England which has now spread to New Jersey, and we are asking for $300,000 for that. Then there is the control of the Japanese bettle. Much money and effort is being expended to control and stamp out these pests. In several instances we believe we will be successful, but if we are not successful we will at least prevent their spread for a long period of time.

In addition to that we have established, and this is a very necessary feature of our work, a port of inspection and quarantine service. California and Florida for years have had such service in their own states, a service which has not only

produced enormous benefit for these states but has given corresponding benefit to the whole country. The State of California spends $50,000 a year on port inspection service and Florida nearly as much. Ships coming to San Francisco, to New Orleans, and to Tampa bring fruit from the Orient. At San Francisco the inspectors have taken from vessels masses of fruit containing all sorts of fruit insects which if they had been allowed to come in, would undoubtedly invade the orchards of California and from there sweep across the country. The value of that service is computed in hundreds of millions of dollars, and the Federal Government has undertaken to extend that service throughout the United States. We are co-operating with California and Florida and eventually we should have a service which is almost as broad and wide-reaching as the Custom service of the United States.

On the Mexican border this service has control of the entire traffic between Mexico and the United States. It regulates the entry of all imports from Mexico and directs and supervises the disinfection of railway cars and freight, express, baggage and other materials entering from Mexico. The reason is that Mexico has been invaded by one of the worst pests ever known and which has already gotten into Texas. This is the pink boll worm, and it came across in some shipments of freight, but now we have this service on the Mexican border which controls all freight and other matter coming from Mexico to the United States. We built seven or eight of the largest fumigating houses in the world, houses in which we can fumigate fifteen freight cars at one time with hydrocyanic acid. We have one at El Paso, another at Eldorado, and smaller ones at other points.

The Board is also in co-operation with all the state officials throughout the country. Your officials in Ohio and other States have been appointed to assist the Federal Horticultural Board in the enforcement of Federal quarantine in your state. We also are in co-operation with thirty foreign countries which have commercial relations with the United States. Practically all of these countries have also appointed officials to inspect and survey products sent to the United States, so that the work of the Board has assumed a world-wide range and covers not only the plant and plant-products coming to the United States, but those which pass from one state to another within the United States.

Among the many quarantines and other regulatory actions which the Board has to administer, and one which is perhaps the most important to you, is what is known as Quarantine No. 37. This quarantine has created a great deal of excitement among men like yourselves who are engaged in fruit growing, and also among certain men who are engaged in plant importation. I do not care to go into that subject very much because you are not acquainted with it and it is not a matter in which you are interested. If I had before me a group of nursery men they would be interested. But I note this in your little journal that I picked up — that you have printed at full length a letter of recommendation by a committee that was appointed which is very critical of that quarantine and of the action of the Board with respect to it. It is a rather interesting document and I hope you will all read it, but I want to say first that in my judgment that article should not have appeared in your journal. It is one that is absolutely controversial and misleading in every line. It gives you impressions which the facts do not by any means warrant and is based on absolute misrepresentation from the beginning to the end.

This quarantine No. 37 restricts the entry of foreign plants and plant products. We found after many years of effort that allowing these plants to come in without restrictions, without inspection abroad, or in this country, the pests were still coming in with them, and the representative men and societies and associations who were interested in pests and their control, realized there was only one method to prevent these pests and that was to limit the entry of foreign plants and plant-products. That matter was considered for over a year. We held conferences and hearings in which all the parties were represented, and we finally established Quarantine No. 37 covering the importation of foreign plants. The natural result was that the men who were engaged as importers of these plants fought the quarantine. They represent a very small group in this country, but naturally their pockets were hurt and they were not pleased. They got out various manifestos and sent them over the country. They attended meetings like yours and had resolutions passed which were sent to the Department of Agriculture. My desk was piled high with them. They came to every member of Congress and were sent on to

me. It was all a campaign of misrepresentation and when it was explained the whole thing failed; there was not a voice in Congress anywhere that gave it support. It was absolutely a propaganda based on misrepresentation.

In the meantime this Quarantine No. 37 had been in force a year. The misrepresentation in regard to this quarantine is that it is a prohibitive quarantine and will exclude all foreign plants from the United States; that this quarantine will forever prevent the important plant products of Europe and other foreign countries from coming into the United States. There is not a word of truth in that. This quarantine makes provision for entry of every plant from any place in the world, but only in quantities necessary to establish the plant in this country. That is the main misrepresentation in this statement. There has never been a thought on the part of the Department of Agriculture that we were going to cut off any new fruits, flowers or plants which are useful in any way from any part of the world. Right in the face of this statement which is being sent out, the Department of Agriculture has issued five hundred special permits for importation of plants for the purpose of establishing new plants in this country. These permits allow the entry of no less than fifteen million plants. That is more than all the plants that were imported before the quarantine. These plants are being grown in twenty states and in a little while we will be independent of these particular plants from foreign sources and released from the danger of the importation of plant enemies. I do not want to go into this because it is outside of your field. The whole purpose of this quarantine is to protect the fruit growers and farmers from pests. The opposition to this quarantine has practically died down and the Department has heard nothing about it for six months. The men who were active in this opposition now come into my office, stand around a little while, hem and haw, and finally this comes out: "Are you going to stand by your quarantine? We have invested our money and we want to see it made a success." These very men who were issuing this propaganda are making this statement. I admit that they are selfish, that they find it possible for them to build up an industry in this country. But the purposes are not tariff purposes but purely quarantine, although it gives the practical effect of a tariff. It gives protection to American horticulture, and on the other hand it will save crops by keeping out these pests. What we want to do is to make sure that you and others like you are not misled by statements like this that say this will be practically an embargo on shipments from Europe. There is not a word of truth in that. We propose to get everything good in the world and keep it as long as there is any need. We all want to work together to build up American horticulture and I do not think there has been a thing done in the last quarter of a century that will be so beneficial from a selfish standpoint to American horticulture as this quarantine No. 37, or that will be so beneficial from the standpoint of keeping out pests. No important pest has come into the country since the quarantine has been established. That may have been luck, but every one of these pests got in before the quarantine, two or three years before — the Japanese beetle, the European corn borer and several others. If there has been any more constructive work for horticulture in the last twenty years I do not know of it. What we want to do is to pull together and not let these malicious statements and misrepresentations continue, but tell the real truth in the matter. Everything the world has the United States will get under this Quarantine, but it will get it under such regulations as will prevent the entry of pests, and the horticulturists, the nursery men who are importers, and the growers of fruit and flowers are swinging around to the support of the Board. We have letters from the most prominent men of the country on that subject. The president of the American Nursery Association, that fought this law for fifteen years, is now practically back of that law. I think the time is past when misrepresentations of this kind should go on. This particular committee whose report is here, and which is published I understand without endorsement — and have not waited for this endorsement, but have rushed into print with this propaganda which has been sent the country over with the idea of pre-judging the facts in the case. If they had found out the facts the report might have been useful.

The Board is not infallible, it may make mistakes, but it is perfectly willing to correct them. It is correcting them all the time. Two or three changes have been made in the last few weeks. We are willing and ready to receive any constructive suggestions, but we do feel that the time is past when misrepresentations of this kind should go on.

I should not have gone into this subject, and I would not have done so if I had not found this particular article in this journal which you have all received. I am very much obliged for your attention.

FREDERIC CRANEFIELD: As editor of this journal I may perhaps have a word. I want to deny that this article is a misrepresentation, I want to deny that there is a single word in it which says that a reasonable quarantine, reasonably enforced, will be opposed by the American Pomological Society or by the Executive Committee. One word more I have to say. Dr. Marlatt has said before you that the Federal Horticultural Board has done nothing that will serve to prevent the importation of foreign plants for the propagation of new plants. I have the word of the curator of the Arnold Arboretum that such is not the case, that Quarantine No. 37 has served to check, if not entirely stop, the importation of plants there. I have also word from the curator of The Shaw Gardens, St. Louis, to the same effect. It seems to me there is a question of veracity in this matter.

DR. MARLATT: Facts are something that cannot be denied. I have in my hand a list of permits for those plants which can not be brought in. These are prohibitive plants and can not be brought in for commercial purposes. There were 311 permits issued up to last June by us. These permits covered a specific amount of plants. They covered nearly 11,000,000 plants. These permits are still outstanding and already under them have been imported upwards of two million plants. These men are not tired of asking for permits. Since June first last there have been 191 additional permits issued and more than one half a million plants have been imported under these new permits. That does not look as if we were prohibiting importation of plants from abroad. Over three million plants have come in less than twelve months.

FREDERIC CRANEFIELD: Are bulbs included in that?

DR. MARLATT: Yes; orchard fruits, bulbs, roses, orchids, herbs and ornamental plants. There were 301 orchids and 451 ornamental plants. Twenty thousand ornamentals have been imported up to June 1st. As to the Shaw Gardens, twenty permits have been issued to them. Permits have also been issued to the Arnold Arboretum, Missouri Botanical Gardens, the New York Botanical Gardens and to the park at Billings. These are all outstanding and cover plants to be picked up in China and the Orient. These people have men out collecting the plants. Missouri asked for a permit for 15,525 plants and they actually imported 15,020 plants. I think I am justified in saying that any statement which says that this quarantine amounts to an embargo on foreign plants is misrepresenting the facts.

A MEMBER: I would like to ask Dr. Marlatt the steps that should be taken to secure nursery stock, apple trees for instance, from Canadian nurseries.

DR. MARLATT: We have reciprocal relations with Canada. This quarantine does not apply to Canada in the same way as other foreign countries, as we look upon Canada as a neighbor. Our lines join and our interests are very much the same and hence we have reciprocity in regard to this quarantine with Canada, which we hope we may forever maintain.

It is possible to get nursery stock from Canada by requesting a permit and complying with the regulations as to reports and certification.

FREDERIC CRANEFIELD: I think this is a question of misunderstanding rather than misrepresentation. I trust you will not blame me too much that I resent Dr. Marlatt's repeated charges of misrepresentation which approach pretty near a question of veracity. Therefore I am tempted to raise a further question. The main thing in that article is a protest against drastic and unreasonable enforcement of Quarantine No. 37. Personally, I wish to be frank and tell you that so far as I am concerned, not being an importer and with scant information at hand, I am unable to say how drastic and unreasonable its enforcement may have been except from the word of others. As far as the nurserymen are concerned they seem to be opposed to Quarantine No. 37 because it is not really a quarantine but a high tariff. Now I submit that if a tariff is necessary for the American nurserymen it should be imposed on the traffic in an open manner, not in the guise of a quarantine. I submit that is a fair proposition. Mr. Moore and the curator of the Arnold Arboretum are not here to support their statements and I unfortunately left their letters at home. That may be passed over. I believe if there is a getting together of the parties interested and a clearer understanding that we will be on safer and better grounds. I have a number of copies of this article here and I wish you would all read it and see if it is a libel.

DR. MARLATT: Unfortunately, I have furnished you with a controversy which perhaps adds a bit of interest to your session. This article was handed to me as I left Washington and I read it on the train and it seemed to me that since your official organ contained matter of this kind which was of so much moment to the whole country, it would be proper and fitting for me to make some answer to it. I regret very much that Mr. Cranefield comes into it. I asked him if he had read it before he signed it and I understood he had not seen it.

FREDERIC CRANEFIELD: I was present at the meeting when it was formulated.

DR. MARLATT: There is nothing personal in it. I am hitting at the serpent of which you are not aware. I do not believe you wrote this Professor Cranefield.

FREDERIC CRANEFIELD: No sir, I did not; but I signed it.

DR. MARLATT: These men who signed this paper are not specialists. Of course we exclude Mr. Cranefield, but the most of these gentlemen are simply wealthy men who have been elected president of some society because of their wealth and prominence, — men like T. A. Havemeyer, Albert C. Burrage, Mrs. Francis King, Frederick R. Newbold — they are not men who know anything about the subject. The committee was appointed by the chairman for the purpose of going over the law and then bringing the matter before the Department of Agriculture to determine what was the truth in the matter. Instead of that this article has been published without any consideration whatever.

Mr. Cranefield has asked what there is in it that is false. Perhaps I used that word a little too strongly. The thing is really a good deal of a joke because we know how absolutely foolish it is, how unworthy the

time I am spending on it, and how futile will be the results. That does not mean that we are not ready to change anything that needs to be changed — but let me read some of the points in this article. Read the last paragraph:

"It is confidently believed that those who are opposed to a Chinese Wall plant-policy for America, * * * will aid the work of this committee in contributions and in effort."

Is there anything in Quarantine No. 37 which indicates that we could do these things? Is there anything in Quarantine No. 37 that looks like a Chinese Wall? Is that not misrepresentation? If not, then I do not know what misrepresentation is.

The main discussion of the Quarantine is on page 54 near the middle. A statement is made there, not from the Federal Horticultural Board and not from any responsible source, to the effect that "the time seemed to be at hand for the inauguration of a policy that would gradually result in the exclusion of all foreign nursery and florist stock." Where they got that I do not know. I have with me all the documents officially issued by the Board from the beginning. It does not occur in any of them. It was distinctly repeated that the time has not come and never will come when we can do without foreign business. The avenue for foreign commerce must always be open. That item on page 54 is repeated twice again in this article. On page 55 it says "With the contemplated total embargo enforced, it would never again be possible to secure for the United States any newly discovered, rare, interesting, valuable exotic fruit or ornamental plants, whether species or hybrids." There is a place where absolute falsity can be branded on it. I think that statement emanated from Boston and it got into this article and got by. That same thing is repeated on the same page.

I have notes up and down all these pages but I will not take up your time to discuss them. I think the answer is sufficient that the text here is not an official document issued by the Board. I also think the question is answered by the fact of the actual importations. These men who brought out this original propaganda are now importing plants. The reproduction enterprise is being established in this country. It is going on in twenty-one states and in the District of Columbia. I have a record of this but I forget how many there are in Ohio. There is no embargo and no Chinese Wall. All these fruits come in but, under a real safe-guard. You read this article, and if you do not get the idea that this Quarantine No. 37 is an embargo, then I am missing the point in the whole article.

I wish again to apologize for injecting this discussion and to repeat that I have no personal feeling in this matter whatsoever, and I am absolutely sure that Mr. Cranefield will be with us in this fight.

With reference to a tariff, that charge has been made repeatedly that we are really endeavoring to create a tariff to protect American fruits. That was the farthest from the minds of any of us. If that was our intent we ought to be fired, every one of us.

FREDERIC CRANEFIELD: I do not mean to convey the impression that the Horticultural Board promulgated a tariff for that purpose, but I said "if a tariff is necessary."

DR. MARLATT: Fortunately, or unfortunately, for this country, any embargo for any purpose on foreign goods must give a certain amount of protection for home-grown articles of the same kind. We can not avoid it. That situation can not be helped, but we can look at it in this way — it is building up American horticulture and that is not to be regretted. We are not alarmed about that. It is a result that was not intended but it is fortunate that it is a good result. On the other hand, we are keeping out these pests and there is no other method of keeping them out. We tried for fifteen years to bring in plants without safe-guard, but it will not work. A great many plants, trees and bulbs especially, come in with balls of earth attached and they can not be disinfected. In the war, gas masks were very important. A ball of earth is one of the best gas masks, and you can not disinfect soil in any way without killing the plant, hence we had to absolutely exclude all earth. In this connection there has arisen the old argument that we are keeping out these plants and allowing the entry of ship's ballast. That was brought up at the beginning. Officials of the Federal Board — the Federal Board has Officials at every important port — and we had these officials visit every port and analyze ballast. During the war we sent ships over as fast as possible and sent them back empty so they had to be ballasted. Ships coming into our ports in peace times without ballast are few, but during the war this was common. This ballast was examined at every port and in most cases was found to be rock and broken stone, or was excavation soil and on examining that soil we found that it was safer than disinfected soil. And so much have we been impressed with the fact that we have modified our quarantine which said originally that sand, soil and earth are prohibited, to read that sand and soil are permitted where they are necessary as packing. For instance, bulbs must be packed in sand or soil and it is necessary to ship them in that soil or they will be destroyed. We began by requiring them to disinfect the soil from Japan and other countries. We now allow plants from Japan to be packed in such soil that is safe. We also allow plants from Holland and Belgium to be packed in dune sand which is absolutely free from vegetation and from any possibility of carrying infection. We allow therefore the use of such sand and soil as is found in the ballast of ships.

I hope I have not caused any hard feelings and that you will feel that I am justified in my view of this statement, and that I have a right, as representing the Federal Department of Agriculture, to present the other side of the story and to give you the facts in the matter.

THE CHAIRMAN: We will now listen to Mr. Wells A. Sherman, of Washington, D. C., who will give us a talk on "The Government Inspection Service."

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## THE GOVERNMENT INSPECTION SERVICE

**Wells A. Sherman, Washington, D. C.**

*Mr. Chairman, Ladies and Gentlemen:* — I will be as brief as possible on the question of fruit and vegetable inspection as handled by the Government. Real inspection, thorough, satisfactory inspection, inspection that furnishes a definite and final basis for settlement, must be based upon standardization; but in much of the fruit and vegetable inspection we have not such a standard. We have not such practice in grading and packing as makes it possible to really render satis-

factory inspection service. The inspection service at present is rendered only at important marketing centers and other designated points adjacent thereto. That is because the inspection service is an activity which Congress threw upon us before we had reached the point where we were ready to suggest that we undertake it. Congress, in throwing upon us the burden of inspection service, used its own language, apparently developed on the floor of the Senate at the moment that it happened to occur to the Senator. The result is that we have an inspection service with certain limitations to what we could do for your industry merely because we were asked to do something without being consulted in advance as to how it could and how it should be done.

The inspection service, however, was instituted for one purpose only, and that is to serve the producer who ships his product to market and cannot follow it personally. It was instituted in order that it might be the means of ascertaining through an unquestionable source the true facts as to the condition of his product on its arrival; that he might be able to know whether the reports which came back to him that the car arrived in bad order were true; that he might have something upon which to measure his claim against the railroad company and that he might have the facts in hand with which to defend himself against any misrepresentation which his agent, the receiver, or his customer, the purchaser in the central market, might make as to bad conditions. Now a curious thing has happened. We have advertised this service as widely as we knew how. We have put on millions of daily market reports the fact that this inspection is established. We have given the names of inspectors and tried to tell the shippers how they could secure from this service the greatest benefit, with the result that the railroads and the dealers are using the service whenever it is to their advantage and to your disadvantage. Whenever the railroad wants a defense against your claim they immediately call for inspection of the car in order that they may have some limit set to their liability and in order that they may have a defense, that there might be some condition at the orchard origin which would account for the trouble. The receiver uses the service for the same purpose. The market is declining and the receiver is losing on a car. He calls for Government inspection often before he looks at the car in the hope that our inspector will find something in the car which he can quote to the shipper as the basis for his claim. I venture to say that our statistics will show less than one-third of the inspections we make requested by the shipper, for whose benefit the service was instituted. If we include the brokers I think perhaps a little more than one-third of our inspections are requested by the grower or the man who claims to represent the grower's interest, and that even the broker will call for an inspection in order that he may have something to back up the report which he makes to the grower that this car was not in first-class order, or some reason to show why he did not get market prices for it.

Our inspectors get their two months training before we allow them to write a certificate; they are taught that while the inspection must be absolutely true and their statement absolutely defensible, while every certificate issued is a legal document which congress has issued and which carries authority that a man's name could never give it, nevertheless they must always remember that the receiver is present and sees the car, he can bring in eye witnesses to make good his own position and take care of himself. He has the car; the shipper is away. He may be very inadequately represented on the grounds and he is relatively helpless, so our inspectors certainly must be just to the absent party. That is as far as we can go in making the service truly serviceable to the shipper. The certificate costs you four dollars. It costs the man in the city who asks for a half dozen every day exactly the same; it costs the railroad exactly the same. The Pennsylvania pays just as much for each certificate as any man in the country. The only difference is this — Congress does something for the benefit of the farmers of the country and gives it a general application so that it may be used by other lines of business, but business men and the railroads are a little keener than the farmer and they get all the benefit there is in it while the farmer gets only a fraction.

You may be interested to know that there are just as many inspections called for on these beautiful boxed apples from the West as on the barreled apples. They are sold at a higher price and must have a smaller number of blemishes, but there is just as apt to be loss on them as on a barrel of apples, and the request for inspection is regulated very much more by the state of the market than by the state

of the package. There is no secret about that. When the market is declining everybody wants to get from under and we have more inspections to make than when the market is rising on the same quality of product. When the market is rising the receiver does not care because he can sell any product which comes in; when the market is going the other way he wants an inspection.

Senator Jones of Washington, the man who injected this idea into the Senate, suggested that these certificates be limited to particular central markets designated by the Secretary of Agriculture. The Secretary must announce the points at which he will undertake to issue these certificates and then it is up to us to keep a man at these points. But there are one hundred other points within a thousand miles which it is impractical to designate and which could not by any stretch of the imagination be considered important central markets, but still there may be a good deal of your product accumulated there. If it is decided to designate markets we cannot always send our men to make the inspections and the certificate would not be prima facie evidence in court because it would not be issued under the provisions of the Act. The next year, however, another member of Congress who realized to what extent this thing might grow, wrote into the Act these words: "When received in interstate commerce at important central markets designated for the purpose by the Secretary," under which Act our inspector in Columbus cannot inspect any product arriving in this market which originated in Ohio, and the inspector in New York City can not inspect the thousands of cars originating in New York State, although he can inspect every car that comes across the river from New Jersey,—a rather ridiculous situation.

Now the thing we want to do is to have these two clauses removed and the Secretary authorized to make these inspections wherever there is a volume of business offered, the fees for which will approximately cover the expense of the service. Under this you would be able to inspect not only at the important receiving centers but also at the shipping points if the volume of business would warrant, and I may say there are a great many fruit and vegetable pools where the business is rather concentrated and where the growers are saying even now that they cannot keep track of their cars, and these men are asking for inspection at the shipping point so they will have something to give them a claim against the railroads. That is all well and good if the product you put in your car is the product you agreed to sell, and if you sold F. O. B. shipping point your shipping point inspection will do; but let me warn you that shipping point inspection when it comes, and it is sure to come,—shipping point inspection will be a two-edged sword cutting both ways, and I imagine a great number of people will be surprised to find what the inspector calls an honest pack at the shipping point. It is very easy to call everything No. 1 until you analyze it by printed definitions and find what No. 1 is. We are hoping that after the first of next July the reconstruction of the service may be such that it will be brought a little nearer to those producing areas which have a large volume of product issuing from a few points.

But eventually what should the Federal Government do in the field of fruit and vegetable inspection? How far should it go, what should be its limitation, how far should the taxpayer be burdened for this sort of service? These are real questions, but I am satisfied, being a little more optimistic than most people, that Congress will make our fees a revolving fund, letting us reexpend the money which we collect and employing more men as the business increases. We can do this with a fixed appropriation no larger than is now going into the service. In fact, if we could have about one hundred thousand dollars to carry the overhead and a moderate appropriation for inspection service it would enable us to go into almost any community which ships two hundred cars of any product at the shipping season and give them a disinterested inspection service, issuing them certificates at the shipping point which would be prima facie evidence in court as to what was actually shipped.

In order to make this service all it ought to be we must have a common language understood between the grower and the receiver. We do not say that every man who produces must sort or grade as closely as the western box apple people do. With them it is a matter of life or death. Their apples would not sell here in competition with eastern apples unless they were more closely graded, and their rough stuff would not stand the cost of transportation and sell in competition with eastern apples at all, consequently they grade very closely. Then conditions are

altogether different where your apples are produced, — different conditions for hauling, some can be trucked because they are near large consuming centers. Personally, I do not accept for a moment the doctrine that the eastern apple districts must use the western system of grading, but we must have a language that means the same thing at the shipping point and in the market, and in the east there will be a market in our cities for nearly all of your produce in ordinary years. The one point we must clear up is that what is understood at the shipping point must also be understood when the product gets to market. Inspection at the shipping point must show that the product is No. 1, No. 2, or No. 3, and the man on the market who gets that product must understand what No. 1, No. 2, or No. 3 means. The man who is purchasing must know what No. 1 grade is, and what No. 3 grade is. The idea is that you can not sell anything and call it No. 1 unless it is No. 1. They found in the west that as soon as they packed only No. 1 grade they did not ship as large a percentage of their crop, and the next thing they found was that their B and C grades were bringing from twenty to twenty-five cents a box more than before. Why? Because they had a lot of apples that came out of their A grade that were fine apples except that they were not uniform. These apples improved their B and C grades so that they sold at a higher price. So there is nothing to be lost by calling the same thing always by the same name. You must sell a man No. 1 apples when you say you do if you want him to come back to you when he wants No. 1 apples. So in my own mind the principal value of standardization in grading is not to make a man do something with these apples that he never did before, but to make him always use the same language with reference to the same thing and to use a language that the man at the other end can always understand.

Now in closing, have we not touched right there the most basic difficulty we have? This applies to those who deal at long range. Every physical difficulty in marketing can be overcome by physical means. You can make just as perfect a package as it will pay you to make. You can send a man along with every car to regulate the temperature, you can put stoves in, you can do anything that is necessary and proper to regulate and control and perfect your physical conditions, but after you have overcome all the physical difficulties of marketing have we not still that uncomfortable situation which exists in a man's mind when he sends his stuff to a distant market to be handled by some one who is not immediately under his control — he wonders what kind of a deal he is getting. So what might be called the psychological troubles are really the worst. I am interested in the work of my division because at every point we are dealing with these subtle basic difficulties of marketing which touch the relationship of man to man and which have a moral aspect, if you please, and my belief is that any work which has no moral aspect is not a worth while work. Our market news service tends to bring about a better understanding between the buyer and the seller because the shipper knows what is going on in the markets as he never knew before. He knows as well as the receiver about the conditions of the market and he is not misled by any irresponsible information. The inspection service gives the shipper a confidence because he is able to find out the truth. An interesting thing in our experience in introducing this inspection service in some localities is that there has been a rush for certificates for two months and then a sudden falling off. Why? For the same reason that a certain disorderly street-corner becomes orderly after an additional police officer is put on. The mere presence of a police officer there means order. That is exactly what has happened in some markets and secondary points. So I think today that probably fifty per cent. of the value of the inspection service is its protective value. The receiver has found that it does not pay him to send back a report that is too rank because the shipment is covered by government inspection. We have made it more difficult for certain men to make the easy money they made before. We have protected the moral side of the industry by acting as a police force. As for the quality of the service itself, I think we may say that while a good many of our certificates have been brought into court I do not think a prima facie case has ever been upset, and while in every car we inspect there is money at stake and somebody would have an end to serve by influencing that inspector to issue a report that was not exactly fair, there has never come to us any evidence of such happening in any single case and of that we are extremely proud. I thank you.

THE CHAIRMAN: Are there any questions which anyone would like to ask Mr. Sherman? If not, we will go on to the last paper on our program this morning, which I hope you will all stay to hear. This paper is by Mr. E. F. McPike of Illinois, who will speak to us on "Our Transportation Problems." This is a subject in which we are all interested. It is not possible for Mr. McPike to be with us this afternoon so we will hear him this morning.

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## THE SUCCESSFUL TRANSPORTATION OF FRUITS AND HOW IT CAN BE PROMOTED BY THE AMERICAN POMOLOGICAL SOCIETY

**Eugene F. McPike, Chairman, Perishable Freight Division, American Railway Association, Chicago**

Agriculture and transportation are of necessity interdependent. Their interests are so closely interwoven that, as has often been pointed out, the prosperity of both is attendant upon the success of each. In a large measure therefore they must proceed hand in hand in mutual confidence and work for the common good. The great importance of the agricultural development of a country like the United States is universally admitted. Recognizing always the supremacy of agriculture as the largest and foremost industry of the United States, the business of transportation is proud to claim for itself the second place.

The opening up of new districts for production is pioneer work of the most lasting benefit and forms a unique monument which soon outgrows its original proportions. In all these projects the railroads have naturally and willingly performed their full part in spite of the tremendous difficulties in their way and the long years of patient working and waiting for the practical results of their enterprise.

Nature's law of compensation is never at rest, for it must operate continually, not to maintain but ever to regain the balance. No sooner are new producing districts brought into existence and large crops developed than the problem is complicated by the advent of pests or other adverse conditions, and so the endless struggle between construction and destruction continues. Without the assistance and devoted work of trained horticulturists, pomologists, pathologists and other experts in matters agricultural, the battle ofttimes would be irretrievably lost by those engaged in trying to increase the nation's supply of fruits and vegetables.

The present paper, by request, aims to point out some of the ways and means by which the members of the American Pomological Society can help promote the fruit industry of the United States as a growing and valuable national asset. There is so much good and needed work in this direction which not only can be done but is already being done by the members of the American Pomological Society that it would have been a much easier task to have prepared a paper relating to the ways and means in which the Society and its members could not assist in the solution of the large problem involved. Furthermore a representative of the transportation interests feels like he is carrying "Coals to Newcastle" when called upon to offer any suggestions to pomologists or to horticulturists as to how they can best promote the successful transportation of fruits.

We will all agree that we must be right before we can go ahead. Therein lies the secret of the successful transportation of products like fruits and vegetables, which owing to their inherent nature are very susceptible to damage by deterioration or decay. The use of modern and efficient methods of production and handling by growers and shippers has been almost exhaustively studied by representatives of the U. S. Department of Agriculture, various State Agricultural Experiment Stations and other agencies, public and private, including individual agricultural experts who have devoted their lives to that problem. All these are trying, with a large measure of success, to carry the message to Garcia and even to make him read it and take heed.

Fruits and vegetables cannot be transported in good condition unless they are in good condition in the first place. That is a necessary prerequisite. To insure the production of fruits and vegetables in the best carrying condition and the tender of them in that condition to the railroads for haulage is a problem involving many contributing factors in all of which the pomologist and horticulturist must continue to lend an active hand. We may indeed very properly go so far back as the selection of the land or soil for particular crops so as to insure the best initial conditions for production. The selection of varieties best adapted to the local conditions, the treatment of the soil, cultivating, fertilizing, spraying and all the many items which severally contribute their share to the ultimate success, demand and must receive close and constant attention at the hands of those qualified by training to give it.

But the work of growing and producing even if attended to in the most perfect manner does not end the story, for the results sought may still be defeated if the utmost care is not used in picking or harvesting in such manner as to prevent or minimize bruising. Come in also the many problems of sorting, grading, handling and packing with due regard to the peculiar character of the products involved. These many important items must be properly handled before the products are put into shape to permit of safe transportation. One factor of extreme importance is the use of strong and suitable crates or other containers which are constructed to allow the necessary circulation of air around the contents and are of such materials or design as will prevent any breakage resulting from the weight of other packages on the top. Then the shipper, who may perhaps also be the grower, is responsible for the careful and safe loading, stowing, stripping and bracing of such products in carload quantities. It would obviously be impossible within the limits of these few informal remarks to attempt any description of the best and most efficient methods of loading, stowing, stripping or bracing different commodities. It is also essential that the shipper give clear, definite and legible shipping directions, which must be in accordance with the provisions of the carriers' tariffs applicable.

There are many different ways in which the interested shippers can be of great practical helpfulness in the promotion of successful transportation. The entire burden cannot properly rest, and must not be placed, upon the railroads, for this would be both unreasonable and unjust. The progressive growers and shippers are very mindful of the responsibilities resting upon them and have found by experience that the best results to them will come from their best performance of all that which they of necessity must do.

The question may be asked: "What have the pomologists to do with many of the factors just mentioned?" They have much to do with many of those factors and with regard to the others they are often able to impress upon the grower or shipper the absolute necessity of leaving nothing undone which will give the best promise of tendering products in good carrying condition for transportation. The real problem at issue is not merely the growing of good crops, but of conserving and making those crops most nearly available for the ultimate consumer. Therefore all concerned must co-operate closely to insure the results sought.

The situation in general contains many signs of hope and encouragement, in view of the already large proportions to which the fruit and vegetable business in the United States has attained. The records of the U. S. Department of Agriculture although incomplete show more than 584,000 carloads of fruits and vegetables were transported by railroads during the calendar year 1919. The actual figure was no doubt very much larger than that. Enormous as this business is now, it is easy to foresee that with further growth of the country and population, the handling of fruits and vegetables must materially increase from year to year. It has been and still is extremely difficult for the transportation companies to keep all their facilities fully abreast with the rapid development of the country. The railways have a large supply of refrigerator cars of which the number is being still further augmented, but they cannot be expected to own or operate enough of such expensive special equipment to take care of the maximum movement from particular districts or during limited periods of the year. The use of box cars, under certain conditions, to help out, is often necessary in order to move the crops. The prompt unloading and release of all cars at destination may seem to be an item of no direct interest to pomologists as such, but nevertheless it has a direct bearing upon the availability of cars in loading territories. Therefore the practi-

cal pomologist or horticulturist, interested in the ultimate results, will find or make opportunities here and there for saying a good word in favor of all reasonable means of economy and conservation, not only of the products themselves but of the transportation equipment and facilities, in order that the greatest good may accrue to the greatest number.

The railways on their part are continuing most actively to study the problems confronting them and are using all the means at their command to promote safe and successful transportation. In all these matters requiring close co-operation and interchange of views, the American Railway Association with headquarters in New York City and Chicago, serves as a veritable institute of applied railroading. It is a general clearing house and medium of consultation and mutual advice.

With every shoulder to the wheel, pushing vigorously, continued progress is inevitable. We must all keep wide awake and fight, ever forward, toward the goal, our own greatest good, the greatest good of all.

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## THURSDAY AFTERNOON SESSION

### Business Meeting

The business meeting was held at the Deshler Hotel and was called to order at two o'clock.

It was moved by Professor Laurenz Greene that Mr. Paul Stark act as chairman of this conference. Motion seconded and carried.

PAUL STARK: Dean Bailey, President of the American Pomological Society, wrote a letter to a number of the commercial organizations and representatives of different commercial enterprises, inviting them to come here for this meeting. It is unfortunate that Dean Bailey cannot be with us. I understand he is on the ocean at present. His idea was to get the representatives here and see if the commercial enterprises could not be interested in the American Pomological Society so that the scope of the work of this Society might be increased. This Society has a great record behind it. It has seventy-five years of honorable history, but Dean Bailey felt, and the Executive Committee agreed with him, that there is a wider field of work for this Society, and it is with this in view that we are gathered here this afternoon. I believe that Professor Paddock can outline the things we have in mind and I would like to call on him.

PROF. WENDELL PADDOCK (Ohio State University): *Mr. Chairman, Ladies and Gentlemen:* Preliminary to what I want to say I will take your time to relate a little personal experience, as I believe it will have a bearing on what I might say.

This city has an institution known as the Columbus Horticultural Society. It is an old and honored institution and has been going actively for over sixty years. In the early days when this town was small this Columbus Horticultural Society was a power for good. It has had a wonderful career and a fine record behind it. There were some mighty strong men connected with the old society, but they have passed on and changing conditions have brought about a different situation. I came to the city eleven years ago and in my position I was expected to attend the Columbus Horticultural Society and become a member, which I did. When I attended the first meeting I was very much surprised to find only about six people present, and then through a period of several years

I would attend the Society meetings and there would only be a half dozen or even less in attendance. But in the meantime there were a few faithful ones, among them our lamented Professor Lazenby, a man whose name we all revere. These men had the traditions of the Society at heart and would not let the institution die; they kept on coming and would not give up. They were bound that the Columbus Horticultural Society has a mission to perform. In the course of events Professor Lazenby died. That seemed to leave no one who was ready to take his place and keep the affairs of the Society in operation. Along about that time it happened I had attended some meetings in the east and had heard about the Rose Societies which are very popular in certain sections and doing a big work, for instance, in Syracuse and other places in New York. I came back much enthused over the Rose Societies, and it was not long before at a meeting of the Columbus Horticultural Society the matter came up as to what should be done with the Society. The thought came to me, why would it not be possible, since conditions had changed, to take up the growing of flowers? That idea was broached, all these men took to it, and the result was that I was elected president of the Columbus Horticultural Society. My friends thought they had a big laugh on me and joked me about becoming president of this defunct society. That spurred me to see what I could do and so we launched this Rose Society, and now we have a very flourishing rose division of the Columbus Horticultural Society. That has led to another division, the iris section. This Iris society will have an annual convention here next year. This old institution has a little money and they can foster these things, and it is our idea to be the parent of these various divisions and help them out as best we can.

Now it seems to me that while this is a little aside, and the Columbus Horticultural Society is a small affair, yet after all history has a way of repeating itself in large as well as small things. The American Pomological Society is an old and honored institution and has had a long and illustrious career. You all know something about the men who have been prominent in the affairs of the Society, beginning with Manning, the Downing brothers, our own Nicholas Longworth, and many others — shining lights in horticulture in the United States and Canada. In the beginning, as was true of the Columbus Horticultural Society, they had definite plans and standards and they did their work remarkably well. Similarly as this city has grown from a little village to a large city, so the United States has grown from a small population to large, and naturally conditions have changed. We have grown out of the amateur stage which prevailed when Manning was the Dean of Horticulture. Dean Bailey says that is to be regretted. Perhaps so, but anyhow we are in a commercial age at the present time and the amateur is in the background. Conditions have changed and this Pomological Society has not changed to meet conditions. I firmly believe that this whole institution is too thoroughly entrenched to ever die. There are a few people like our Professor Lazenby, who revere the traditions of the Society and the memories of the men who have been connected with it. When we have a man like Dean Bailey who will give his time to become president of this Society, you may know there is something about it that ap-

peals to him, and if he can afford to put in his time on a thing like this, how much more can we afford to give our time to it. This Pomological Society is seventy-five years old and has done its work along certain lines, but conditions have changed and the management of the institution has not changed to meet conditions, and that is what we are up against now. Certainly in a great country like the United States and Canada there is a place for an institution that will appeal to all classes of people who are connected with the business of horticulture. There ought to be room for such a society and we believe that if it is not the American Pomological Society it will be some other institution that will perform that function. Now while we have the organization and a little money back of it, why not go ahead and make it an organization that will do this work? Why put it off? Why wait for somebody to make this possible when we have the organization already? It ought to be quite easy to make this old Society function along these lines. There are many horticultural interests represented in these two nations and there is no connection between the various organizations at the present time. Would it not be for the good of all concerned if there could be some body where all the different interests could meet and work together on the various problems as they arrive, and not one be pulling away from the other when problems come up which appeal to our certain lines of work. If we could have some central organization where these things could be thrashed out, where the fruit grower would get a better idea of the nurseryman and have a better feeling toward him, toward the manufacturer of spray materials, machinery and all that, it seems to me it would be a whole lot better plan.

I was very much impressed with the talk that our Mr. Lincoln gave before the Society yesterday. I happened to be at the first meeting where the question of marketing the crop of apples was talked over. You notice that he reported that just a little effort accomplished a great deal of good along the line of marketing our surplus fruits. It strikes me that would apply to the question in hand. There are a great many interests that would be affected by an organization if we could find some scheme that would be workable and in some way work this whole situation out. Some of us have talked it over and thought about it, and we think we can see wonderful possibilities if some of you men can think out a plan that would be feasible. I Iam sure as far as I am concerned this American Pomological Society will eventually find its work, just as the Columbus Horticultural Society has found its work; but why let it drag along for years until it does find its place? Why not put it on its feet right now?

The Chairman: Professor Paddock has outlined in a brief way something of what we all have in mind. This proposition is so big that it takes a whole lot of thought to figure out what we want to do. I do not believe anybody knows exactly what we want to do, but it will be something that will progress as the various ideas come up. There is one thing sure, the pomological industries and the allied industries — all the commercial enterprises that are affected by fruit-growing, which includes the manufacturer of spray materials, of machinery, barrels, etc., — we know they represent a great deal of investment and if something can be

done that will gather all of the effort into one — a supreme council, if you want to call it such — which will not speak for one section but for the whole pomological industry, I believe the country will sit up and take notice.

The point Professor Paddock brought out about the marketing of fruit I think is something very real. I believe the experience we had this fall in certain parts of the country in marketing the crop is like an operation — it is sometimes very severe, but after the patient recovers he is better off than before. I think that is one line of work this proposed council can carry out and a great deal more, I am sure. We would like to hear from Professor Greene, if he has anything to say.

PROF. LAURENZ GREENE (Indiana): Professor Paddock has outlined the idea which the Executive Committee has had in mind. The Executive Committee of the Society has had three meetings this summer in Columbus for the purpose of ascertaining in what way the Society could be made of greater use to the pomological interests. We have discussed many ideas and plans and have tried to work some plans that did not work. Dean Bailey was very much interested, as a number of the commercial interests here well know, in getting the commercial enterprises to help in the work of the Society. He very pertinently pointed out at several of our earlier meetings that commercial pomology is distinctly an American project. Some of the men here served overseas and understand what he means when he says that. There are many problems which the nurserymen, which the manufacturers of many products used by fruit-growers come up against, problems of transportation, legislation, etc. It has seemed to some of us that a central organization which would take into its council every commercial interest which affects the pomology of this country could certainly find a field of work. That would be the ultimate aim. The American Farm Bureau Federation has organized its affairs something along this line. In Columbus tomorrow a committee of the American Farm Bureau meets to study the question of canning crops. They have a committee of seventeen at work on the marketing of grain. They have a livestock committee, and so on. The American Farm Bureau does not in any sense of the word attempt to market grain or livestock, or to can crops. They do, however, centralize in their officers and board of directors the efforts of all commercial agricultural lines. Now it has seemed to some of us that a similar organization of the pomological interests which would supply the cherry growers in their association with information and give them the benefit of trained traffic men; which would give this information to the orange growers of both Florida and California, to the apple growers' associations in different parts of the country, to the nurserymen, the manufacturers of spray materials and machinery — that such an organization which could be relied upon for information in regard to railroad transportation, in regard to inspection, as you heard about this morning, would be of great value.

I do not know whether that gives you any additional ideas to those Professor Paddock brought out, but some of us have been thinking and talking along this line and this is about the idea of the Executive Committee. We are sorry that President Bailey could not be here to present

these ideas, but he wanted the fruit growers and the commercial men to get together and talk this thing out freely and as informally as possible.

THE CHAIRMAN: Professor Greene has brought out several other points. Something that he mentioned recalled to my mind a couple of cartoons I saw in the *Country Gentleman*. He spoke of the Federal Farm Bureau. One of these cartoons shows the farmer calling to a crowd of men made up of Representatives in Congress, laborers, and bankers, trying to get their attention; but they pay no heed to him. The next cartoon the scene is changed and the farmer is laughing because he has back of him fifty thousand members of the Federal Farm Bureau and when he speaks now these men all listen to him. I think that expresses just exactly what this thing might develop into. In other words, it is something that is affecting the pomological interests of the country. It is a vital thing for us who are here, and we should sit up and take notice in time to save money before it is lost, as in the apple crop this year. If we have an organization we can speak for the whole industry and we will be a big force.

If anybody else has any other suggestions we would like to hear them. What we want is suggestions; we want to know what we are going to do. It is a big proposition and we wantto get big ideas if we can. Mr. Cranefield, have you something to say?

MR. FREDERIC CRANEFIELD: I fear not. Professor Greene has outlined the work of the Executive Committee the past season and I do not think there is anything I could add that would be of benefit to this conference, except one thought perhaps. Fruit growing is the only major branch of agriculture that has no national organization. I agree heartily with all that Professor Greene has said. The Committee labored day after day and we were impressed with the fact that our time and efforts were not worth much. Doctor Bailey was very good to give his time and attention to this matter, and I want to echo what Professor Paddock said, that if a man like Dean Bailey can give his time to this Society it must be worth something. I know there are men here, and women too, no doubt, connected with commercial interests, who can aid by giving their views on this situation.

THE CHAIRMAN: Professor McHatton, we would like to have a word or two from you.

PROF. T. H. MCHATTON: I do not know that I have anything special to add to the remarks already made except this, that the Executive Committee for the past year has been working along these lines, with the idea that the Pomological Society could be of more help to the allied interests if we could get more cooperation among ourselves as growers and among all the interests. Both of the men who have spoken have been giving you our ideas and personally I would like to hear from some of the men who have so graciously come here at the request of Dean Bailey. I feel with their ideas we will be able to get at some solution of this problem.

THE CHAIRMAN: That is a good suggestion and we will be glad to hear from anyone who has come on President Bailey's invitation, or from anyone else. Mr. Deming is a spray manufacturer. What do you think about this proposition, Mr. Deming?

MR. DEMING: I had no idea I would be called on or I would not have come at all. I had a letter from Doctor Bailey three or four weeks ago asking if I would not come into a conference on the second day of this convention, and I replied that I would be glad to do so, but I had no idea what the conference was for. I expected to have a new power sprayer to exhibit at the Apple Show and I thought it would be a very good arrangement, so I wrote him I would be glad to come. I do not know how Doctor Bailey happened to want me to come unless it is because I am a Cornell man. I was not a student in the department of Agriculture, but I am of course very much interested in agriculture and in fruit growing. Of course this is partly selfish, but from an ideal standpoint it is a splendid thing for the country to have a great deal of good fruit marketed every year.

I do not know that I can offer any suggestions about a procedure to increase the efforts of this organization, but I will say that Professor Paddock and the other gentleman have given my ideas in general on the subject. I believe that the manufacturers of machinery and supplies that are used by the horticulturists will cooperate and that it will bring about good results. I suppose a little pep and speed would be a help, and I am reminded of the story of the Kentucky Colonel. I do not know whether you will see the application, but I think I can. This Colonel was met on the street one morning by a friend who said, "How are you this morning?" "Well," replied the Colonel, "pretty good, if I were not so d—d dry all the time." This friend said, "Colonel, come and walk down to my house and get a little mint julep. I have a fine new recipe." "Walk!" replied the Colonel, "what's the matter with running?" I think we need a little more speed.

THE CHAIRMAN: Mr. Deming, do you think an organization as lined up by Professor Paddock and these other men — do you think we could depend on the backing of the spray machinery people?

MR. DEMING: I should think so.

THE CHAIRMAN: You brought out the point that it was more or less selfish. I believe in every case we will be doing that same thing whether we are apple growers or whatever we may be. Indeed, the work of this Society might be called selfish, yet it is not. In other words, the more good fruit is grown the better it will be for the American people, and the more fruit is consumed the more money apple growers will make, and the more spray material will be used. From that standpoint it affects every one. Mr. Harrison, we would like to hear from you.

ORLANDO HARRISON (Maryland): It seems to me the first thing to find out is whether we have back of us the State horticultural societies. If the horticultural societies from each State are back of this Pomological Society there is no reason why we should not take on some speed. The American Pomological Society has a good record back of it. We all know that no firm, no corporation, no individual, can do business very long unless he has a safe footing. If he has this and makes a good beginning then he may continue fairly well. It seems to me you have the backing and the foundation, and what is needed at this time is about one hundred members to make up $100.00 each to start with. I do not know any better way than to formulate some plan by which each State society

can become a member by subscribing $100.00, and then outside of that get $100.00 each from one hundred members. Then let us go to it and see if we can not make something out of this Pomological Society.

PROF. E. R. LAKE: In response to this I might read you two telegrams received from State horticultural societies today. They show what is the attitude of the State societies.

GRAND RAPIDS, MICHIGAN, December 1, 1920.

*Secretary of American Pomological Society,*
*now in session, Columbus, Ohio.*

The Michigan State Horticultural Society now in session at Grand Rapids, send their best wishes for a pleasant and successful meeting.

GEORGE M. LOW, *Secretary.*

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STAUNTON, VIRGINIA, December 1, 1920.

DR. L. H. BAILEY, *Care Apple Show, Columbus, Ohio.*

The Virginia State Horticultural Society in convention assembled extends to the American Pomological Society its sincere greetings and best wishes for success of continued accomplishments in your high aims and standards in pomological world, of which your society is the founder

H. M. HOGE, *President.*

PROF. LAKE: I think Mr. Shaw can speak for Maryland.

PROF. S. B. SHAW (Maryland): *Mr. Chairman, Ladies and Gentlemen:* By way of explanation I would like to say that several weeks ago Mr. Lake called upon me for some assistance in interesting the different state horticultural societies in a movement to affiliate with the American Pomological Society. The request came at a very busy time of the year and it was almost impossible for me to give the attention which was desired to this line of work. But before taking the matter up with any other organization in another State it seemed wise to begin at home with our own organization and see how they felt on this matter. Each and every member of our Horticultural Society was canvassed, and I may say that while we have a small territory in Maryland, we have a membership that represents between eighty and eighty-five per cent of our fruit growers. That means our commercial growers as well as the amateurs, so that when we have an action by the Society we feel it is representative of our people and our interests. As I say, the Society was canvassed prior to our meeting two weeks ago and at that time the matter was presented officially, resulting in their passing unanimously a resolution to the effect that they would support any effort put forth by the American Pomological Society and authorizing the secretary to pay the annual dues without limitation. That was their spirit. But the Executive Committee brought out one point which they would like to have emphasized with this affiliation. They were willing to take this action and to join in this movement, but they want to see some definite, concrete action by this national organization towards perfecting an organization that will increase the interest and bring about a greater development of our fruit-growing interests.

One of the things which our organization has started among others has been that during the past two years we have taken steps towards get-

ting greater publicity in the utilization of our fruit crops, especially apples. Perhaps you may not be familiar with what was done at one time by the International Apple Shippers' Association along that line. We started work of that kind in connection with apples, but for some reason or other Doctor Borden, who was head of the publicity committee, left the organization and the matter dropped. Then we started what the citrus growers have started and put into effect, what the cranberry growers are doing, and what the prune, raisin and nut growers in California are doing. Our people in the Maryland Horticultural Society are beginning to realize that they have a product to sell. We have the oldest organization in years, and we have all heard for years about methods of production, the same as other horticultural societies throughout the country. They are adequately equipped to receive that information, but apparently they have lost sight of the fact, as individuals and as an organization, that they have a product to market. They have known each year that they have to market the crop, but they have seemed satisfied to let that matter take care of itself. They have heard at large conventions and national meetings about the control of insects and diseases, how to fertilize, how to prune, and all matters relating to methods of planting and similar subjects, but there was very little said about the question of marketing, and if anything was brought up on that subject it did not receive very enthusiastic support. You take any business, trade or industry that has amounted to anything and one of the first things to be considered is the marketing of the product. A fair example of that is the Standard Oil Company. They developed a natural resource, but they did not carry the development of that resource a step farther than their campaign for greater utilization of that product. One of the first means of utilization of their product was the coal oil lamp, and when their consumption was developed to meet that they went on to other things. So as fruit growers the greatest thing we can do is to bring about a greater utilization of apples which will mean a tremendous increase in business and will benefit not only the individual but the industry as a whole. If we could get every man to double the quantity of apples that he now uses what would it mean? Take the season that we have just come through. If a national campaign had been put on all over the United States in which every man, woman and child would have been induced to eat double the number of apples they had normally consumed, do you think there would have been as much howling on the part of the growers about marketing their crops? No. But you cannot do this by thinking about it; you can not do it by saying it is a good thing, but "Let George do it." It means concerted action. I talked to a man this morning in the exhibit hall along that line, a man from the Northwest, and I think he will bear me out in this statement. Whenever people have increased the consumption of their product they have done it by establishing a successful market. Why do you suppose the raisin growers, the prune growers, the citrus people, the nut growers have carried on a line of publicity for greater utilization of their products? You pick up any popular magazine and you will find full page ads urging the utilization of raisins; you will find the same thing true of English walnuts. They show how walnuts and raisins can be used in different ways as food. Coming in on the car last night I called

the attention of one of our members to an ad in the car showing how the different citrus fruits could be used as food. The National Apple Shippers' Association got out a publication in which they gave 197 ways of using apples. The average housewife when she talks about using apples thinks of apple pie, apple sauce and baked apples. We put on a banquet last year in which every item on the bill-of-fare had apples as a part of it. It was an eye opener to our people and some of them went away saying they did not know that apples could be used in as many diffrent ways. I may say this that at the University our Home Economics department is now planning to put out a publication in which they will give recipes showing how apples can be utilized in between two and three hundred different ways, and at our next meeting in Baltimore we expect to put on an exhibit showing possibly two hundred different prepared dishes illustrating how apples may be used, dealing with that fruit alone.

In taking up this matter I have gotten off the subject which Mr. Lake asked me to speak about. We took this matter up with every horticultural society in the United States. I suppose we had replies from about twenty per cent. Some few of them were optimistic; a smaller number rather pessimistic, some of them saying they believed the undertaking would be a good thing but they did not know how to go about it. One secretary said they had an organization of about two thousand people and the only way to put the matter before them was when they were assembled at their annual convention. I understood later that this organization receives a State appropriation for the maintenance of its work, and yet there was not a willingness to put this matter before their members by mail. In our organization in Maryland we have no Federal or State appropriation. The only money we have to carry on our business is from voluntary contributions and our annual dues, but when we want to put any proposition before our people we can do it. I might say also that we have in our membership representatives of the nurserymen, the implement men, spray material men, and equipment men in Maryland. That work is already started in our own organization and it is a kind of work our people are very enthusiastic about.

Just one more word. We have all spoken about publicity in the fruit business. There are two men in the audience engaged in similar lines of business, representing two nurseries in the United States, probably two of the largest. If you mentioned the names of either of these firms in any horticultural or pomological society in the United States you instantly think of them as connected with the nursery business. We want to do the same thing in connection with our fruit business. When our American Pomological Society can become such a factor in this country, and it can, then we have gone a long ways toward helping to put across something worth while.

Mr. Frederic Cranefield: I do not like at this time to speak again when there are so many other men you want to hear, but I want to say a word about the State horticultural societies. I doubt if they are the boys that will put it across. I am from Wisconsin. A friend of mine travelled in England years ago and on one occasion found himself in a railway compartment with a number of English people and he kept his mouth shut; they could not drag anything out of him at all. He would

answer "Yes" or "No", but that was all. Finally one of the Englishmen, commenting on Americans, said, "You Americans are so boastful." We are not always boastful in Wisconsin, but to show you the feeling in our State Horticultural Society, we have expended in excess of $500.00 of our funds in furthering the interests of the American Pomological Society. That is a measure of our interest in the work. We have published a great deal of material in our Society Bulletin, entirely without expense to this Society, and I wish to assure you that the Wisconsin Society does take an active interest, a heart and soul interest in this work and will do all it can; but with the exception of Maryland and a few other societies who are able to work along the line that Professor Shaw has outlined, I doubt whether you will get very much help from the horticultural societies, at least until the idea is sold to them more nearly than at the present time. But I am here to pledge our help, both material and in any other way we can to this movement.

THE CHAIRMAN: I think that point is well taken. We are going to find some people who will say it cannot be done. In every big movement there is always somebody who thinks that, but nevertheless when the time comes the thing is done. We believe this can be done and we believe this is the time for action. We should like to hear from Mr. Babcock.

D. C. BABCOCK (The Barrett Company): I do not know that I can say anything that will be any help, but I heard a bunch of fruit growers talking the other day and one man said, "Well, if we are going to put on a fruit show we had better ask for an appropriation." One of the other men said this: "We are producing this crop and we have to sell it, and it is up to us to put it across, because we are the men that reap the gain." As commercial men I think we are all interested in this organization and will stand back of you. I am sure the company which I represent would be perfectly willing to give all the support they can. But I think it is something in which everyone should take an active part. It is not right to shoulder it on two or three because that does not create an interest. Everybody should have a finger in the pie and should help.

PROF. LAURENZ GREENE: Mr. Babcock made me think of one thing which I would like to present to you right now. The Executive Committee of the Society at present feel that the commercial interests should be represented and that the Executive Committee should be made up of that class of business men. We would like to have you feel that if this thing is to go along the lines that we have talked of here, it will not be because you are helping the American Pomological Society as at present organized, but that you are going to remake it, revive it under a new constitution if you wish, and so far as the present Executive Committee is concerned when it goes out of office we want you to feel that all we have attempted to do is to bring before you some plan which we would like to see you carry through, and you will find every member of the present Executive Committee ready to give you all the assistance possible in so doing.

MR. TRANTER (Hardie Mfg. Company): Speaking for the Hardie Mfg. Company, we are in accord with the things which have been brought

forth here at this conference, and we are willing to give our financial support as far as may be expected, and also our support in any other way we can. As for methods for carrying out these plans it seems to me it would be a good idea if the Society would secure the services of some sort of an organizer, such as Mr. Goodman, who organized most of the fruit growers out West, and who is now organizing the electrical interests of the United States. If we could secure the services of some such man for as long as may be necessary, say a year, and have him train a paid secretary to carry on the work after he is through, I think we would make more headway than if we try to carry on the work as it has been in the past. In other words, bring the commercial viewpoint into the work. I talked to a couple of gentlemen the other day who are interested in the electrical business, and they told me that a very large electrical company has secured Mr. Goodman's services for a year and they are going to link up all the electrical interests and try to increase the demand for electrical appliances. They are about to do the same thing we are trying to do. That will be my personal idea of getting at the matter. All of us are busy with our own affairs and if it is left to us we would not get very far with it, whereas if we could take the money and hire the right kind of a man and have him organize the thing and then turn it over to a trained secretary of real ability, someone who could hustle, we could put this thing across. He could tie up the horticultural societies with this Society and make a success of it.

THE CHAIRMAN: Mr. Tranter has really expressed the views of the Executive Committee. They realize that to put across a thing as big as this it is necessary to have money and backing, also to have a paid secretary of high ability to put it over. There are men who can do that — get the support of all the commercial enterprises, the horticultural societies, the fruit growers' association and everyone who is really interested in fruit growing.

T. H. MCHATTON: The Executive Committee of the American Pomological Society has had this idea, that there is a larger field for this organization to occupy, and it is with that in view that we have called this conference. Of course, as was said in the beginning by Mr. Deming, we might be accused of being selfish, but we might accuse the whole United States of being selfish from that standpoint. In other words, the greater the amount of fruit produced the more spray materials will be used, and one thing is absolutely dependent upon another. The growers all over this country are producing more and more fruit, but unless these growers have a voice by which they can communicate with the public and sell their fruit, by which they can protect themselves with legislation, they will naturally stop growing fruit, their crops will be reduced and the other industries will fall off. With that view, you as business men can see the advisability of getting this whole thing organized, fruit growers as well as the allied interests.

In regard to a paid secretary, I think that is a good thing. We recognize that the American Pomological Society has a large field of operation. We recognize that its voice in pomological affairs is authority; that if we speak well of a variety that variety stands well, and if we condemn a particular variety it remains condemned. We recognize these

things, but we have not recognized as we should that this Society should be a power in a legislative and business way. The college professor is bound to bring more or less of the psychological into whatever he does, and we want to get away from that. If I went down to Washington as a college professor they might listen to me, but they would smile and that would be the end of it. But if I went representing a body of business men they would sit up and listen to what I had to say. The point I want to make is that we want you gentlemen from a business standpoint to get behind the American Pomological Society. We are a big business country. Why should not the American Pomological Society be the nucleus around which all these organizations may be bound together. The advertising agencies, the citrus fruit growers of California, the peach people of Georgia all have their organizations through which they can go to Washington and make the people there listen to them. Let us get the fruit growers and the spray material men and all the rest together, because what is good for the spray material business is good for the fruit business. We want an organization around what we consider the center — the American Pomological Society.

THE CHAIRMAN: I believe Professor McHatton did make matters clearer. Mr. McPike is here and we would like to have him tell us something from his angle.

E. F. MCPIKE (Illinois): I represent the railway people in the fruit handling business of the United States. I have not had opportunity to consider this organization from the transportation standpoint. I think there is very little that I would be authorized to say on this subject beyond what I said this morning. Of course the transportation lines are chiefly interested in the production of the maximum quantity of the best quality of both fruits and vegetables. It is a very important business. There are probably a good deal over a half million car-loads of fruit and vegetables moving every year in addition to local consumption. Just what the transportation lines could do in the way of cooperating with a larger organization of the kind you have in mind I am not prepared to say, but I think they would be greatly interested and would be willing to give the matter careful consideration.

From a transportation standpoint we view fruits and vegetables as rather closely inter-related. As I remember it, there is quite a society of vegetable growers with headquarters in Kentucky. And it occurred to me as a tentative suggestion that when you develop your plans you might arrange for some sort of amalgamation or affiliation, if you please, for I think you will find a common interest to a certain extent between the desire and needs of the fruit industry and the vegetable industry. I think that one tentative suggestion is about all I can offer now.

THE CHAIRMAN: Just what is your idea as to the whole proposition, Mr. McPike? Do you think it is workable?

E. F. MCPIKE: I feel a little modest in coming before you for the first time and venturing to give a definite opinion, but if I were in your shoes in this matter I think I would want to do just exactly what you are proposing to do, to build up a comprehensive organization that would cover not only the academic and theoretical features of the work, keeping up the old standard in this line, but also taking in practical work by closer

affiliation with the manufacturers. It seems to me that you have a great deal to gain and nothing to lose and it might not be any more expensive than all the separate organizations that have been kept up before. I was rather taken with the thought that the state horticultural societies ought to come in in some way, either directly by contributing as state societies, or in some way be more than small detached sections; that there should be regional branches of your Society with the American Pomological Society as a national clearing house. Offhand, I am inclined to favor the thought that you are here discussing. It seems to me that you ought to broaden your Society and enlarge it as much as you can.

THE CHAIRMAN: This is a big proposition and I am sure everyone agrees with me that we do want to cooperation of the state horticultural societies. Probably the point about the vegetable growers affiliating is important. We do want legislation and transportation that will look after perishable fruit, there is no question about that.

MR. H. G. INGERSON (Friend Sprayer Company): I do not think I can add anything to what has been said except to pledge the support of our company. I hope the commercial interests will be represented on the Executive Committee, as has been suggested, and that we may all get together with the common purpose of increasing fruit growing and securing better marketing methods. The manufacturers I am sure feel that they should be represented on the Executive Committee as has been expressed.

R. L. KELLY (Sherwin-Williams Company): I believe the commercial interests are realizing more and more each year the value of associating and cooperating with the growers and workers like the men who make up the membership of the American Pomological Society. As a representative of Sherwin-Williams in the insecticide department I feel sure that we will be glad to do anything we can in a material way, to help draft any plans, or to offer any ideas or suggestions that will have to be made when these plans are gotten together.

There is one question in my mind that I would like to bring up. It may create a little discussion. Most of you know that this fall at Washington the manufacturers of spray materials and the dealers in spray materials, as well as the entomologists, the pathologists, got together and formed a Plant Institute Research Bureau. It is their plan to carry on work no doubt a great deal along the line that this organization is thinking about, but not on such a large scale. I have no suggestion to offer except that as this Bureau has already been formed it might be worked in with your organization, or you might cooperate with them in some way.

THE CHAIRMAN: We would like to hear from Mr. Pratt.

B. G. PRATT (The Scalecide Company): I am sorry that I was delayed and did not hear the first part of the discussion, but I have been much interested and have heard a good deal on the outside. I have been interested in the American Pomological Society for a good many years, even before I became particularly interested in fruit. The proposition before this meeting as I understand it is to make a national organization that will embrace a little bit more than our horticultural societies. Looking at the whole proposition, both as a fruit grower and as a manufac-

turer, the whole question comes down to this, and we must settle that point — will it pay? It has been said that we are a commercial nation, and so we are. There will be no difficulty at all in putting this proposition over and putting it over big if we can convince the fruit growers, the horticultural societies, and the manufacturers of spray materials and machinery that it will pay. I believe it can be done, and I believe the American Pomological Society is the logical society to do this. One of the speakers has just alluded to the Institute organized in Washington a few months ago which embraces the manufacturers of spray materials and machinery, as well as the horticulturists, the plant pathologists and chemists. It was very interesting to see how many different organizations and departments were represented on the board of directors. And without any criticism at all, the consensus of opinion was that the professors must have a majority on the board of directors. I can understand that very well because there are technical things to come up. But as I understand it today the effort is to make the American Pomological Society not only the scientific body which it has been in the past, and the last word on nomenclature and the value of different fruits, but a commercial organization which will help in increasing the demand and the sale of the products which the members of the American Pomological Society are producing. The selling end of the business is the biggest end today, and any man that has had much to do with any business realizes that. We can grow perfect apples, but the thing is to find a customer for those apples when you have them ready for market. It is all right to say that if you have good apples you can sell them. That is all right; but you try it. A great national organization which will direct and lay out plans for a selling campaign, for an advertising campaign, will be of help in both ends of the game.

THE CHAIRMAN: I believe the commercial interests will stand back of us for they can see that it will pay, and if the commercial interests have a good big voice in what is done it is up to them to see that it does pay.

MR. PRATT: I was speaking as a fruit grower on that. Every fruit grower must feel that the American Pomological Society will pay them in dollars and cents.

THE CHAIRMAN: I think every fruit grower will agree that the sales end is a big end. I will now call on the president of the Association of Nurserymen, Mr. L. C. Stark.

L. C. STARK: The American Association of Nurserymen, of which I happen to be President this year, went along for a good many years and its activities were more or less perfunctory. Then about ten years ago they began to realize that the nursery business was not being conducted along as progressive lines as some of the members thought it should be. The upshot of the entire situation was that after two or three years of talking the association was reorganized on a concrete, workable plan. We formerly had dues of from $5.00 to $10.00 a year. We paid our Secretary from $300.00 to $500.00 a year to see about a meeting place each year and do a few other little tasks, but it did not pay us and we decided to tackle it from a business standpoint. We raised our dues to $50.00 a year and this year we will raise about $35,000.00

in the same group of men that formerly contributed $5.00 and $10.00 apiece. That organization has not accomplished all it set out to accomplish, but it has encompassed a considerable portion of it. It has stimulated a good many nurserymen who were not members to become members, and it has refused membership to a great many whose activities did not make them eligible. I am sure it will have a good effect on these men. Perhaps some day they will conduct their business so they will be eligible, which will mean a greater confidence in nurserymen on the part of the orchardists. The problem of the nurserymen was not entirely the same problem that you men are discussing today, but it was similar in that we had an easy-going organization and were accomplishing little; but we have developed into an active organization accomplishing much. The main change has been that we now have funds to employ a competent executive secretary and a competent manager, and these men along with the Executive Committee are spending this money for the best interests of the nursery industry, and are also considering at all times the good of the fruit interests as a whole, because the nurserymen know their interests are those of the orchardists in the long run.

Someone mentioned national questions that might arise when it would be necessary to send someone to Washington. If we nurserymen send someone to Washington he goes representing the nurserymen, and that is all very fine. But nurserymen are bound to be biased in their views and consequently we do not get the consideration that the representative of the Farm Bureau Federation gets, and that is the very pertinent point that is in my mind in this matter. If we re-organize this Society into a national body that really represents the fruit-growers of the Northwest, of the Northeast, New York, the Central West, the Ohio Valley, and the country as a whole, which represents the fruit dealers and allied interests such as the spray material men, the machinery men, the nurserymen — if it sends someone to Washington or elsewhere as representing the entire horticultural interests of America, if it goes in the person of a competent paid secretaary who is drawing $8,000.00 or $10,000.00 a year because he is worth it and because he is making his time valuable to the members of the Society — when we can do that it will pay. I am an orchardist and I am a nurseryman, and I am strong for any supreme body, I do not care whether it is the American Pomological Society, whether it is a supreme horticultural council, or whatever you may call it so long as it has behind it the horticultural interests of the country, and when we get that organization the nurserymen will be glad to contribute their support, financial and otherwise. When you have such an organization, something that has power, it will not be a question of getting members, but of keeping out those we do not want. I know how it was with the nurserymen. When we had five hundred members it was like pulling teeth to get $5.00 a year; the association did not amount to much. After we reorganized and put up our dues a lot of men who objected to paying $5.00 a year came around to get in. We have not heard a murmur about the advanced dues because they know it pays.

THE CHAIRMAN: One point that has been mentioned is whether we shall change the American Pomological Society into a supreme coun-

cil. I think one of the big things about the American Pomological Society is that it has seventy-five years of history back of it and that it is recognized by all the horticultural societies and fruit interests as the supreme court of horticulture. There would be no difficulty about the standing of the Society because it already has the highest standing.

L. C. STARK: I did not mean to intimate that I did not appreciate the value of the name of the American Pomological Society. We all know that. The public knows a great deal about it. In fact, it is really much larger in the minds of the public than it is in the organization when we meet together. I simply made the statement in a comparative way to bring before you my ideas regarding the value of the Society regardless of the name. In other words, such an organization, regardless of its name, would be valuable to all the horticultural interests.

PROF. LAURENZ GREENE: We have had up for discussion some time the question of the activities of this Society and the best mode of carrying them out, and it has seemed to some of us that even though this organization should undertake some of the things that have been talked of today, there will be nothing to prevent the same men, or the same type of men, who have been carrying on the matter of nomenclature of new fruits from doing that work as a committee, or a department of a larger organization, and it was with that idea of increasing the field, of presenting to you all these plans in the name of the Pomological Society, for what they are worth, that we come before you this afternoon.

THE CHAIRMAN: In other words, we want to keep what we have and get more.

MR. WHITMARSH (The Corona Company): I can pledge our support to this organization, but it seems to me there ought to be some plan whereby the associations would be affiliated with each other. It seems to me if we could all get together we could really do something in the end.

EMMOR ROBERTS (New Jersey): This is the first time I have attended the American Pomological Society meeting, although I have read the proceedings for several years back. I agree with the Chairman that we want to hold on to what we have accumulated in the past and try to secure more. We are certainly in a great business, the fruit business. I look upon it as a fine business because I am an active apple grower myself. Those who are interested, whether from a professional viewpoint, as active business men, or representing the commercial interests, should all be interested in this American Pomological Society, and I believe unquestionably that all working together we will know what we are planning for and can carry out our plans much better. I certainly hope the plan will be put through and I think the future outlook for the Society is very good.

THE CHAIRMAN: I am sure there are a number of other people here who have some suggestions to make and we would like to hear from anybody who has something to say.

MR. TEMPLIN (Calla, Ohio): I have been a Life Member of this Society for fifteen years, but this is the first time I have had the pleasure of meeting with you. There have been a great many good things said today. While listening to the rest of you the thought came to me, how

can this thing be worked out so as to make this organization represent all of the allied interests? It seemed to me it would have to be done through committees, and my thought is to have numerous committees, say Committee No. 1, nurserymen, fruit-growers and wholesale fruit dealers. These are closely allied interests. The nurseryman sells the trees to the grower who grows the fruit, and then the wholesale man distributes it. Committee No. 2, fruit-growers, machinery and sprayers and fertilizers. Committee No. 3, fruit-growers, retail fruit dealers and wholesale fruit dealers. Then perhaps a Committee No. 4, fruit-growers, wholesale fruit dealers and transportation agencies. It is not only growing the fruit, but the selling it, and you can not sell it unless you have some means of transportation. Perhaps another committee would be the orchardists, the fruit sorting machinery, containers, etc. Then another, consisting of nurserymen, landscape gardeners, and special flower associations such as the Rose Association mentioned, the Carnation Association, etc. Then perhaps another, a member of the Nurserymen's Association, a member of the seedsmen, and a member of the Florists' Association. Then another — fruit growers, pomology specialists and transportation specialists. Then another on nomenclature, judging and maybe something else. Then you might have these committees meet say two months before the regular meeting of the American Pomological Association and have them talk to their various interests and make up their minds what they would like to have discussed at the next meeting. Then let them appoint a committee of three to confer with the Executive Committee of this Society and consider their suggestions. They would really form a program committee and in the meetings such as we have been having today you would see the final results of these special committees.

Mr. H. W. Schmitkons: The Federal Farm Bureau suggests that we might consider the advisability of affiliating and cooperating with that Bureau, thereby increasing our influence in legislative matters and in other ways. Other interests, the vegetable people, the stock growers, etc., are affiliating with the Farm Bureau. The officers do not wish to urge or force anything, but said if we wish to affiliate they would be very glad to have us do so. I wish we might consider that thing, whether at future meetings or at this meeting.

The Chairman: I think that is a good suggestion. We would undoubtedly profit, but there are a good many things to be taken into consideration.

Mr. G. T. Abbott (The Barrett Company): Along the line of what Mr. Schmitkons has said, I was in Grand Rapids yesterday and in the horticultural society up there I noticed that their resolutions, in fact everything they did, was being worked out through the Farm Bureau. If that thing can be arranged I believe we would have a good deal more weight in anything we want to put across, for the Federal Farm Bureau is the strongest organization we have along that line.

H. P. Sweetser (Maine): I think it will be all right to affiliate with the Federal Farm Bureau, but I think we are big enough to organize something of that kind and maintain our identity. It seems to me the greatest work of this Society will be to reach down and help in the

organization of local and district associations which will be our support. I think that is the history of large organizations, that the smaller organizations have been combined until finally national organizations have been established. I think our work should include the actual placing of managers or experts in the field. I think we can do our work, as has been stated, by making this the head organization and having the support I have just indicated. If that is true, our work to a certain extent is pretty well outlined, because we need to get in touch with each State and get the support of the local organizations, and then if possible unite them in a constructive organization which perhaps will be a second support. So far as having practical men, the growers, spray material men, transportation men and all these interests affiliate with us, I think we must actually do something that they can see, but I think in our plans we should present a definite scheme whereby these local organizations can be helped. Such a scheme, if we could carry it back to the State organizations, would mean that the State organizations should have managers whose duty it would be to travel among the growers and other interests giving expert advice. Of course the question arises there in the minds of some that this line of work is being handled by the agricultural colleges and experiment stations as well as by the United States Department of Agriculture. I believe, gentlemen, that the time has come when interests of such type as we represent here today are making bigger demands than the general public will ever stand for in taxation, and because of that the private interests (as an illustration I say the fruit growers) must support their own societies and pay the tax among themselves. Of course some people will say that the Government is curtailing, that the states are curtailing, because they do not wish to raise the taxes; but I do not think that is entirely true. I think our demands are going ahead so fast that we really cannot expect general taxation to cover our needs, so I think the work of our local organizations should be to the extent of furnishing expert advice. That means that they must raise money enough to pay state managers and expert advisers, as has been mentioned by one or two of the speakers. The only way to do that is to strengthen our local organizations and then see that they are guided by the national organization, the American Pomological Society.

THE CHAIRMAN: Undoubtedly I believe as this thing goes on it will and should take on new duties. It will be a process of gradually building up, and there will be a lot of work to be done which we do not think of now because it is a mighty big proposition, bigger than any of us realize.

The Northwestern part of the country has done a lot in cooperative work, especially in the Yakima Valley. Mr. Swartz is here, and we would like to hear from him.

MR. SWARTZ: Since coming east I have been hesitant about raising my voice in discussion, because as I have gone up and down through the cities — Boston, New York, Philadelphia, Washington, and now Columbus, and have seen everywhere in your stores our Northwestern apples which have so successfully invaded your markets, since I have heard over and over again critical remarks and unfriendly remarks regarding our apples, I did not know whether it would be safe for me

to have anything to say. The whole thing reminds me of a story, perhaps you have heard it, of the missionary who went to the South Sea Islands to attempt to do some educational work among the savage islanders. He had before him a savage chief and he began something like this: "Chief, what is good?" The chief thought for a moment and then he said, "Good is when I take my neighbor's wives and oxen." Then the missionary said, "Chief, what is evil?" The chief thought for a good while, and finally he said, "Evil — that is when my neighbor takes my wives and oxen." I think you will see the application. If you people here in the east had your organization so perfected that you could enter our territory in the West I think it would be a good thing.

In a way I am here representing the Horticultural Society of the State of Washington. We had a meeting of our Board of Directors not long ago, and knowing that I was coming east these gentlemen asked me to run up to this meeting and bring back to our State Horticultural Society on December 16th, a report of this meeting. And believe me, ladies and gentlemen, when I go back I will have some report to make. it has been with a great deal of pleasure, indeed, that I have attended this meeting this afternoon and listened to the plans of this Society for its future work. I have always had a vague idea of what the American Pomological Society was and what it stood for. I had supposed, and perhaps I was right, that its work was almost altogether technical, and I was a little bit scared when I came here, because I am not a technical man in any sense of the word. I am only a fruit grower.

I heartily agree with you that it is necessary that this Society should in the future follow different lines than it has in the past. I do not mean that it should drop the things it has been doing in the past, but that it should branch out and broaden. This country of ours needs cooperation between the horticultural interests and I think that was what was in the minds of the members of our Board when they asked me to stop here. Probably they had some communication from your Secretary or from Dean Bailey in regard to that. I do not know; I was simply asked to come here.

A great deal has been said about cooperation in the Northwest, and the success they have had in certain lines in the way of standardizing their pack and their methods of marketing. You people are familiar with our methods, and in some instances you have followed in our footsteps. Since we have been cooperating and developing better business methods we realize more and more the value of this cooperation and the success it has brought to us. I do not mean to say that we are perfect out there. We realize that we are very far from perfect; but what we have done has been of great value to us.

I do not know that I have anything to suggest as to the future activities of the Society. Several gentlemen who have spoken this afternoon, especially the gentleman from Maryland, have suggested some things I had in mind, and one of these is distribution. The distribution methods are very poor, indeed, but this Society, cooperating with all the other societies of the country, can do much in improving this. Another thing is the matter of education, not only of the producer but of the consumer. I presume most of you have noted the work that has been

done by the California people in advertising their different products. They have educated the public until they have increased several times the quantity of their products that is consumed in this country. In our own district, the Yakima Valley, one of our growers who has a large territory has spent a great deal of money in whole-page advertisements of the Northwestern apple, and he has already begun to get returns from the money invested. I think a great deal more could be done in that line, and if the fruit interests all over the country are cooperating I believe that a strenuous campaign along the line of educating the public to the value of our fruit products will so increase the consumption that a great many of the marketing troubles we are experiencing at present will disappear.

PROF. LAURENZ GREENE: Most of the men who have spoken this afternoon have seemed favorable towards the reorganization of the American Pomological Society, and in order to bring the matter more concretely before this body I would move that the Chair appoint a committee as large as he may desire from the commercial interests represented here, that committee to prepare a report which will be submitted to the convention tomorrow — a report of plans and policies. This committee is also to constitute a nominating committee and present a list of names for the Executive Committee and other officers tomorrow. In support of that I would like to suggest that at the meeting of the convention tomorrow the annual election of officers will take place, but it seems to me these gentlemen might want to discuss whether they want to change the Constitution and present a plan of organization, so in order to get the matter before the group I would like to move that such a committee be appointed by the Chair.

(Motion seconded and carried.)

PROF. WENDELL PADDOCK: I suppose it would do no harm to revert to the former line of thought. It strikes me that our line of argument has been rather selfish because we have for a moment forgotten that there is a little bit of the Old Country to the north of us. We have been talking just about our territory down here and have forgotten that this is an international society.

THE CHAIRMAN: Professor Macoun, we would like very much to hear from you.

W. T. MACOUN (Ottawa): It seems to me that the most feasible way to organize this new Society would be to have an organization with a central committee, or council, in which each organization would be represented, and in that way the Canadian organization would be represented in the American Pomological Society. It would not be necessary that the Canadian Association should wait on your government in matters relating to our own particular legislation. I do not think the new organization would affect adversely the international character of the Society. It simply means that we could work together along international lines. My own idea is to have a federation of the societies and have the members of these societies form a supreme council which would be called the American Pomological Society. In that supreme council would be a committee of the old Society which would represent the old aims of the Society, such as nomenclature of new varieties, which would be a per-

manent committee altogether separate from the larger committee. It seems to me if we could get an organization of the nurserymen and others represented here today we could develop a very large membership and much good could be done through the federated societies. Then with a good paid secretary, which is a most important thing, that would be the beginning of a great work among the horticultural interests; but the first thing to do is to federate these different organizations.

THE CHAIRMAN: I will read a list of the different interests here which Professor Lake has prepared, and if there is any interests here not included in this list I wish you would speak up, because we want everybody represented on this committee. We have the spray machinery manufacturers, fertilizer manufacturers, fruit growers, manufacturers of spray materials, scientific horticulturists, nurserymen, horticultural societies, manufacturers of packages, transportation agencies, and the Dominion of Canada; also the farm papers. We would like to hear from some of the farm paper men. Let us know how much publicity we are going to get.

MR. ALLEMAN (National Stockman and Farmer): It is with great pleasure that I appear before this organization. The farm papers as a class are in favor of any forward-looking movement. You will get all the publicity you want, but do not overlook the Farm Bureau, which is already organized and is prepared to organize still further. They have a number of different committees through which you can work without needless duplication. I do not know the terms of admission to the Farm Bureau, but unless they would be too heavy I think we could well afford to recognize it as a superior institution and work through their various departments whenever it would be to our advantage.

W. H. LLOYD (Ohio Farmer): Recently I attended a convention of the Vegetable Growers of America. The discussion there was along similar lines, namely, the development going on in this country among the producing class of people. Their idea was to affiliate with the Farm Bureau and in case of any legislative problems or matters of marketing and distribution, the influence of an organization like the American Farm Bureau, representing the entire agricultural population of the country, would be much greater than that of a small organization like the Vegetable Growers of America. I think the same thing is largely true of this organization, but I personally do not want the organization to lose sight of the work done during the last seventy-five years, and which has given this Society its name. We can broaden the scope of the Society, but let us keep the technical work as our main work, and carry our marketing problems and legislative problems through the Farm Bureau Federation.

T. H. MCHATTON (Southern Ruralist): As far as the Southern Ruralist is concerned, we have three hundred thousand subscribers in the Southeast, and any support the paper can give I am sure it will give. I happen to be the editor of the horticultural section and have been for twelve years, and anything which the paper can do to assist in the development of fruit growing in the future it will be glad to do.

PROF. LAURENZ GREENE: I would like to bring up one suggestion. We do not for a moment want to lose sight of the Farm Bureau Federa-

tion, but I do believe that the Farm Bureau Federation will expect the pomological interests to handle their own affairs, and until we organize these interests we will not get the help the American Farm Bureau can give us. It seems to me that is a later step.

L. C. STARK: Regarding the American Farm Bureau question — recently it became necessary for the nurserymen and nursery interests to go to Washington and ask for a certain thing. Never before had we worked through or with the American Farm Bureau Federation, but that matter was laid before them, they quickly saw the importance to the nursery and orchard interests, and they went with us to the hearing and supported our views in the matter, undoubtedly enabling us to get better action than we would have gotten if we had simply appeared as representatives of the American Nurserymen and the orchard interests. That same cooperative activity can be used in the present plan without submerging the American Pomological Society at all.

THE CHAIRMAN: In appointing this committee I would like to say that if there is anyone here who is an official of any of these organizations and can speak officially I would like to appoint him on the committee. So as I read this list if there is anyone here who represents the sub-organizations or some of these large organizations I wish you would correct me, because I would like to have someone representing the different associations. The list is as follows:

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| Spray Machinery | Mr. Tranter |
| Fertilizers | D. C. Babcock |
| Fruit Growers | Emmor Roberts |
| Spray Materials | R. L. Kelly |
| Scientific Horticulturists | Wendell Paddock |
| Nurserymen | L. C. Stark |
| Dominion of Canada | W. S. Blair |
| Horticultural Societies | Frederic Cranefield |
| Farm Papers | Mr. Alleman |
| Railroads | E. F. McPike |
| North-west | Mr. Swartz |
| Iowa | E. N. Reeves |

THE CHAIRMAN: If there is nothing else to come before this meeting I would like to call a meeting of this Committee immediately upon adjournment.

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## STUDENT HORTICULTURAL SOCIETY ENTERTAINMENT, THURSDAY NIGHT

At the request of Secretary Lake, the Student's Horticultural Society of the Ohio State University gave a program for the entertainment of the Society on the evening of December 2nd. It was Professor Lake's idea that this program might well take the form of an initiation of the students of the Collegiate branch of the American Pomological Society. Plans were made accordingly. The first part of the program was intended to be rather impressive and in general was patterned after the average lodge ritual.

In the second part of the program, an attempt was made to introduce a bit of fun in the form of mild hazing. During this part, the

initiates were made to do various stunts such as dance, sing, fight and so on. This was followed by a series of pleasing pageants and dances by the girl members of the local Horticultural Society. Music for the occasion was furnished by the horticultural orchestra composed of six pieces.

All together, the efforts of the students were well received and was a pleasing bit of diversion from the usual routine and hard work of the convention program.

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### FRIDAY MORNING SESSION

The Friday morning session was called to order at ten-fifteen by the Chairman, W. T. Macoun.

THE CHAIRMAN: We will now come to order. As the first number on the program I will ask Mr. Harrison to give us his talk on "The Legislation Problems Before the American Fruit Growers."

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## THE LEGISLATION PROBLEMS BEFORE THE AMERICAN FRUIT GROWERS

**Orlando Harrison, Maryland**

*Mr. Chairman, Ladies and Gentlemen:* From our standpoint in Maryland there is no difficulty in getting all the legislation that the farmer and agriculturist needs at any time when they go to the Legislature united. I have been in the Maryland Senate for eight years and at no time have I seen the farmers and fruit growers denied what they want in the form of legislation, especially if they are united on what is needed for their respective sections, on what is needed for the general welfare of the fruit business and for the farming interests. In our State we have passed a grading law which was recommended by the U. S. Department of Agriculture, and we passed it without a single dissenting voice. One of our friends in Virginia said to me, "It is something strange how Maryland can put over a bill so drastic in form as the grading law, and yet we do not seem to agree at all in Virginia, just adjoining." But my friends, the point is not wholly in the legislation. We have put through every bill presented to me for the fruit growers in Maryland without any difficulty whatever; but the weakness in a way has been after the bill has been put through in enforcing that bill. I think all of our people at home will say we have ample legislation; in fact I have said many times that we have one hundred bills on the statute books of our State where we only need one.

In the matter of national legislation I was very much pleased yesterday when the gentleman spoke of the Bureau of Markets and mentioned the fact that he felt sure we will be able to get different legislation on the inspection of fruit and vegetables at the point where it is grown. I want to speak from my own knowledge during the past season — I happen to be the president of the Produce Exchange of Pocomoke City which handles many car-loads of potatoes. While my contracts were for $8.00 a barrel for early potatoes, the shipments started at $10 and $12 and continued for two weeks in the first part of the shipping season. Later the prices declined twenty-five to fifty cents until they fell to $5 or $6, or even $3. To my knowledge some of the men who had contracted for a large quantity of potatoes at $8 when the market was above $8, when the market went below $8 had them shipped to the Boston market, and the first thing asked for was Government inspection whereby they might be able to find some defect in each car if possible, and there is where they based their claim to the shipper. I say to you that this Government inspection has really been a boomerang against us. It has not in any

way, except in a few instances, worked to the advantage of the grower. It really has been to the advantage of the man who wanted to take advantage of the declining market. I know of farmers in Virginia (Virginia is only fifty miles away from us) who have lost frightfully this season, many practically lost their farms because men have gone from under their contracts and have appealed to this Government inspection. Sometimes the trouble may have been from delay in shipment, the transportation was not of the best. But be that as it may, a car of potatoes on the road from four to twelve days, it is not hard to find a defect in some way that will give a man a chance to drop the whole thing and reject it. That is where the losses have come.

Another thing has come to us in our own line. We had 106 cars of peaches and we used refrigerator cars. It costs $176.00 a car to express to Boston, so we put in three tiers of barrels rather than four tiers and sent them by freight. In other words, we sold them f. o. b., Boston or nearby and paid the difference between the express and freight charges in order to get them there in perfect condition. It seems to me that is one of the great things we should ask for from our legislators, cooperation with the railroad people, ask them to lower the minimum shipment of peaches and early apples. I do not know whether you ship early apples or not, but we find Yellow Transparents are just as perishable as peaches, and I know great loss is being sustained from this overloading. They demand a minimum of 18,000 pounds, some 20,000 pounds, and we are asking that the minimum weight for cars of perishables like peaches and early apples should not be to exceed 16,000 pounds.

I think if we could get together on legislation along these lines it would be a great advantage. But whenever we go to the Legislature let us go united, determined on what we want, and I believe we will have no difficulty in getting from State legislatures and from the Federal Government whatever we want. I thank you.

THE CHAIRMAN: Is Mr. Brown of Ohio here? Is there anyone here who would like to speak on this subject? I may say as far as legislation in regard to inspection of fruit in Canada is concerned we have found it much better to inspect the fruit where it is shipped. For many years we tried inspecting it at destination, but found it was not satisfactory, and now, although it takes more inspectors, we find it much more satisfactory to have the inspectors go to the packing houses and examine the fruit there. They are not only able to see whether the fruit is well packed, but are able to instruct growers in methods of packing and in that way are able to keep a good feeling between the shippers and inspectors. I understand Mr. Roberts from New Jersey is here, and we would like to have him say a few words.

MR. EMMOR ROBERTS (New Jersey): I do not think that I can add anything. I heard Senator Harrison's closing remarks, that the farmers and fruit growers must stand together to get legislation. I have had a little experience in bringing about legislation and I know that when a group of farmers come to a legislature united, if their proposition is fair and just they can get nearly anything they want. The legislators will always listen to them. If they know what they want they usually get it. I hope that the new Farm Bureau movement will be a big force in enacting legislation and getting the farmers together, and I hope the American Pomological Society will be able to serve in an advisory capacity in matters horticultural in this Farm Bureau movement.

THE CHAIRMAN: I will now call on Mr. V. H. Davis of Ohio to give us his paper on "The Future of the Peach Industry in the Northern States."

## THE FUTURE OF THE PEACH INDUSTRY IN THE NORTHERN STATES

**V. H. Davis, Ohio**

I did not receive notice that I was on the program until it was too late to prepare anything beforehand, so I will not take up any considerable amount of your time but simply state in as few words as possible some of the reasons why it seems to me there is a splendid prospect for the peach industry in the northern peach growing sections.

To begin with, our nurserymen friends tell us that in order to maintain a normal acreage of peaches over any considerable territory, good, bad and indifferent, it requires about twenty-five per cent new planting every year. For the past ten or twelve years that percentage has not exceeded ten per cent instead of twenty-five, and for the past few years it has been a good deal less than that, so the acreage of peaches over the northern portions of the country, including what might be called the northern peach-growing belt, has been rapidly decreasing, and we appreciate that that is true, too. Then again, for the last fifteen or twenty years there has been a decided trend all along the line towards apples and people have been planting apples instead of peaches because they felt the growing of apples was less risky than peaches. That is certainly true, of course, even in cases where conditions are the most favorable for the production of peaches. Now on top of this very evident decline in the acreage planted in the last ten or twelve years, and the drift from peaches to apples, even in the peach-growing belt, we find that the winter of 1917-18 eliminated approximately fifty per cent of bearing trees throughout the entire northern peach-growing district. That was true in the northern part of our own state, it was true to a greater or lesser extent in both Michigan and New York, which are the leading sections in the northern peach-growing belt. This means that we have a very large decrease in acreage and very high prices for nursery stock, which in turn has greatly decreased the re-planting that might have taken place if peach stock had been available at anything like normal prices. There is a vast difference between the six and ten-cent prices we used to have and the forty to seventy-five-cent prices we have now.

Then there is another factor. In our own peach district in the northern part of the state we find this to be true, and I think it is true in most sections that have come into prominence as special crop districts — that somehow or other it has been managed so that when we had a crop everybody else had a crop, which serves to depress the market for that section. The central section of our peach-growing district is Ottawa County, and while a good many peach trees have been planted around the edge of this territory, these areas are not being re-planted and I do not believe they will be. It will only be those particular sections of the district that are most favorable for this particular kind of fruit that will be re-planted.

For these various reasons, therefore, I do feel that the prospects for the next fifteen or twenty years for peach growing in this section of the country, the northern peach-growing belt, are favorable as far as climate and soil are concerned, together with the market facilities offered. I think there is a splendid opportunity for the planting of peaches at the present time.

THE CHAIRMAN: We will be glad to have discussion of this subject because this is the only paper on peach growing that we have on the program this year.

A MEMBER: I would be glad to have Mr. Davis tell what varieties they plant after Elbertas.

V. H. DAVIS: We have just about come to the conclusion that we will plant very little of any variety after Elberta. In our own planting we are planning to develop some apple orchards along with our peaches. In the past our district has been devoted almost entirely to peaches, and we plan to plant a considerable acreage of apples along with the peaches. We do not want peaches coming into bearing with apples very much later

than the Elbertas. We would like to find a good variety of peach, something similar to the Elberta, as good as it is or better, that would come in about ten days or two weeks before the Elberta, but we would like to wind up our peach picking with the Elbertas.

THE CHAIRMAN: We have had quite a number of speakers on the program disappoint us. They have not been able to get here, and you will see that we have had to go from one part of the program to another as the men came in. As far as I can make out, there are no more men here whose names are on the program who have not been heard. If any man is here who has not been called on we would be glad to have him come forward now.

If there is no one here to address us further we will now have the report of the conference which was held yesterday afternoon in regard to the future of this Society. It has been felt that it would be desirable to bring larger interests into the work of this Society and increase its usefulness throughout America, so a conference was held yesterday afternoon by men who are interested in all phases of horticultural work, and it is the report of that conference that we will hear now. I shall therefore call on Mr. Cranefield, who is the secretary of the committee appointed by the conference, to give us a report of the proceedings and the action of the committee afterwards.

MR. CRANEFIELD: The committee is not ready.

THE CHAIRMAN: Then I think it would be a good idea to have general discussion of the subject.

E. N. REEVES (Iowa): Just a word to the association. This is my first visit to the American Pomological Society and I am glad I came; I am pleased with what I have heard and seen during the sessions, but in one way I am somewhat disappointed. I have always understood that this association was made of experimenters, those who were disinterested largely in a financial way in the production of fruit, but who wanted to benefit the fruit interests in general and have worked unselfishly toward that end. The discussion of the papers has taken more of a commercial aspect than I had expected. I presume this is all right and the times are ripe for that, but I do not believe we ought to forget that the original purpose of the Society was experimenting, and I think we ought to guard against the American Pomological Society running into purely commercial lines. There must always be the effort to work unselfishly along experimental lines. I think you will all agree that there is no section where we have a perfect list of any of the fruits. It has been shown that we do not have a perfect list of peaches, and with apples we are all hunting for some better varieties. So there is room for the experimental yet. We realize that our state experiment stations have largely taken over the work of experimenting, and they will continue to work from a scientific standpoint, but it is up to the home experimenter to do a lot of this work. There is now being done a minimum amount of experimentation. I know something about it in my part of the country. In the northern part of Iowa the difficulty of growing apples was so apparent years ago that the nurseryman, C. G. Patton, received the Wilder medal for his production of seedlings. He started experimenting fifty years ago in a haphazard way at first. Then he worked out a

system of breeding experiments where he knew one parent, then later with the experiment station he took up the work of cross-breeding where both parents were known, until now he has many seedlings where both parents are known back to the third generation. While he has not a perfect list, he has established something that is being taken up by the experiment stations. Mr. Patton is about eighty-seven years of age, he is feeble, and he has sold his experimental stock to the State of Iowa and the Experiment Station has charge of that. At the Experiment Station for years they have conducted a line of experiments similar to those of Mr. Patton, but from a more scientific standpoint. They found certain cross-breeding has been of value. No cross of the Ben Davis was of any value. On the contrary, the Jonathan was good. Frequently you get an apple fully as good as the Jonathan in quality with some added value. A lot of these seedlings are bearing and you can see what an attractive apple is the cross between the Jonathan and the Salome. This apple we feel is of better quality than the Jonathan, or as good, is a much better keeper and will not spot like the Jonathan. At the Station there are a good many thousand of seedlings of known parentage yet to come into bearing, and we hope to have a big list of valuable ones from that. One of the things we are looking for is hardiness. We must have hardier trees to stand the winters we have out there. Minnesota is working along this line and Prof B—— of the Minnesota Station has a long list. In a short time we hope to extend the apple-growing region five hundred miles north. How far we will go remains to be seen.

I hope this Society will not lose sight of the fact that we need these lines of experiments for which this Society was established. I thank you.

THE CHAIRMAN: We hope to have more addresses like Mr. Reeves' after the report of the conference.

MR. CRANEFIELD: At the risk of boring you I wish to offer a word or two in the way of explanation. The Executive Committee of this Society realized last year that some effort must be made to formulate a plan for the building up of this Society, therefore the conference yesterday afternoon. The conference appointed a committee on ways and means, plans and policies. This committee met after the Conference and promulgated this report which I am authorized to present to you at this time.

C. P. CLOSE: I would like to know if authority has been accorded to this committee, if the Constitution has been waived, and if this is legal. The usual form is for the various Vice Presidents to meet and present the names to the Society and have the Society vote upon them. My understanding was that these officers had not only been nominated but elected.

MR. CRANEFIELD: There was no feeling, in presenting this report, that we were assuming any authority. After a year's hard work we had this conference yesterday and the conference acted in a way to further the interests of the Society. Technically, I will agree that it is not according to the constitution. We propose, after the report is accepted or rejected, to present the revision of the constitution. I think we are proceeding legally.

PROF. E. R. LAKE: The adoption of this report does not signify anything until the Society has acted upon it. A report from a committee does not elect or nominate officers. The whole matter would have to be referred to the nominating committee for final approval, or by modifying the constitution which would require a two-thirds vote. The natural course would be to adopt the report and then refer it, or the part in regard to officers, to the nominating committee.

A MEMBER: May I ask if this committee was not instructed to report policies for the coming year?

MR. CRANEFIELD: In reply to that I will say that the committee concluded that in order to make any sort of intelligent report on plans and policies it would require anywhere from a couple of days to a week — at least, it would take a longer time than the committee had at its disposal, which was about an hour and a quarter. It was the intention if this report was accepted and the executive committee elected, that the committee would meet at its earliest convenience and spend a day or a week in outlining plans and policies for the future of this Society.

C. P. CLOSE: I move the adoption of this report.

(Motion seconded and carried.)

L. C. STARK (Missouri): Before the adoption of that report is passed I would like to call attention to the fact that in this executive committee appointed the South has no representation — the southern horticultural interests, which we all know are very vast. If we want this thing to be a national power it must include the South. Also there is no specific representation of the horticultural societies, and they are to be the stronghold of this rejuvenated organization if it is to be the power it ought to be and we believe will be. Therefore I would like to move that the committee of five be extended to a committee of seven, in order to make a place for the southern representative and for a representative of the various horticultural societies.

In that connection, being a member of the committee that brought in this report, I would like to say that our endeavor was to cover the various horticultural activities in this committee, leaving the preponderance of power in the hands of the actual, practical orchardists, and including the useful allied interests, because if this thing is to go big it must have the support of the interests both financial and otherwise. I offer that as an amendment to the resolution — two additional members on the executive committee, with the understanding that they are to be a representative from the South and a representative of the horticultural societies.

THE CHAIRMAN: This report has been carried, but as it will be referred to the Nominating Committee your suggestion can be acted on by the Nominating Committee.

L. C. STARK: I will move that this be referred to the Nominating Committee with the suggestion that they give it serious consideration.

(Motion seconded and carried.)

THE CHAIRMAN: I will ask Mr. Cranefield to report on the matter of the revision of the Constitution.

MR. FREDERIC CRANEFIED: At the St. Louis meeting we made some revision of the constitution, and that which I present now is supple-

mental to that which you have in your hands. Since that time the committee to revise the constitution have gone over in detail each article and several amendments will now be offered. I presume if we are to proceed to the adoption of this constitution a motion to that effect would be in order. Otherwise, we shall proceed. I will read the draft as I have it here and offer it to the Society for adoption.

**Article I. Name**

The name of this Association shall be the American Pomological Society.

**Article II. Object**

Its object shall be the advancement of the science and art of Pomology.

**Article III. Membership**

The regular membership of this Society shall consist of Junior, Annual, Society, Life and Institutional members.

The special membership shall consist of Honorary members, subscribers, contributors, Junior and Senior Patrons.

PROF. E. R. LAKE: I want to speak a word about the Juniors. The term "Junior" came up in a conference of students yesterday morning and they have asked that the name "Junior" be changed to "Collegiate." Some states are very much in favor of this name and if it will help the Society I think the name should be changed.

MR. CRANEFIELD: After the entertainment last night I think we are ready to admit that some of the members are not Juniors. Personally, I have no objection to the word "Collegiate" and will make it to read that way.

**Article IV. Meetings**

The regular meetings of this Society shall be held annually at such time and place as the Executive Committee may decide.

Special meetings may be convened upon the call of the president or by the executive committee on petition signed by a majority of its members.

**Article V. Election of Members**

Students shall be eligible for Collegiate membership on recommendation of the professor of pomology in the faculty of the institution whence the applicant registers.

Any person shall be eligible for Annual membership on payment of membership fee.

Any society of established standing shall be eligible for Society membership and may become a member on its own election.

Libraries and educational institutions may become members on their own election; such memberships shall be limited to thirty years.

Any person shall be eligible to Life membership on recommendation of a special committee appointed by the president to determine the applicant's qualifications; and may be elected to such membership on approval by two-thirds of the Executive Committee.

Honorary membership, in recognition of eminent or distinguished service to pomology, may be conferred upon any person nominated by not less than a two-thirds vote of the Executive Committee, and who receives not less than a two-thirds vote of the membership present at a regular annual meeting.

The designation of Subscriber may be conferred by vote of the executive committee upon any person, firm or corporation that may have contributed valuable services toward the accomplishment of a definite periodical purpose.

The designation of Contributor may be conferred as above, upon any person, firm or corporation that may have contributed means, material or special services of notable permanent value for the advancement of the work being carried on by the Society.

The title of Junior Patron may be conferred in similar manner upon any person, otherwise eligible to regular membership, who may contribute at any one time to any of the permanent funds of the Society the sum of $500.

The title of Senior Patron may likewise be conferred upon any person similarly eligible who has contributed for a like purpose the sum of $1,000.

C. P. CLOSE: I would like to move that the portion of the constitution thus far read be adopted. The object is that we can keep this much in mind, and if it is agreeable we had better vote on this much now and then take up the other sections one by one.

(Motion seconded and carried.)

**Article VI. Dues and Fees**

The dues for Collegiate membership shall be one dollar for the calendar year; for Annual membership shall be two dollars for the calendar year; for Society membership shall be ten dollars for the calendar year. The fee for Institutional membership shall be fifty dollars; the fee for Life membership shall be one hundred dollars.

C. P. CLOSE: I move the adoption of Article VI.

(Motion seconded.)

L. R. TAFT (Treasurer): It seems to me we are keeping out life members with a fee of $100. We formerly had it at $20 to $25, and we have received as high as twenty-five members at a session. It gives us more life members to have a smaller fee, and it helps us to distribute our reports. One of the perquisites of life membership is that they receive a set of the back volumes, and you can get out from four to six hundred back volumes into the hands of individuals. During the last year when the fee has been $100 we have not received a single fee. We have lost money I think by having the fee so large and we have failed to get out our reports. While I would not favor the old fee of $25, it seems to me the fee that was mentioned is too large, and I would move an amendment to this article that the fee be $50 instead of $100.

PROF. E. R. LAKE (Secretary): We have two or three life memberships, but the fees have not been turned in because of the unsettled state of affairs.

(Mr. Close's motion, as amended by Prof. Taft, carried.)

**Article VII. Officers and Executive Committee**

The officers of this organization shall consist of a President, first and second Vice-Presidents, one of which shall be from Canada; Secretary-Treasurer and Executive Committee consisting of the President, first and second Vice-Presidents, and seven additional members, six of whom shall constitute a quorum.

The foregoing officers shall be elected by ballot at the regular annual meeting, and shall hold office one year thereafter and until their respective successors are elected.

The Executive Committee shall have full charge of the ad interim business of the organization.

It shall make full and complete reports of its ad interim action together with such suggestions and recommendations as it deems for the best interests of the Society to the Society in session.

The Secretary-Treasurer shall be ex officio Secretary of the Executive Committee.

MR. CRANEFIELD: This is the vital part of the whole revision. The old constitution provided for a Council, cumbersome and clumsy, consisting of the State Vice Presidents. We would not get business done in a thousand years with the old constitution — nothing worth while for the good of the Society. It has been the aim of the conference and the committee appointed by it to put this in a short, business-like way. Whether we have failed or not rests with you. It is the combined thought of the Executive Committee and all others who have been invited during the year to help us, and we believe it to be the best for the interests of the Society. I move the adoption of Article VII as read.

(Motion seconded by C. P. Close, and carried.)

MR. CRANEFIELD: The first article of the By-Laws seemed to need revision, and like Article VII of the Constitution we revised it considerably. It now reads as follows:

**By-Laws**

1. The President shall preside at all meetings of the Society; he shall exercise a general supervision and control of the business and affairs of the Society, and appoint all committees unless otherwise directed.

L. C. STARK: Does the appointive power of the president include the Executive Committee?

MR. CRANEFIELD: No, they must be elected.

C. P. CLOSE: I move the adoption of Article 1 of the By-Laws.

(Motion seconded and carried.)

2. In case of death, sickness or inability of the President, his official duties shall devolve on the Vice-President.

3. The Secretary-Treasurer shall receive all moneys belonging to the Society and pay over the same on written orders of the President. He shall, with the assistance of a reporter appointed by him, keep a record of the transactions of the Society for publication.

PROF. E. R. LAKE: I want to ask a question. Contemplating that this will be a big business organization, is it not good business practice that the Treasurer should be under bond, when he will handle thousands of dollars a year? Would the man not want to protect himself?

L. C. STARK: That could be handled by the Executive Committee.

E. N. REEVES: I do not want to see that passed without provision for that bond.

MR. CRANEFIELD: Do you not have confidence in your Executive Committee?

E. N. REEVES: Every confidence in the world, but the Society should furnish the proper bond for him as a business proposition. Every corporation looks after furnishing bonds for their officers and it is proper to take this precaution. I move that this article 3 be amended that he shall furnish such bond as required by the Executive Committee.

(Motion seconded by Prof. Lake and carried.)

4. There shall be a Finance Committee of three members appointed by the President at each annual meeting.

C. P. CLOSE: You have the words "Finance" Committee. Usually that word is "Auditing" committee, is it not. It is usually their duty to audit the books. I think that would make it clearer if it were Auditing Committee.

(Change accepted.)

MR. CRANEFIELD: We have combined some of the articles and made a smaller number, but there is very little change in the balance. I therefore move that the rest of the By-Laws be adopted as printed.

(Motion seconded and carried.)

MR. CRANEFIELD: I will now offer a new By-Law which does not appear on the printed page, to take care of the Collegiate membership.

"There is hereby established a membership in this Society known as the Collegiate membership, which shall be open to students in Pomology in any agricultural school, college or university."

I move the adoption of this By-Law.

(Motion seconded and carried.)

MR. CRANEFIELD: I move the adoption of the Constitution and By-Laws as read, as a whole.

(Motion seconded and carried.)

THE CHAIRMAN: The next thing is to refer this report to the Nominating Committee. We will adjourn for a few minutes.

PROF. E. R. LAKE: I will read the names of the State Vice Presidents.

MR. CRANEFIELD: I take the stand that this is out of order. We are acting under the revised Constitution which takes no cognizance of State Vice Presidents.

THE CHAIRMAN: The understanding was that the part of this report from yesterday afternoon referring to officers should be referred to the Nominating Committee of the American Pomological Society as it stood for this year.

MR. CRANEFIELD: If that is the way it was understood, I withdraw my point of order.

RECESS.

(Following the recess the Secretary read the report of the Nominating Committee.)

PROF. E. R. LAKE: The Nominating Committee ask me to make the following report.

"The Nominating Committee begs leave to report as follows:
*President* — L. H. Bailey, New York
*Vice-President* (Canada) — W. T. Macoun, Ottawa
*Vice-President* (United States) — *C. J. Tyson, Pennsylvania*
*Secretary-Treasurer* — R. B. Cruickshank, Ohio

*Executive Committee:* —

H. H. Hardie, Michigan; Paul Stark, Missouri; G. M. Minnich, Ohio; J. L. Dumas, Washington; C. A. Bingham, Ohio; Frederic Cranefield, Wisconsin; A. J. Evans, Georgia."

PROF. LAKE: In addition they directed the Secretary to draft resolutions covering our condolences to Prof. Cruickshank; our thanks to the Ohio State University and the students for their excellent entertainment; to Prof. Paddock for his great service to the convention, and to anyone else who might be suggested.

T. H. MCHATTON: I move the adoption of this report; that the rules be suspended and the Secretary instructed to cast the vote of the Society for the officers nominated by the Committee.

(Motion seconded and carried, the ballot cast and the above officers declared elected.)

PROF. LAKE: I will also read the resolutions prepared by the Committee:

1. That this Society prepare rules and regulations as uniform as may be possible for the conduct of fruit shows and undertake to secure general adoption of the same by fair boards or governing bodies.

2. That this Society issue for the guidance of intending planters a statement for general publication on the condition of commercial fruit growing in the United States and Canada.

3. That a special committee of the American Pomological Society be appointed to encourage the holding of students' judging competition by or under the auspices of State, Provincial or district horticultural or fruit-growing societies, and to arrange to bring the winning teams in such competitions together in the American Pomological Society contests.

4. That the American Pomological Society at its future conventions offer prizes in plate apples open to all States and Provinces. It is suggested that ribbons be used for prizes and the list of varieties be limited to those of general importance.

5. That a standing committee be appointed on rules and regulations for student judging competitions. Names suggested are:

R. W. Rees, Ithaca, N. Y., Chairman.
B. D. Drain, Massachusetts.
F. M. Harrington, Iowa.
J. W. Crow, Ontario.
F. G. Charles, Ohio.

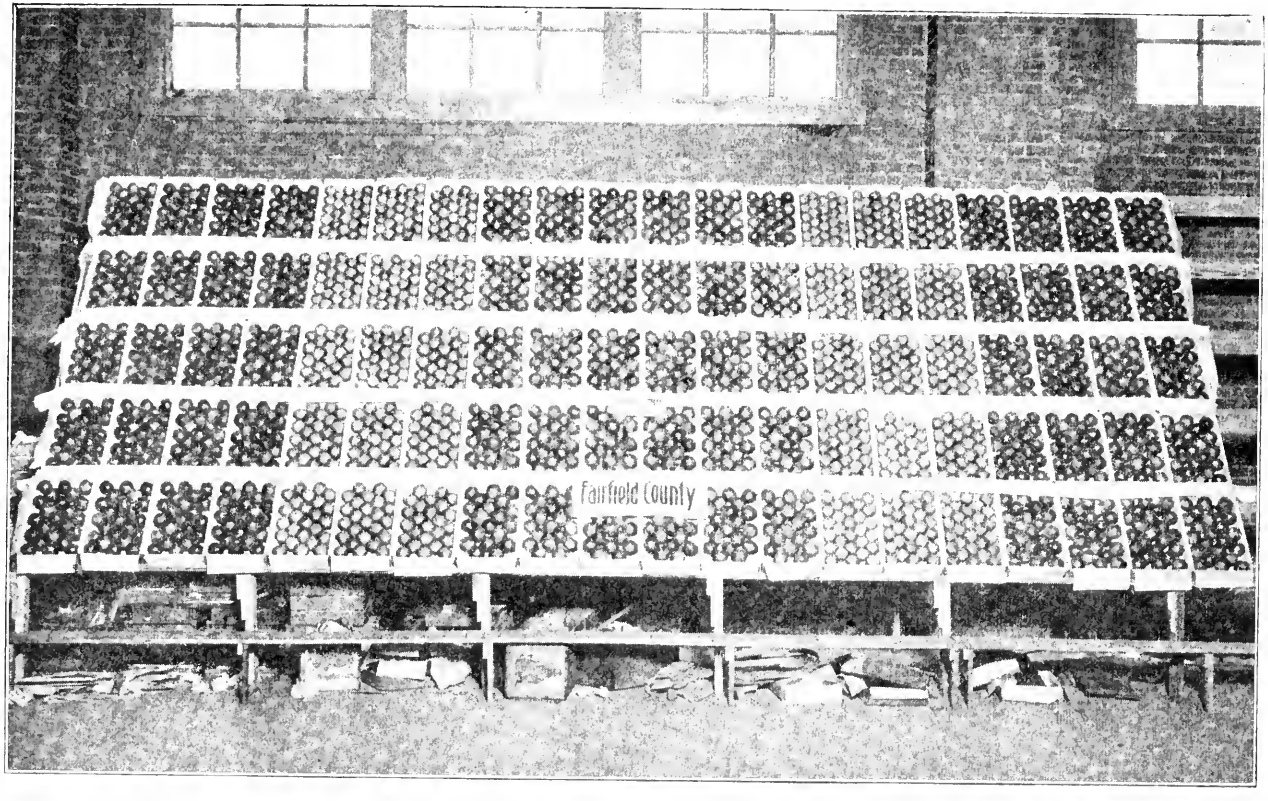
(It was moved, seconded and carried that the above resolutions be adopted.)

PROF. LAKE: I have a sixth resolution to offer.

6. That the Society take steps to institute careful inquiry into the cost of production of apples.

I move that this be referred to the Executive Committee.

(Motion seconded and carried.)




First Prize, One Hundred Tray Display, Exhibited by John C. Hoffman.

## SECRETARY'S REPORT

Extended and repeated absences from Washington during the last two years have so seriously disturbed systematic secretarial effort that we find it impossible at this time to present anything more than a sketchy report of the activities of this office during that period.

For the first time in a decade or more the executive committee has held three quarterly meetings, all at Columbus, March 23, June 30, and October 13. At each of these a quorum was present and with Dr. Bailey presiding. The secretary was absent from the October session, Mr. Cruickshank acting.

At these meetings the reports from various sub-committees were discussed, revised, amended and outlines extended for future service until it is safe to say nearly every phase of our work was covered, though the chief part of the consideration was given to ways and means, looking to the inauguration of the plans and policies outlined at St. Louis, 1919.

Perhaps I can do no better at this time than quote from a letter recently received from Dr. Bailey referring to the October meeting. "We had a first-rate good meeting and satisfied ourselves that things are going." There is a volume in that sentence. At least it conveys to those of us who have had the pleasure of laboring with Dr. Bailey in this effort to reinvigorate the Society, the knowledge that he finally feels, after months of correspondence, days of conference, and endless periods of thought on his part, that we are again on the upgrade.

And now it is for us of the rank and file to push the movement forward with a spirit akin to this Ohio spirit that surrounds us so happily at this time.

I need not tell you that the correspondence of the office is growing apace. The calls for help, sample copies of our publications, and other service is so insistent that nothing less than some regular help will keep us in the good graces of the fruit growers. Fortunately there appears to be at best a temporary solution of part of the problem, of which you will learn through the report of one of the standing committees of the Society, a little later.

Among the matters especially turned over to the Secretary was the problem of determining if it were practicable to issue bonds in the name of the Society; herewith is the attorney's report.

In explanation of this action I may say, the executive committee thought that this course might permit of getting quickest action in the effort to put the St. Louis legislation into force.

In connection with the above matter the secretary was requested to "feel out" certain individuals who from time to time in the past had expressed a desire to see the Society go forward along some of the lines indicated by the Pickett committee. The correspondence along this line covered some weeks in the early part of this year and brought out the fact that there were a number of persons ready to subscribe liberally toward a forward movement if substantially organized, and at that point, because of absence in the field, the work was left and there has been no opportunity to pick it up since.

The appointment, in July, by Dr. Bailey, of two keen young state society secretaries, to serve as Assistant Secretaries for A. P. S. was the one thing that saved this office from entire collapse. Mr. Cruickshank of Ohio has carried all the responsibility and has done most of the work covering the local arrangements, printing the program, selecting and preparing the meeting place, getting out announcements, arranging the schedules and advertising the event. Mr. Shaw of Maryland has had full charge of the subject of affiliation of state, provincial and district societies. He has made a strong appeal to organizations and workers for cooperative effort and I am sure we will see results from his work later, as we now see it, from that of Mr. Cruickshank.

To these young men we are indebted for much of the success of this, the program feature of the meeting, while to Professor Paddock, Mr. Charles and their coworkers and the juniors we should accord all credit for the successful judging contest and "the junior evening."

Another special topic assigned the secretary this year was the assembling of material for the "Annual", which has proved to be something of a task in itself. As you probably all know Dr. Bailey has proposed the publication of an annual, somewhat after the lines of the Annals of Horticulture, published by him in the

later eighties and early nineties. In view of the fact that the St. Louis meeting was simply a conference of leading workers in horticulture and chiefly state station men it was thought quite proper to put the first annual out in the place of the regular proceedings. Outside of the reports of the committee on Nomenclature, new fruits, and the new one on plans and policies, there was nothing for a report save informal discussions pertaining to the reorganization of the Society, of these no record was kept.

As now planned, and developed as far as the material has been collected the annual ought to be out this winter and will cover a field something after this scheme.

**The Pomological Annual**

Part I should be the regular annual report.

Part II should be a compilation of the secretary's office, comprising such things as,

Summaries or outlines of new books and bulletins.
List of pomological societies of the world.
Descriptions of new fruits (new introductions) of the world.
Pomological statistics of the world.
New insects and diseases, etc.
New inventions.
Progress in marketing, storing, etc., by-products.
Digest of legislation.
Necrology.
Exhibitions.
Tools and conveniences.
New personalities in the field.
A collection of snappy and pertinent paragraphs and remarks.
Articles now and then on fruit-growing in the different countries.
In general, *keep tab on progress in pomology.*

The editor welcomes suggestions as to any other items that ought to be included in a volume of this character. A feature of the first volume will be colored plates of the two latest Wilder medal fruits — Golden Delicious apple, Temple Orange.

And now, merely incidentally, permit me to refresh your mind on one or two old topics and a new one for a change. Legislate at an early date upon the subject of registration, verification, and publication of the names and descriptions of new varieties of fruits of American origin, as to time, place, manner and fees.

Establish a *full set of regulations* covering the subject of awarding the Wilder and other medals and the issuing of other awards and give consideration to the question of increasing the number or grades of medals.

Take some steps to authorize the acceptance of memorial endowments in behalf of the Junior work, and provide regulations for disbursing the proceeds. Determine upon a policy to be pursued in the procurement of a series of state awards, medals, purses and other premiums for the interstate or international judging counts, via the state societies.

Institute a practicable place for commemorating the names of departed pomological workers, both state and national; and helping in the work of establishing memorial monuments at the points of origin of meritorious new varieties.

Authorize some committee, then require it to complete the work (begun some years ago) to report upon a set of suitable designs for an official seal, button or buttons, pennant, monogram, and on society colors. Hereafter this last will be an attraction feature of our regalia and almost an essential with the junior, and besides, some of the seniors are not yet beyond the influence of such addenda.

Beyond this I may scarcely "report" more than to say farewell: To the hundreds of workers included in our membership during the past ten years, I owe a debt of gratitude that can never be cancelled. But for their generous suggestions, help and support it would have been impossible to perform the duties or render the service required of the official positions occupied during that period. The many letters of cordial well wishes received during the years as secretary have been the real incentive to service. For the warm friendship formed during this

period I shall ever feel grateful, and if in return the Secretary's office has done aught to have earned all these words of appreciation, the lion's share of credit must be accorded to those who have so willingly responded to the call "for copy" at all times.

Sincerely,

E. R. LAKE.

THE CHAIRMAN: We have nothing else to bring before this body and I therefore declare the Thirty-seventh Annual Session adjourned.

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EAST LANSING, MICH., November 30, 1920.

L. R. TAFT, *Treasurer,*

IN ACCOUNT WITH THE AMERICAN POMOLOGICAL SOCIETY.

| 1920. | | | |
|---|---|---|---|
| January 1. | To Cash on Hand | $898 23 | |
| November 30. | To Cash, 298 Annual Memberships | 596 00 | |
| " " | To Cash, 2 State Memberships | 20 00 | |
| " " | To Cash, 15 Junior Memberships | 7 50 | |
| " " | To Cash, 3 Reports sold @ 1.00 | 3 00 | |
| " " | To Cash, Interest on Bonds | 200 00 | |
| " " | To Cash, Interest Life Membership Fund | 24 93 | |
| February 10. | By Cash, E. R. Lake, Expense | | $211 03 |
| March 3. | By Cash, Simons Bros. Co., Medals | | 13 90 |
| April 5. | By Cash, R. H. Darby Co., Stationery | | 13 25 |
| May 15. | By Cash, Democrat Printing Co., Bulletins | | 69 30 |
| May 15. | By Cash, General Paper & Supply Co., Envelopes | | 22 05 |
| June 22. | By Cash, Herald Publishing Co., Envelopes | | 7 75 |
| July 15. | By Cash, Tracy & Kilgore, Bulletins | | 75 00 |
| Aug. 5. | By Cash, R. H. Darby Ptg. Co., Stationery | | 23 85 |
| Sept. 9. | By Cash, Tracy & Kilgore, Bulletin | | 50 00 |
| Oct. 4. | By Cash, Lawrence & Van Buren Ptg. Co., Stationery | | 56 72 |
| Oct. 4 | By Cash, F. J. Heer Ptg. Co., Envelopes | | 8 25 |
| Oct. 22. | By Cash, E. R. Lake, Salary and Expense | | 138 95 |
| Oct. 22. | By Cash, Tracy & Kilgore, Bulletin | | 55 00 |
| Nov. 2. | By Cash, Tracy & Kilgore, Bulletin | | 55 00 |
| Nov. 8. | By Cash, Michigan Education Co., Stationery | | 11 50 |
| Nov. 29 | By Cash, L. R. Taft, Expense | | 19 54 |
| | | $1,759 66 | $830 59 |
| | By Cash on Hand | | 929 07 |
| | | $1,759 66 | $1,759 66 |

Respectfully submitted,

L. R. TAFT, *Treasurer.*

EAST LANSING, MICH., February 28, 1921.

L. R. TAFT, *Treasurer,*

IN ACCOUNT WITH THE AMERICAN POMOLOGICAL SOCIETY.

| 1920 | | *Dr.* | *Cr.* |
|---|---|---|---|
| Dec. 1. | To Cash on Hand | $929 07 | |
| 1921 | | | |
| Feb. 28. | To one Life Membership | 50 00 | |
| " " | To one State Membership | 10 00 | |
| " " | To 58 Memberships @ $2.00 | 116 00 | |
| " " | To one volume sold | 1 50 | |

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|---|---|---|---|---|
| 1920 | | | | |
| Dec. 15. | Michigan Education Co., Receipt blanks | ..... | | $10 70 |
| " " | Vesta C. White, Stenographer | ..... | | 10 00 |
| " 27. | E. R. Lake, Salary to Dec. 4 | ..... | | 32 00 |
| " " | E. R. Lake, Expenses at Committee Meetings | ..... | | 59 29 |
| " " | E. R. Lake, Expenses at Annual Meeting | ..... | | 100 00 |
| " " | E. R. Lake, Postage, Telegrams, etc | ..... | | 27 67 |
| 1921 | | | | |
| Jan. 4. | F. J. Heer Ptg. Co., Printing | ..... | | 35 50 |
| " " | R. B. Powers, Badges | ..... | | 38 00 |
| Feb. 10. | Tracy & Kilgore, Printing Bulletins | ..... | | 164 50 |
| " " | Miss Emma Meinhard, Stenographer | ..... | | 20 00 |
| | | | $1,106 57 | $497 66 |
| | Cash on hand to balance | ..... | | 608 91 |
| | | | $1,106 57 | $1,106 57 |

Respectfully submitted,

L. R. TAFT, *Treasurer.*

The treasurer's books show a balance of $730.00 credited to the life membership fund, and that the receipts from the Wilder medal fund have exceeded the outlay for medals by the sum of $499.20, but as the current funds were not sufficient to pay the bills it has been necessary to draw on these funds.

Accounts audited and found correct by auditing committee of the Executive Committee.

## STUDENTS' JUDGING CONTEST

### Records of Teams

| | | | |
|---|---|---|---|
| 1. | Ohio State University | 9443⅓ | points |
| 2. | Cornell University | 9270 | " |
| 3. | Massachusetts Agricultural College | 9133⅓ | " |
| 4. | Iowa State College | 8876⅔ | " |
| 5. | Ontario Agricultural College | 8813⅓ | " |

### Records of Individuals

| | | *Identification* | *Placing* | *Total* |
|---|---|---|---|---|
| 1. | A. L. Laisy (Ohio) | 1733⅓ | 1550 | 3283⅓ |
| 2. | H. L. Geer (Mass.) | 1766⅔ | 1400 | 3176⅔ |
| 3. | P. A. Niles (Iowa) | 1733⅓ | 1410 | 3143⅓ |
| 4. | H. Howlett (Cornell) | 1733⅓ | 1400 | 3133⅓ |
| 5. | J. R. Almey (Ontario) | 1700 | 1430 | 3130 |
| 6. | H. T. Scott (Ohio) | 1766⅔ | 1350 | 3116⅔ |
| 7. | E. A. Prentiss (Cornell) | 1700 | 1410 | 3110 |
| 8. | R. C. Peck (Mass.) | 1766⅔ | 1290 | 3056⅔ |
| 9. | H. M. Wells (Ohio) | 1733⅓ | 1310 | 3043⅓ |
| 10. | L. S. Phelps (Cornell) | 1666⅔ | 1360 | 3026⅔ |
| 11. | C. H. Mallon (Mass.) | 1633⅓ | 1270 | 2903⅓ |
| 12. | H. W. Peterson (Iowa) | 1700 | 1200 | 2900 |
| 13. | J. A. MacAdam (Ontario) | 1733⅓ | 1160 | 2893⅓ |
| 14. | H. A. Hahn (Iowa) | 1733⅓ | 1100 | 2833⅓ |
| 15. | G. L. Jarvis (Ontario) | 1500 | 1290 | 2790 |

## EXHIBITS

In conjunction with the Ohio Apple Show which was of large proportions and well staged, there were American Pomological Society exhibits from Canada and from many states in the Union. The whole thing occupied a room 200 feet by 100 feet.

# FIRST
# POMOLOGICAL ANNUAL
# 1920

(119)

## WILDER MEDAL AWARDS

**37th Meeting, Columbus, Ohio**

### Wilder Silver Medal

Central Experiment Farm, Ottawa, Canada, for collection of new and promising winter apples.

### Wilder Bronze Medals

New York Experiment station, Geneva, for exhibit of old and new varieties.

Miss Elizabeth C. White, New Lisbon, New Jersey, for exhibit of blueberries.

Ohio Agricultural Experiment Station, for general collection of fruits.

New England Fruit Show, for display of the best fifty Baldwin apples.

Experimental Station, Kentville, Nova Scotia, for collection of English and American apples.

Wisconsin Horticultural Society, for plate display of State grown varieties of apples.

### Award of Merit

Albany Pecan Growers Exchange, Georgia, for collection of commercial varieties of Pecans.

San Jose Apricot and Prune Growers Association for display of evaporated prunes and apricots in commercial packages.

Wenatchee Valley Fruit Growers Association, Washington, for choice plate display of commercial apples.

California State Board of Agriculture, for display of bottled fruit juice.

California Walnut Growers Association, for fine display of Persian English Walnuts.

C. Forkert, Mississippi, for display of three new cross-bred varieties of Pecans.

Mrs. Banning, Alabama, for display of Alabama commercial varieties of Pecans.

Mr. E. H. Riehl, Godfrey, Illinois, for display of chestnuts.

Mr. C. S. Ketcham, Middlefield, Ohio, for display of nuts and fruits.

Mr. Herbert C. White, Putney, Georgia.

Iowa Agricultural Experiment Station (Professor S. A. Beach), for display of seedling apples.

Ohio Agricultural Experiment Station, for grape juice exhibit.

Dr. S. B. Guerrant, Calloway, Virginia, for exhibit of apples.

Stark Brothers Nurseries and Orchards Co., Louisiana, Mo., for exhibit of Delicious apples.

Mr. H. H. Hume, Glenn St. Mary, Florida, for exhibit of Citrus Fruits.

Fruit Branch, Department of Agriculture, Toronto, Canada, for fine commercial exhibit of apples.

## WILDER MEDALS

### Golden Delicious Apple

Awarded St. Louis meeting, 1919.

Season, winter; Form, roundish-oblong-conic; above medium in size; cavity regular, size medium, deep, slope abrupt, marked with little red; Stem, length medium, slender except thickened at spur-end, fuzzy; Basin regular, rather narrow, moderately deep with abrupt slope, furrowed; Apex, usually five knobbed; Calyx large, lobes long, reflexed, fuzzy, light colored; Eye broad, funnel form; Surface smooth, except slight ridges which are often prominent at apex; Color, pale rich

yellow with very thin bronze blush on sunny side; Dots, many, small or large, but prominent, raised or sunken, russet or red, some beneath skin; Skin, thin; tough; Flesh, color rich yellow, texture crisp juicy; Core, round, small, open; Calyx tube short, broad, funnel form; Stamens medium; Seeds obovate, plump, small to medium, dark brown; Flavor mild sub-acid, rich pleasant, nearly sweet; Quality very good. Much like Grimes Golden but a later keeper. — C. P. C. — 1920.

According to reports received from various states, the tree is hardy, very vigorous and begins bearing the second and third years after planting. Four year old grafts at Louisiana, Mo., produced in 1920, large crops of fruit, a portion of which was developed from lateral bud on twigs grown in 1919. In the nursery the tree has proven to be as vigorous a grower as Delicious.

C. P. Close,
W. J. Green.
Attest: E. R. Lake. W. Paddock,

### Temple Orange

Awarded Columbus meeting, 1920.

Form, oblate slightly roundish; Size, medium large; Attachment, moderately firm; Basal markings, slight depression, wrinkled; Apex, flat tip in very small saucer shaped depression; Surface,much pitted, somewhat irregular; Color, rich orange red; Oil cells, many, medium size; Weight, heavy for its size; Peel, easily separated or peeled, very thin, 1/8 inch, rather tender texture with very little white portion; flavor, rich, pleasant aromatic, not strong; Segments, 12, quite regular; Flesh, light yellow, translucent, tender; cells, medium in size, irregular; Tissue, envelope thin; core, very small, tender; Juice, colorless, very abundant; Flavor, acidity, sweet rich; sweetness very sweet, slight strawberry flavor; quality, very best; Seeds, irregular, long or thick, medium in size, white, about 24 in number.—C. P. C. 1921.

This tree is evidently a seedling and was no doubt planted in grove form at the time of the freeze of 1894-5. It is located in the grove now belonging to Mr. L. A. Hakes at Winter Park. The tree is approximately the same size as the surrounding trees and shows no different characteristics except the leaf has more the appearance of a tangerine than a round orange. Up to recent years the fruit was sold to commission men on the tree, and this tree, with the rest of the grove was harvested prior to December to avoid the possibility of damage by cold and no particular note was taken of the tree as it was passed as a type of tangerine.

About eight years ago the late Wm. Chase Temple, who resided in that vicinity, had his attention called to this tree and immediately he called our attention to it. The fruit was different in appearance but of course green. This was during the fall. We persuaded the owner to permit the fruit to remain on the tree until it was ripe and it developed this wonderful orange which ripened along about the same time as the Valencia. We watched it the next year with the same result. We then began to reproduce it and found that it reproduced identical to the parent tree in every way. — C. P. Close.

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## A POMOLOGY ARBORETUM

**Prof. N. E. Hansen, South Dakota Experiment Station, Brookings, South Dakota**

In looking through Downing's "Fruits and Fruit Trees of America," one is impressed by the thousands of varieties which it would be impossible to find now. Commercial apple culture tends more and more to standardize upon a few varieties, especially those that will stand long distance transportation. The tender-fleshed varieties of the highest quality are discriminated against in favor of apples of solid texture. Firmness rather than quality is now the first essential. But it is barely possible that the future development of apple culture will revert in part to

the old orchard of many varieties, such as is the distinguishing feature of Pomology in Europe. Some of the older amateurs of England and the continent may raise one or two hundred varieties of apples or dwarf trees in a miniature orchard. This fashion may never come to America. But that is no reason why we should lose most of the wonderful fruits of Downing's time, which are the survivors of many millions of seedlings during the past three centuries in our eastern states.

Variation in the apple goes out in all directions like the spokes of a wheel. It seems to be unwise to cut off any of these rays or lines of variation. To avoid irretrievable loss we should gather together into one or more Arboretums two or more trees of each seedling of any promise whatever. We should not destroy all these "Blood lines" as we do not yet know much about apple genetics. Some of these seedlings may never appear again when once destroyed and they may have valuable characters essential to the evolution of the future ideal apple for America.

Only one Shakespeare was born in the history of the human race. So with the apple, an apple with a certain combination of unit characters may appear only once in the evolution of the apple. Hence, I favor the establishment of an Apple Arboretum.

Perhaps the largest collection of varieties of the apple in America at present is that of Benjamin Buckman of Farmingdale, Ill., who has over 1600 varieties. The New York Experiment Station at Geneva has tested over 1000 varieties. Very near to this comes the Experiment Station at Ottawa, Canada. There may be larger collections but I do not know of them. I trust some benevolent millionaire will some time provide a fund for this purpose, with the American Pomological Society as custodian of all the good apple seedlings of America and other countries of the world. By all means let all the "freaks", such as "Coreless and Seedless" apples, be included. Some future apple-breeder may be able to utilize them.

Other fruits in addition to the apple should be represented, including the remarkable native seedling fruits that are sometimes found growing wild. But the apple as the King Fruit of the north temperate zone should be the main endeavor. In time the collection of all fruits should be as complete as possible. To sum up the whole matter, this Arboretum should be to Pomology what the Arnold Arboretum is to Arboriculture.

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## THE HORTICULTURAL TREND IN THE NORTHWEST

**C. I. Lewis, Organization Manager, Oregon Growers Cooperative Association**

The Pacific Northwest is passing through an epoch of heavy planting. This is especially true of the districts west of the Cascade range. Prune trees for the past three years, have been planted as fast as the nurseries could turn them out. A very large acreage is also being planted to Loganberries, gooseberries and strawberries; there are single strawberry plantings in the Salem district this year of 600 acres. The Loganberry acreage bids fair to reach within a three year period, from 15,000 to 20,000 acres, judging by the present plantings. Nuts such as walnut and filbert are being planted extensively and there is renewed interest in cherries and pears. In the southern part of Oregon, some interest is being taken in apricots.

This great diversity in planting has been brought about to a certain extent by a phenomenal development in the horticultural products business. A few years ago, we had two or three canneries in Oregon. We now have over 50 in the state. In the Salem district alone, there are three canneries, the largest jam and jell plant west of the Mississippi River, two Loganberry juice factories, three vinegar works, several barrelled shipping plants for the handling of frozen fruits, and three large prune packing plants.

## Marketing

In Oregon the greatest development in marketing during the past year was the organization of the Oregon Growers Cooperative Association, a body which sells and packs fruit for its members at cost. In one year's time this body has secured 27,000 acres and 1400 members, and are doing a business ranging from $5,000,000 to $8,000,000. Fresh fruit packing plants, prune processing plants, canneries and similar plants are being established in various parts of the state. Up to the present time, nearly $300,000 has been invested in such plants. The Association is handling fruits of all classes, such as apples, pears, prunes, berries, cherries, and nuts. This means that together with the big association in Hood River and smaller associations at the Dalles, Mosier and other points of eastern Oregon, that the great bulk of Oregon products will be handled through cooperative bodies. Brand names are being established and national advertising will be undertaken. It is felt by those well informed that this step is the most constructive which has been taken in the state of Oregon in the past twenty years.

## Some Growing Problems

The war brought on a revolution in spraying in Oregon. The tendency is to get away from the two or three horse power spray rig to one of 10 or 12 H. P. In this way two large guns can be used and the amount of work done per horse and man is greatly increased. In addition to this, the introduction of spreaders such as casein ate, soap bark and crude oil, are becoming quite generally used. The introduction of these spreaders seems to indicate that within a short time we can very materially reduce the strength of some of our spray solutions, especially the arsenate.

With the high prices which growers have been receiving for their products the past three years, there is renewed interest in the feeding of trees. Fertilizers and manures will be used as never before. Nitrogen in some form or another is the element which the growers are adding to their soils and which in nearly every case, is producing big returns. Stock yard manures and dried sheep manure are being purchased by the trainload. In the spring, liberal applications of nitrate of soda, or sulfate ammonia, are generally giving growers good results. In the irrigated districts there has been some evolution in the handling of the shade crops such as alfalfa. Frequent discing during the season is found to give a better distribution of water, to add more organic matter to the soil, to give less run off, and to generally result in the upbuilding of the trees. The orchardists have generally passed that period where they must cut much of the alfalfa or similar crops for hay, and only small amounts are now being used. One factor which has contributed to this has been a sort of poisoning which has killed quite a large number of horses as the result of eating hay which has been sprayed.

## Functional Troubles

The Northwest passed through the hardest winter in its history, and there has consequently been some tree damage. This is leading in a few places to functional troubles which come as a result of devitalization of the trees. Good tillage and proper feeding will restore most of such trees. The same weakness of the trees has contributed to the spread of some diseases. Apple tree anthracnose has worked more rapidly and seriously than is common. In addition to the fall spraying of Bordeaux, many growers are now shaving off the new wounds and painting them with Bordeaux paste. Fire blight in some parts of the Northwest broke out more virulently than usual but has been well controlled. A new disinfectant has been worked out by Director F. C. Reimer, of the Southern Oregon Experiment Station: 1 gram of cyanide of mercury, and 1 gram of bichloride of mercury to every 500 C. C. of water. This gives a disinfectant which will control blight germs on both instruments and wounds.

The scarcity of help and its high price, has driven the fruit grower in the West more and more to the use of machinery. Tractors are being more generally used than formerly. Even orchards as small as ten acres in extent are putting in small tractors. Many growers are purchasing trucks. Associations are putting in large trucks, individual growers, small trucks. Growers are also quite generally introducing mechanical sizing machines and carriers to facilitate and cheapen the handling of the packed fruit.

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## POMOLOGY IN AUSTRALIA

**J. R. Warren, Territorial Vice President, Camberwell, Victoria, Australia**

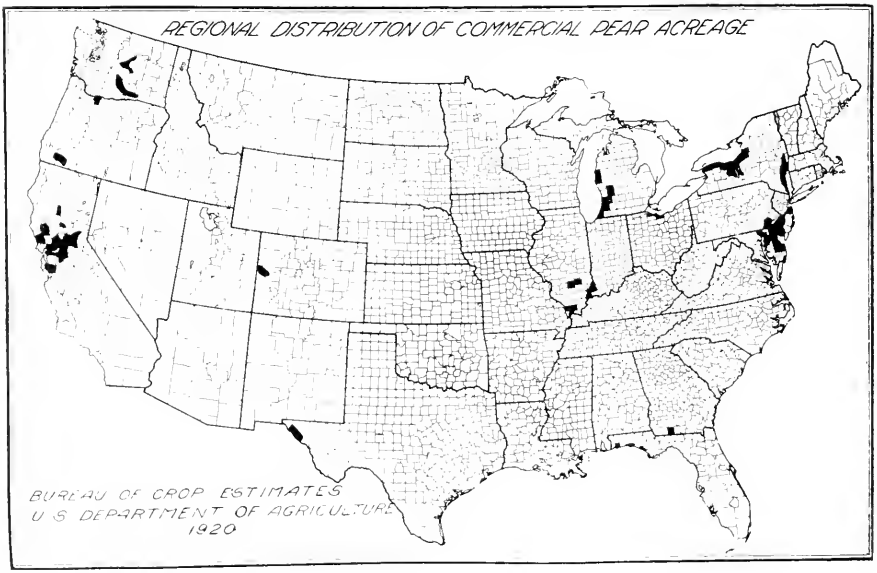
There are in the Commonwealth of Australia numerous Horticultural, Floricultural, Rose, Carnation, Dahlia and other kindred Societies. The nearest approach to a pomological society is the Pomological Committee of Australia, the result of a very important Conference of delegates representing the various States of Australia, held in the City of Brisbane, Queensland (the land of golden promise), in May, 1914, and presided over by Mr. James Lang, J. P. of "Langsdale", Harcourt, Victoria. Mr. E. E. Pescott, Principal of the School of Horticulture, Burnley, Victoria, was appointed Secretary. The effect of the Brisbane Conference places the Pomological Committee under the auspices and control of two representatives from each of the several states in the Commonwealth. The results of the Committee's work is that Pomology has assumed a more definite and scientific character and its field of research work is carried on with greater efficiency and a firmer basis than under the former disconnected system of separate state management as in force prior to the Brisbane meeting in 1914.

The Committee recognized that the nomenclature of fruit grown in Australia was considerably confusing and misleading owing to the various synonyms given to fruit, especially apples and pears grown under different names in the several states of Australia. They undertook the important work of standardizing of fruit names and the elimination of unsuitable varieties with the result that after the collection of much valuable information and data they succeeded in issuing a very interesting and valuable official and authenticated descriptive and classified catalogue of each type and class of fruit and their suitability to the climate and soil conditions of Australia for export to over-sea markets.

A variety of other subjects more or less important and interesting have engaged the attention of the Committee with the result that their researches and investigations have contributed much towards giving Pomology in Australia a very notable and valuable impetus. The Committee regard the coming movable Conference to be held in May next as the most important in the history of the Society and its future one of great resourcefulness and added activity. The Committee is fortunate in still having Mr. E. E. Pescott as its energetic Secretary.

The Rose (Queen of Flowers) is most extensively grown in Australia; the Chrysanthemum, Dahlia, Carnation, and Daffodil have in the past claimed a large number of admirers and occupied next to the Rose the attention of nurserymen and the general public. The Gladiolus is now just coming to the fore. Several of the leading nurserymen have of recent years specialized and hybridized the Gladioli to such a high degree as to produce flowers that will compare most favorably with those grown in any other part of the world.

The Commonwealth of Australia is now spending about £400 a year in fighting tropical diseases and already remarkable results have been achieved against such diseases as filaria and hookworm. These results have been made possible largely through the cooperation of the Rockefeller Institute of the United States. Dr. Heier and Dr. Sawyer, representatives of the Institute, lately visited Australia, seeking further cooperation of the Government in the campaign for the eradication of tropical and other diseases. They met with a favorable reception from the Prime Minister, Mr. Hughes, and their proposals the cordial endorsement of the Government.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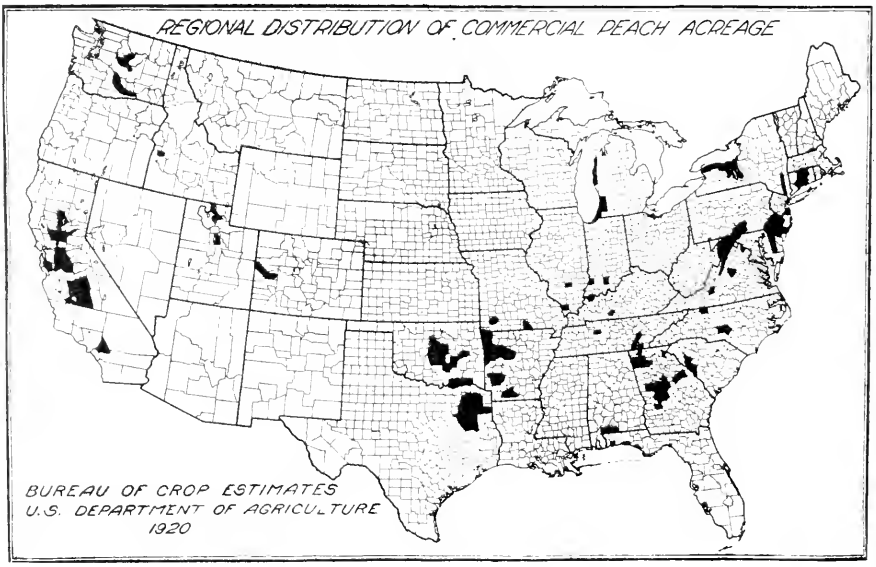
BUREAU OF CROP ESTIMATES
U.S. DEPARTMENT OF AGRICULTURE
1920


REGIONAL DISTRIBUTION OF COMMERCIAL PEACH ACREAGE
BUREAU OF CROP ESTIMATES
U.S. DEPARTMENT OF AGRICULTURE
1920

# REPORT OF COMMITTEE ON NEW FRUITS

By C. P. Close, Chairman

This report is rather lengthy because a report of this committee has not been printed for several years and a special effort was made at this time to complete the lists of varieties up to date. Generally the names and descriptions are given as they appeared in print or in correspondence, but a good many cases of duplication or wrong use of names have been corrected. Many of the names as given do not conform to the code of the Society and should be corrected later. Much of this information was obtained from nursery catalogs and in such event the name of the nursery firm is given. This report is largely a compilation of data from various sources and is supposed to be correct. However, there has been no opportunity to check up on descriptions and the committee does not assume any responsibility on their correctness.

The special object in mind in making this report so voluminous is to make the lists of the different fruits complete as explained below. Some of the varieties included are not strictly new in point of time since they were first introduced, but they are new to most people and should be available for ready reference. With peaches, for instance, the names listed do not appear in Hedrick's Peaches of New York. The list here, and those in Hedrick's Peaches of New York should, therefore, contain all of the peach names ever given in American peach literature. With apples, the effort has been to include everything not in Ragan's Nomenclature of the Apple and Beach's Apples of New York. Thus these books and this list should contain all of the varieties ever introduced in this country. With cherries this list supplements Hedrick's Cherries of New York. All of the strawberries are listed except those appearing in the Virginia Station Technical Bulletin No. 11, North American Varieties of the Strawberry, by S. W. Fletcher. Thus the Virginia bulletin and this list should contain all the strawberries ever introduced in the United States. The bush fruit lists include those not in Card's Bush Fruits. The pear list supplements Ragan's Nomenclature of the Pear. The other lists contain as many new varieties as could be located except that with grapes a great many European varieties introduced into California are not included because the information could not be assembled.

The chairman wishes to thank those throughout the country who have so kindly given information included herewith, but especially does he wish to recognize the invaluable aid given by Miss Magdalene R. Newman and Prof. E. R. Lake of the United States Department of Agriculture.

## APPLE

*Aldrich Winesap:* Winfield Nurseries, Winfield, Kansas. Said to be a strain of Winesap.

*Anoka:* Seedling of Mercer wild crab, topgrafted on Oldenburg. Originated by N. E. Hansen, Brookings, S. D., and introduced by him in 1918. Fruit two and one-half inches in diameter, round, color of Oldenburg; flesh white, subacid, good. September.

*Arthur Sheed:* A new English variety. "Russet suffused with golden and red coloring, medium to large in size, of superior quality for cooking or table use. Season October to March (or April to September in Australia). The

tree is a good grower, constant bearer and very heavy cropper." Fruit World, Melbourne, Victoria, Australia, July, 1919.

*Bay State:* Transactions of the Massachusetts Horticultural Society, 1907; Part II. Originated by A. B. Howard, Belchertown, Mass. "This apple comes later than the Gravenstein and fills a season not covered by any other good quality apple. In appearance it is like the Gravenstein but smaller and with larger stripes; the flesh is more crisp and the texture is good."

*Bill Arp:* Newton Nurseries, Newton, Miss. Large, red cheek, mostly covered with deep crimson and white dots; flesh yellow, tender, sweet, best quality. Tree strong, upright. September and October.

*Black Beauty:* Sunny Slope Nursery, Hannibal, Mo. Glossy black red color.

*Black Janet:* Sunny Slope Nursery, Hannibal, Mo. Almost black, close kin to Delicious only darker red, has same habit of growth; fine keeper, rich yellow flesh of fine quality.

*Bonita:* Seedling of Garden Royal, possibly crossed with Williams. Originated by Luther Burbank, Santa Rosa, Calif., in 1900. Tree medium strong, compact, "absolutely free from disease, both fruit and tree", very productive, annual bearer. Fruit small to medium, oblate, very deep crimson with slight russet at stem end; flesh white, exceedingly tender, sweet to subacid, superior quality; core small. September to October 15.

*Brand's Red Apple:* Wealthy x Malinda. Originated by Archie Brand, Faribault, Minn. Farmer Seed and Nursery Company, Faribault, Minn. Has good qualities of both parents. Medium size, conical, bright deep red. Will keep until April.

*British Columbia:* Originated with H. P. Bales, Nicomen, B. C. "Tree vigorous, very hardy, annual and abundant bearer. Fruit large, russet on yellow ground, sometimes striped with red, somewhat irregular, flavor mild, subacid of the highest quality. January to June.

*Caramel:* From mixed seed of choice standard Northern apples. Originated by N. E. Hansen, Brookings, S. D., and introduced by him in 1919. Fruit medium size, two and three-fourths inches in diameter, yellow mostly covered with red stripes, evidently of Fameuse type; flesh snow white, sweet, excellent. Winter.

*Carlow:* Roanoke Nurseries, Roanoke, W. Va. Some specimens would pass for Yellow Newtown in color and shape, even though they are just a little long, others are a little broader than Yellow Newtown with a very deep and russeted cavity. Flesh white tinged yellow, rather coarse and tough, moderately juicy, sweet good quality, not especially promising — too light in color and too tough in flesh. C. P. C.

*Cathey:* Originated with Frank Cathey, Mountain City, Rabun Co., Georgia. Fruit medium to large, irregularly oblate to conical, more or less ribbed, skin thick, tough, green to pale yellow, sometimes russet streaked, waxy, dots areolar, raised, russet to black; cavity medium to very deep, narrow usually dark russeted, furrowed and sometimes lipped; stem medium, sometimes clubbed, pubescent; basin medium to deep, abrupt and much furrowed, calyx medium, closed or partly open, lobes long, stamens medium; core medium size, seeds irregular, plump, medium size; flesh coarse to mealy, not firm, rather dry, subacid, aromatic, quality fairly good.

*Champ Clark:* Sunny Slope Nursery, Hannibal, Mo. Not described.

*Chance:* Seedling from mixed Northern grown varieties. Originated by N. E. Hansen, Brookings, S. D., and introduced by him in 1919. Fruit of full commercial size, oblate, red striped with attractive blue bloom; flesh white, pleasant subacid. Midwinter. The name Chance was used for another apple some years ago.

*Clinton:* Ben Davis x Green Newtown. Originated at the Agricultural Experiment Station, Geneva, N. Y. Introduced about 1911. An attractive midwinter apple of medium size, resembling Green Newtown in shape and quality, but of a handsome red color.

*Cortland:* Ben Davis x McIntosh. Originated at the Agricultural Experiment Station, Geneva, N. Y. Introduced about 1911. A large apple of the McIntosh type, in season from November to February, and promising commercially.

*Delzeit's Fancy:* Originated by P. J. Delzeit, Rosedale, N. J. Fruit conical to roundish, ribbed, pale yellow washed and mottled with bright or dull red, with dark splashes. Fair, sells well, very handsome. July 1 to August 1.

*Down's Delicious:* Sunny Slope Nursery, Hannibal, Mo. Fall variety. Not described.

*Duncan:* Originated by H. B. Duncan, Yakima, Wash. Supposed to be a seedling of Grimes x Delicious. Fruit of the same shape, size and nearly the same color as Yellow Bellflower; flesh tinged yellow, moderately fine grained, juicy, rich, pleasant, sweet, very good. Last of September.

*Edna No. 55:* Northern Spy x Swaar. Originated by Ben Knaub, North Vernon, Ind. Fruit irregular, roundish-oblate, flattened at ends; flesh clear transparent yellow with blush of pinkish red, good. Winter.

*Estelle:* Harrison Nursery Co., York, Neb. Seedling of Oldenburg. The fruit is said to be almost identical with Oldenburg as to season and quality but the tree is a more rapid grower.

*Evelyn:* Seedling of Wealthy. Fruit medium size, well colored. Tree hardy. Originated in Minnesota. Winter.

*Fenley:* Originated by R. H. Fenley, Kettle Falls, Wash. Fruit roundish-oblong-conic, angular, rich yellow with blush, quality good. October to December. Named at 1911 Spokane Apple Show.

*Flava:* John P. Vikla, The Lonsdale Nursery, Lonsdale, Minn. Fruit medium size, yellowish-green with large brown dots, juicy, mild, subacid, quite rich, good quality. September and October.

*Fords Winter:* Newton Nurseries, Newton, Miss. Not described.

*Gallia Beauty:* Originated on the farm of Wm. Coon of Clay Township, Gallia County, Ohio, about 1863 as a sprout from a Rome Beauty tree which was broken off when three or four years old. The fruit is solid red in color resembling Rome Beauty at the stem end but not at the calyx end and is far superior in quality to Rome Beauty. The tree resembles Rome Beauty in many respects. (Information furnished by Ernest J. Riggs, Gallipolis, Ohio.)

*Gem City:* Seedling of Fameuse. Originated in Wisconsin. Fruit medium size, oblate, slightly irregular, skin thin, bright red with stripes of darker red; dots small, many, grayish; cavity broad, deep; stem short, stout, basin broad, medium deep, slightly corrugated; calyx closed; core large, clasping; seeds large, plump; flesh white, crisp, moderately juicy, rather pleasant subacid, fair to good quality. Winter.

*Goal:* Originated by D. E. Junkin, outside of Albany, Oregon. Introduced by Albany Nurseries, Albany, Oregon. Fruit roundish, conical, yellowish striped with red, resembling Gravenstein, quality good. July to December.

*Golden Delicious:* Originated with A. H. Mullens of West Virginia. Introduced by Stark Bros., Louisiana, Mo., in 1916. Fruit roundish-oblong-conic, resembling Delicious in shape, above medium size; cavity regular, medium width, deep, slope abrupt, somewhat marked with red; stem medium, slender, except where thickened at spur end, fuzzy; basin rather narrow, moderately deep, abrupt, furrowed; calyx large; lobes long, reflexed, fuzzy; eye broad, funnel-formed; surface smooth except slight ridges which are often prominent at apex; skin thin, tough, pale rich yellow sometimes with thin bronze blush; dots many, small or large but prominent, raised or sunken, russet or red, some beneath skin; flesh rich yellow, crisp, juicy, rich, pleasant, mild subacid, very good quality; core small, round, open. Winter. C. P. C.

*Golden Winesap:* Fruit Grower 1916, p. 227. Originated in the orchard of Mr. C. E. Bennett, Ogden, Utah, from seeds of Winesap. Fruit medium to large, round to roundish oblong, yellow with red blush; flesh firm, crisp, juicy, appetizing flavor. Bears marked resemblance to Winter Banana but is superior in quality and freedom from bruise discoloration and storage scald. Exceptionally late keeper.

*Gold Ridge:* Seedling of Yellow Newtown. Originated by Luther Burbank, Santa Rosa, Calif., in 1908, and introduced by him in 1912. Tree compact, stocky, very productive, "not subject to mildew or scab." Fruit medium to large,

oblate, yellowish green blushed crimson; flesh pale whitish yellow, crisp, mild sprightly subacid, quality excellent to best; core medium size. October to March. This name has been previously used in Canada and also in Benjamin Buckman's list.

*Hackworth:* Chase Nursery Co., Chase, Ala. Originated in Morgan County, Ala. Tree a very strong grower. Fruit medium to large. July and August.

*Helm:* Baker Brothers Co., Fort Worth, Texas. Originated in central Texas about 38 years ago. Fruit bright red and of fine quality. This was introduced into the Iowa Pines and grown there under the name of Ramsdell. Originally introduced by F. T. Ramsey.

*Herkimer:* Ben Davis x Green Newtown. Originated at the Agricultural Experiment Station, Geneva, N. Y. Introduced about 1911. A fruit for late winter, of good quality and handsome appearance. It resembles Ben Davis externally and internally but is much better in quality.

*Hudson:* Originated with S. W. Underhill, Croton-on-Hudson, N. Y., about 1900 from seed of Yellow Newtown. Fruit round conic, often oblique, rich or greenish yellow, washed, mottled or slightly striped with bright red, good to very good. Late winter.

*Ice Cream:* Milton Nursery Company, Milton, Oregon. "Tree hardy, regular and prolific bearer. Fruit medium size, round, rather flattened, red striped; flesh white, tender, juicy, subacid. Similar to Snow apple. Best of dessert varieties. Last of September."

*Joyce:* Seedling of McIntosh. Originated by the Central Experimental Farm, Ottawa, Canada, about 1899. Fruited first in 1911. Fruit medium, oblate to roundish, ribbed, cavity medium depth and width; stem short, moderately stout; basin medium depth and width, wrinkled; calyx closed; skin moderately thick, tender, yellow, washed and splashed with crimson; dots few, yellow, distinct; flesh dull white, tender, melting, juicy; flavor subacid, pleasant, aromatic; quality good to very good; core medium, open; seeds medium size, acute. Resembles McIntosh very much in flesh and flavor but is earlier in season. September and October.

*King David:* A chance seedling originating in Washington County, Ark., and first noticed in 1893. Introduced by Stark Bros., Louisiana, Mo., about 1904. Fruit medium size, oblate, slightly conic, very dark red; flesh yellow, rich, juicy, very good. Tree strong, vigorous, spreading, very productive.

*King Davis:* Sunny Slope Nursery, Hannibal, Mo. Not described.

*Lord Kitchener:* Originated and introduced by R. E. Burton, Vacaville, Calif. Tree thrifty, upright, stands hot climates of interior valleys of California. Fruit large, pyriform, red; flesh white, fine grained, sweet, high quality. August.

*McMullen:* About 1898 Joe McMullen of Stonewall, DeSoto Parish, La., purchased several apple trees from a traveling agent but there is no record as to what the variety was. The fruit seemed to be desirable for Louisiana conditions and was named McMullen about 1905. Fruit round oblate, quite uniform, medium to large, greenish washed with dark red; dots conspicuous but few, cavity broad, abrupt; stems short, rather stout, knobbed; basin wide, deep, slightly furrowed; skin thick; core medium size, conical; seeds medium size; flesh yellowish, moderately fine, tender, juicy, subacid. September to October.

*Madison Sweet:* R. B. Buchanan, Memphis, Tenn. Fruit large, yellow, sweet and juicy.

*Maryland:* Westminster Nurseries, Westminster, Md. This is Monacacy, which this firm renamed Maryland in 1918 because the latter name is easier to pronounce than the former.

*Melba:* Seedling of McIntosh. Originated by the Central Experimental Farm, Ottawa, Canada, about 1899. Fruited first in 1908. Fruit medium or above, roundish conic, ribbed; cavity open, medium depth; stem medium length, stout; basin medium depth and width, wrinkled; calyx closed; skin moderately thick, tender, perfumed, pale waxy yellow washed and splashed with bright carmine and crimson, dots few, pale, indistinct; bloom bluish; flesh white, crisp, tender, juicy; subacid, sprightly, aromatic, pleasant, good to very

good; core above medium, open. Suggests McIntosh in perfume, flesh and flavor. Season same as Liveland but is a better shipper. August to mid-October.

*Minnehaha:* Seedling of Malinda open pollinated. Minnesota State Fruit Breeding Farm. Introduced in 1919. Fruit large, oblate, red striped; flesh whitish, crisp, pleasant, aromatic, good. Tree hardy and productive. Ripens with Wealthy.

*Money Maker:* Sunny Slope Nursery, Hannibal, Mo. Vigorous grower, hardy and regular bearer, producing fruit of high color and fine quality; splendid keeper; glossy red.

*Nassau:* Esopus x Ben Davis. Originated at the Agricultural Experiment Station, Geneva, N. Y. Introduced about 1911. A medium-sized apple of attractively contrasting red and yellow color, much better in quality than Ben Davis but hardly equal to Esopus. Its season is late fall.

*Onondaga:* Ben Davis x McIntosh. Originated at the Agricultural Experiment Station, Geneva, N. Y. Introduced about 1911. A medium-sized, midwinter apple, of very handsome greenish-red color almost entirely overspread with dark McIntosh red splashed and mottled with carmine. It is of the McIntosh type, but more conical in shape, desirable for cooking and would be liked by many as a dessert apple.

*Orenco:* Originated near Oregon City, Clackamas Co., Oregon. Oregon Nursery Co., Orenco, Oregon. Tree vigorous, hardy and thrifty, resembling Northern Spy. Fruit bright red with numerous light dots; flesh crisp, tender and juicy, delicious flavor; core very small. November to May. "Superior to McIntosh Red or Spitzenburg as a dessert apple."

*Oswego:* Sutton x Northern Spy. Originated at the Agricultural Experiment Station, Geneva, N. Y. Introduced about 1911. Larger than Northern Spy, more conical, brighter in color and equal in quality though of a different flavor. It is a late winter and spring variety.

*Otsego:* Ben Davis x McIntosh. Originated at the Agricultural Experiment Station, Geneva, N. Y. Introduced about 1911. Though rather small, this apple was thought worthy of propagation because of its handsome, bright red color, good quality, small core and few seeds. It is in season in early winter.

*Patricia:* Seedling of McIntosh. Originated by the Central Experimental Farm, Ottawa, Canada, about 1899. Fruited first in 1914. Fruit medium, roundish conical; cavity narrow, medium deep to deep, russeted; stem short to medium, stout; basin deep, open, wrinkled; calyx partially open to open; skin moderately thick, tender, pale yellow, well washed with bright crimson, dots obscure; flesh white and yellowish with traces of red, tender, melting, subacid, pleasant, good to very good, resembles McIntosh considerably, has a marked perfume; core medium, open; seeds medium, light brown, acuminate. October to December.

*Pedro:* Seedling of McIntosh. Originated by the Central Experimental Farm, Ottawa, Canada, about 1899. Fruited first in 1911. Fruit above medium, oblate conic; cavity medium width, deep, russeted; stem short to medium, stout; basin deep, medium width, slightly wrinkled; calyx partly open or open; skin thin, tough, greenish yellow, well washed with crimson, predominant color crimson, dots few, indistinct; flesh dull white, crisp, tender, melting, juicy, briskly subacid, pleasant; core small, open; seeds medium size, acute. Much like McIntosh in flesh and flavor, good. September and October.

*Pickwick:* Originated with a Mr. Gross of Winona, Minn. Underwood Farms, Lake City, Minn. Said to have the quality of Wealthy, the hardiness of Oldenburg and the long keeping quality of Malinda. Tree strong, vigorous. Fruit brilliant red, somewhat resembling McIntosh; flesh clear white, delicious.

*Prize Delicious:* Winfield Nurseries, Winfield, Kan. "An extraordinary type of the well-known Delicious."

*Queenstown Beauty:* Originated in Canada and is of the Fameuse type.

*Rensselaer:* Ben Davis x Jonathan. Originated at the Agricultural Experiment Station, Geneva, N. Y. Introduced about 1911. Of Jonathan type, exceedingly attractive in color and of fine flavor, though of only medium size. Its season extends through the winter months.

*Riverside Seedless:* Originated with Robert Fellows, Riverside, Calif. Resembles Yellow Newtown but larger, russet around stem, greenish but when overripe with reddish tinge, crisp, juicy, fine flavor; some fruits have a few seeds; there is very little core. Tree is prolific bearer. Last of October and early November.

*Rockland:* Ben Davis x Mother. Originated at the Agricultural Experiment Station, Geneva, N. Y. Introduced about 1911. This cross remembles Mother in size, shape, color, texture, flavor and quality and should be especially desirable as a dessert fruit in early and midwinter. It is most pleasing in appearance, though small.

*Rogers:* Originated in Alcorn Co., Miss. Corinth Nurseries, Corinth, Miss. "A fine fall and winter apple. Blight proof."

*Saratoga:* Ben Davis x Green Newtown. Originated at the Agricultural Experiment Station, Geneva, N. Y. Introduced about 1911. A large, late winter and spring apple, nearly or quite as good as Green Newtown. The bright, purplish red color is spread over greenish yellow and is splashed and mottled with crimson, making it very bright and attractive.

*Scarlet Beauty:* Van Dusen Nurseries, Geneva, N. Y. "Of a vivid brilliant all-over red, as handsome as the fine McIntosh and much larger. It is of fine quality, a regular and heavy bearer."

*Schenectady:* Ben Davis x Mother. Originated at the Agricultural Experiment Station, Geneva, N. Y. Introduced about 1911. A remarkably handsome early winter variety, red in color with carmine mottles and splashes and brightened by greenish yellow undercolor. It is large in size and of fine roundish conic shape. While not quite high enough in quality for a dessert apple it is much better than Ben Davis.

*Schoharie:* Ralls x Northern Spy. Originated at the Agricultural Experiment Station, Geneva, N. Y. Introduced about 1911. Of Northern Spy type, good size but not large. It has the delicious flavor and aroma of the Northern Spy but its flesh is more yellow. It is in season in late winter and spring and is desirable for either cooking or dessert, but is a trifle dull in color.

*Senate:* Sunny Slope Nursery, Hannibal, Mo. Winter variety. Not described.

*September Red:* Originated in Georgia. Newton Nurseries, Newton, Miss. Tree thrifty grower and heavy bearer. Fruit medium size, red; flesh yellow, fine quality. September.

*Silver Medal Winesap:* Original tree in Mason orchard, Belle Plains, Kan. Winfield Nursery Co., Winfield, Kan. Trees and fruit larger than Winesap. Fruit bright red; flesh fine grained, crisp, juicy, melting, very slightly acid, flavor excellent, long keeper. Winter.

*Skillet Creek:* Originated by L. B. Irish, Baraboo, Wisc. A late keeper not yet introduced.

*South Carolina Summer:* Originated in South Carolina. Introduced by Wm. T. Hood and Co., Richmond, Va. Fruit conical, yellow white mottled and washed with rich red, quality good. July 1 to August 15.

*Stearns Seedling:* Originated by C. L. Stearns, Clay, N. Y. Fruit roundish to roundish oblate, often slightly conical, greenish yellow mottled in part with red with stripes and splashes of rich carmine, good. Winter.

*Summer Orange:* Originated in Chatham County, North Carolina. Maple Grove Nurseries, Kimesville, N. C. Not described.

*Swan:* Originated by Frank J. Schwan and Son, Dansville, N. Y. "Fruit irregular round flattened at ends, sides often irregular; green, mottled and striped dull red with green ground showing through, good. Late fall.

"This seedling tree was brought from Germany by Anthony Schwan many years ago."

*Tioga:* Sutton x Northern Spy. Originated at the Agricultural Experiment Station, Geneva, N. Y. Introduced about 1911. Another most promising, late winter and spring apple of Northern Spy shape, of high quality and handsome appearance. It is large in size, yellow in color, blushed, mottled and faintly splashed with pinkish red.

*Turley:* Seedling of Winesap originated by Joe E. Burton, Mitchell, Ind. Fruit very large, rich red, globular, slightly conic; flesh rich yellow, crisp, juicy, rich mild subacid, very good quality, much like Stayman Winesap. The color is better than Stayman Winesap.

*Underwood's Winter:* Underwood Farms, Lake City, Minn. "January to March Tree vigorous and hardy, an early bearer and prolific. Fruit hangs to tree in hardest winds. Fruit large, yellow with rosy crimson blush on sunny side; flesh white, tender, crisp, juicy and mildly subacid, good flavor. One of the best late keeping varieties."

*Vanderpool Red:* Oregon Nursery Co., Orenco, Oregon. Tree strong, vigorous, productive. Fruit large, "brighter red than the Spitzenburg", fine texture, good flavor, a long keeper.

*Vermont Spy:* Winfield Nurseries, Winfield, Kan. "An improved type of Northern Spy. Large, bright red, superfine quality."

*Waldron Beauty:* Originated with G. W. Waldron, Oregon City, Ore. Same type as Fameuse and McIntosh. Fruit larger than Fameuse, almost entirely covered with red over a greenish-yellow background; flesh white, delicious. September to December.

*Wardwell Sweet:* Mrs. Wardwell, East Orland, Maine. Fruit roundish, slightly oblate, ribbed, rich yellow, mostly mottled and blushed with rich dark red; quality fair. Winter.

*Westchester:* Ben Davis x Green Newtown. Originated at the Agricultural Experiment Station, Geneva, N. Y. Introduced about 1911. Of Green Newtown shape, but even better in quality and with the attractive Ben Davis color. It is a medium-sized, early winter, dessert apple.

*West Jonathan:* Winfield Nurseries, Winfield, Kan. "Ideal type of the Jonathan family. Fruit extremely large, very dark red."

*Winfield Stayman:* Winfield Nurseries, Winfield, Kan. "A remarkable strain of Stayman Winesap. Fruit of exceptional size, dark rich red."

## CRABAPPLE

*Alexis:* From seed brought from Russia. Originated by N. E. Hansen, Brookings, S. D. and introduced by him in 1919. Fruit much like the Dolgo crab, long conical, polished, brilliant, dark, solid, cherry crab with attractive blue bloom; flesh yellow, acid. Tree very productive.

*Amur:* Open pollinated seedling of Pyrus baccata cerasifera. Originated by N. E. Hansen, Brookings, S. D. and introduced by him in 1912. Tree vigorous, upright grower, very hardy, very productive, very blight resistant thus far. Fruit medium size, round oblate, intense bright red; flesh white, firm, sprightly subacid. Midseason.

*Beauty:* Seedling of Pyrus baccata cerasifera, from seed received from Russia. Originated by N. E. Hansen, Brookings, S. D. and introduced in 1919. Fruit brilliant solid cherry red with orange red underneath, one and one-fourth inches in diameter, dots distinct, few, white; basin deep, irregular; calyx deciduous with russet scar; flesh white, firm, very juicy, acid. Season extending to January. The name "Beauty" was given to another crabapple about 1899.

*Cathay:* Seedling of Pyrus ringo. Originated by N. E. Hansen, Brookings, S. D. and introduced by him in 1919. Fruit one and one-half inches in diameter, clear bright yellow all over with some orange blush; calyx deciduous; flesh clear, juicy, acid. Tree very productive. Fruit cooks up as easily as Oldenburg.

*Dolgo:* Evidently a form of Pyrus baccata but with persistent calyx lobes. Brought from Russia by N. E. Hansen, Brookings, S. D. in 1897 and introduced by him in 1916. Tree vigorous, hardy, very productive, very resistant to blight. Fruit medium, long conical, intensely bright red; flesh white, firm, very juicy, sprightly subacid. Late.

*Florence Hyslop:* Woodruff-Boyce Seed Co., Seattle, Wash. "Large, deep crimson, one of the most beautiful of the crabs." This may be Florence.

*Giant Wild:* Found in the woods near Sherrard, Ill. Scions taken by N. E. Hansen, Brookings, S. D. in 1911 and introduced by him in 1917. Tree vigorous, with round spreading top, not entirely hardy at Brookings. Original tree very productive and disease resistant. Fruit three inches in diameter, oblate, green; flesh greenish white, firm, acid with native acerbity. Winter.

*Ivan:* Evidently from Pyrus baccata. Originated by N. E. Hansen, Brookings, S. D. and introduced by him in 1916. Tree very vigorous, with spreading top, hardy, fairly productive, resistant to blight. Fruit large, one and three-fourths inches in diameter, roundish oblate; calyx lobes deciduous; skin marbled and striped with red and orange red; flesh white, firm, juicy, acid, good for culinary use. Late.

*Izo:* Fluke No. 10 x Yellow Transparent. Originated by N. E. Hansen, Brookings, S. D. and introduced by him in 1919. Fruit oblate, yellow with bronze cheek, dots russet; flesh firm, subacid. Season to midwinter.

*Missouri Wild:* Found many years ago in Missouri by the late Col. J. C. Evans of Kansas City, Mo. and introduced by him. Fruit roundish, two and one-half inches in diameter, truncated, regular, rich golden yellow.

*Nocalyx:* Seedling of Spitzenberg crab. Originated by N. E. Hansen, Brookings, S. D., and introduced by him in 1920. Fruit round, two inches in diameter, yellow with red stripes, sprightly subacid with a sweet aftertaste. September.

*Olga:* Oldenburg x Pyrus baccata cerasifera. Originated by N. E. Hansen, Brookings, S. D. Introduced in 1919. Fruit one and one-half inches in diameter, oblate, bright cherry red with blue bloom; flesh yellowish white, crisp, acid, good. Tree hardy, vigorous, extremely productive. Midseason.

*Sapinia:* Seedling of Winesap topgrafted on Virginia crab. Originated by N. E. Hansen, Brookings, S. D. and introduced by him in 1920. Fruit almost two inches in diameter, thinly washed with dull red, flavor subacid. Late winter.

*Sasha:* Hibernal x Gravenstein. Originated by N. E. Hansen, Brookings, S. D. and introduced by him in 1919. Tree of strong, stocky growth; has not yet fruited.

*Sugar:* Seedling of Antonovka. Originated by N. E. Hansen, Brookings, S. D. and introduced by him in 1919. Fruit two inches in diameter, round oblate, yellow with bronze blush; flesh sweet, rich. The name "Sugar" was given to a European crab many years ago.

## PEAR

*A. J. Cook:* Seedling of Bartlett. Originated by J. E. Hassler, Placerville, California. Introduced by Loma Rica Nursery, in 1916. Tree resembles Bartlett but branches are more slender and whiplike, vigorous grower. Fruit medium to very large, shaped like Bartlett but irregular, light yellow with some rusting; flesh coarser than Bartlett but flavor practically the same. Ripe at Grass Valley about Christmas.

*Bartlett* (of Roeding): A bud sport of Bartlett which appeared on the ranch of J. R. Chadbourne, Suisun, California. "Identical with regular Bartlett except ripens several weeks earlier."

*Bartlett, Early Type:* Silva-Bergtholdt Company, Newcastle, California. Imported from France by Silva-Bergtholdt Company, about 14 years ago. Fruit almost identical with Bartlett but ripens 10 days earlier and has a shorter ripening season.

*Carmel:* Originated with Nathan W. Crawford, East Carmel, Ohio, and introduced by him about 1850. Tree hardy, productive; fruit russet, flesh juicy and excellent. Ripens early.

*Cassel:* Introduced by Cassel Nursery, Cleveland, Ohio, about 1914. Probably a cross between Angouleme and Kieffer, having characteristics of both. Tree strong, upright, productive either as a standard or dwarf. Fruit large, somewhat resembling Angouleme in shape, rich lemon yellow; flesh yellowish white, fine grain, rich, juicy and sweet. October to December.

*Clarksville:* Sunny Slope Nursery, Hannibal, Missouri. Original tree about 90 years old.

*Dixie:* Griffing Brothers, Grand Bay, Alabama. Supposed to be a chance seedling of LeConte and Sand pear, originating in southern Georgia. "The crop

is regular, very heavy, of fine quality and the trees have always been absolutely free from blight".

*Duchess Bronze:* Introduced by Leonard Coates Nursery Company, Morgan Hill, California. Fruit very large, skin rich brown, quality good. January.

*Early Ely:* Texas Nursery Company, Sherman, Texas. Introduced by this company. Fruit small, deep yellow, best quality. Season June in Texas.

*Felix Sahuit:* Introduced by Leonard Coates Nursery Company, Morgan Hill, California. Fruit small, skin green; flesh juicy, very good. November.

*Ford:* Ford Seed Company, Ravenna, Ohio. Resembles Bartlett in size, shape and color; rich, sweet and juicy, almost coreless and seedless. Tree healthy, productive, vigorous grower.

*Fretwell's Prolific:* Sunny Slope Nursery, Hannibal, Missouri. Originated with Mr. Jack Fretwell, Williamstown, Missouri, about 30 years ago. Fruit not described.

*General Wauchope:* "New pear raised from the intercrossing of Duchess d'Angouleme and Ne Plus Meuris. It appears to have the shape of the former and the flavor of the latter, the rind green with a slight color. It is said to keep well until Christmas." American Gardening, January 4, 1902.

*Gogol:* Parrot Pear x Pyrus Ovoidea. Originated by N. E. Hansen, Brookings, S. D. and introduced by him in 1919.

*Golden June:* (June Coreless). Sunny Slope Nursery, Hannibal, Missouri. Originated with Mr. Joe Houghlin near Bloomfield, Kentucky. Tree probably 75 years old. Begins ripening about June 20. Has very small core. Said to be delicious.

*Jewel:* Sunny Slope Nursery, Hannibal, Missouri. Originated with Capt. Bankhead near Edgewood, Missouri, about 60 years ago. Said to be productive and has not blighted.

*Koehler Comice:* Stephen J. Harmeling & Son, Vashon Island, Washington. Not described.

*Levard:* Fancher Creek Nurseries, Fresno, California. Fruit medium to large, pyriform, dark green, bronze on one side; flesh firm, sweet, melting, delicious; excellent for cold storage. December.

*Louis Pasteur:* Introduced by Leonard Coates Nursery Company, Morgan Hill, California. Fruit small, skin brown, very good. November.

*Luola:* Seckel x Dana Hovey, 1907. W. C. Eckard, Watervliet, Michigan. Fruit very small, globular, greenish yellow with faint blush, very rich, excellent. Season October.

*Muir's Everbearing:* Sunny Slope Nursery, Hannibal, Missouri. Originated with Mr. Hal Muir, Bloomfield, Kentucky. Fruit said to ripen from August to November. Delicious. Original tree about 60 years old.

*Pushkin:* Pyrus Ovoidea x R. & K. 553, a Russian pear. Originated by N. E. Hansen, Brookings, S. D. and introduced by him in 1919.

*Riehl's Best:* Sunny Slope Nursery, Hannibal, Missouri. Not described.

*Test:* Luther Burbank, Santa Rosa, California. Twentieth Century Fruits. "A large pear, being four inches long by two and one-half across. In form much like Bartlett and in quality more like LeConte, but far better and far more prolific than either. Ripens four weeks later than LeConte. When canned is firm and white and fully equal to or better than Bartlett."

*Tolstoy:* Clapp Favorite x Pyrus Ovoidea. Originated by N. E. Hansen, Brookings, S. D., and introduced by him in 1919.

*Ulatis:* Seedling of Bartlett. Originated by R. E. Burton, Vacaville, California. Introduced by M. Sharpe, Vacaville, California, in 1916. Tree productive. Fruit medium size, pyriform, yellow; flesh white, fine texture, sweet, good quality. September.

*Wades Pear:* Grown by I. C. Wade, Cornelia, Georgia. Fruit rather large, roundish, short pyriform, irregular; cavity round, very small, shallow, abrupt, russet; stem short, very stout, fleshy at insertion; basin shallow, abrupt, wrinkled and furrowed; calyx small, closed; color pale yellow, dots small to large,

raised, russet, very prominent; flesh white with yellow fibers, moderately juicy, tender, rather coarse; nearly sweet, good; core small, spindle shape, closed; seeds medium sized. Midseason.

*Wilder Sugar:* Orange County Nursery Company, Anaheim, California. "Medium large, greenish yellow shaded brown, excellent quality. Vigorous and productive. August."

## PEACH

*Ada Lyle:* Originated with W. J. Lyle, Winder, Ga. Introduced by J. G. Justice in 1905. Jackson Nurseries, Winder, Ga. Fruit extra large, flavor excellent, ripens with Carman. Freestone.

*Alamance Beauty:* Originated with S. L. Spoon & Son, Kimesville, N. C., Maple Grove Nurseries, Kimesville, N. C. Fruit large, yellow, good, cling.

*Alabama Hart Cling:* Originated with D. M. Hart Jr., Weatherford, Texas. Fruit large, pinkish white, flesh creamy white, red next to pit, flavor excellent; cling, Mid-season.

*Alpha:* Originated by Dr. C. S. Webster, White City, Kansas, and introduced by him about 1915. Seedling of Omega. Tree and fruit buds hardy. Fruit large, white with scarlet blush, flesh firm and quality good. Season between Alexander and Triumph, last of July and first of August in Kansas.

*Anderson:* Originated with John Anderson, Danbury, Ohio. Greening Nursery Co., Monroe, Mich. Tree productive. Fruit large, yellow; flesh yellow, juicy, fine flavor; freestone. Ripens a few days earlier than St. John.

*Anita:* Originated by J. W. Stubenrauch, Mexia, Texas. "An improved Elberta but larger with more color and surer to bear, ripening several days later."

*Archias Missouri Pride:* Archias Seed Store, Sedalia, Mo. Tree vigorous, hardy, productive. Fruit much larger than Elberta, globular, rich golden yellow overlaid with carmine; flesh solid and meaty, fine grain, delicious flavor; freestone; good shipper.

*Arkansas Indian Cling:* Arkansas Nursery Co., Fayetteville, Ark. Fruit medium to large, solid red; attractive.

*Arkansas White:* This name covers several seedlings originated by Grammill & Smith, Wetumka, Okla. These seedlings ripen from August 1 to the middle of September, the early ones being freestones and the late ones clings.

*August Elberta:* Rush Park Seed Co., Waco, Texas. "A large, fine Elberta-like peach that ripens about a month later, quality the best, freestone.

*Barbara:* Originated by J. W. Stubenrauch, Mexia, Texas. Fruit nearly round, highly colored; flesh light yellow, fine grained, very high quality; freestone Tree very productive.

*Bass:* Introduced by Wolverine Cooperative Co. Ltd., Pawpaw, Michigan, about 1910. Originated by Harvey Bass, Lawrence, Mich. Very similar to Chairs

*Baston:* Originated by Isaac W. Baston, Martinez, Ga. Fruit large to very large, oblong conic, lopsided with unequal sides, color pale yellow, blushed with light and dark red; flesh pale yellow stained with much red, nearly sweet, fair quality. July 1 to 20 in Georgia.

*Baucom:* Originated with John Baucom, Weatherford, Texas. Western Home Nursery, Weatherford, Texas. Fruit nearly round, a little lopsided, large, "brownish yellow mixed with Indian Blood". "Clear Seed." First half of September in Texas.

*B. B. Cannon:* Originated by B. B. Cannon, Weatherford, Texas. Western Home Nursery, Weatherford, Texas. Fruit very large, reddish yellow; flesh firm juicy, flavor excellent. Last half of September.

*Belle of Bloomfield:* Sunny Slope Nursery, Hannibal, Mo. Best of all early peaches, hardy, beautiful. June 25 to July 10.

*Belle of Kentucky:* Sunny Slope Nursery, Hannibal, Mo. Snowy white, cling, juicy, rich, finest of late peaches. October 5 to 25.

*Belle of Nelson:* Sunny Slope Nursery, Hannibal, Mo. Freestone, richest quality. August 10 to 25.

*Belle of Pike:* Sunny Slope Nursery, Hannibal, Mo. Free, white with red cheek. August 1 to 10.

*Bentley's Early:* Originated near Baker's Landing on Dun's Creek, Florida. Fruit below medium size, roundish oblong, greenish yellow washed with red; flesh white, slightly subacid, melting, fairly juicy, fine grain, quality good. Pit medium size, cling.

*Best Ever:* Originated with M. C. Eakle, Halfway, Md. Introduced by the Mountain View Nursery Co., Williamsport, Md. in 1913. Fruit large, yellow with red cheek; flesh yellow, quality very good; freestone. Ripens about with Late Crawford.

*Betu* (Kerr's No. 2): The Florida Agriculturist, May 22, 1889. Not described.

*Big Indian Blood Cling:* Originated by Dr. Adam Guthrie Sr., Quitman, Ark. Introduced by Stark Bros. Nurseries, Louisiana, Mo. "The biggest, handsomest and best of all blood clings. The flesh is red like that of a beet". Fifteen days after Elberta.

*Black's October:* Texas Nursery Co., Sherman, Texas. Introduced by M. G. Black of East Texas. Large, red cheeked, cling. Late.

*Blood Cling:* French Nursery, Clyde, Ohio. "Large, dark claret with deep red veins, downy; flesh deep red, very juicy, vinous and refreshing. Middle of August." This is probably not the same as the Blood Cling given in Hedrick's "Peaches of New York", as that is very late in season.

*Bouquet:* Seedling of Peento. Resembles Peento except it is a month later in ripening.

*Brescher Cling:* Sunny Slope Nursery, Hannibal, Mo. Not described.

*Briggs Cling:* Waxahachie Nursery Co., Waxahachie, Texas. Fruit creamy white with red blush; flesh sweet and firm; clingstone. Nearly identical with White English.

*Briner's Favorite:* Originated with Martin Briner on Catawba Island, Ohio, about 1885. It has also been called Pearce's Mammoth and Briner's Yellow. Fremont Nursery Co., Fremont, Ohio. Tree has low spreading habit of growth with foliage like Smock, not subject to leaf curl. Fruit equal to Elberta in size but superior in quality; flesh yellow, freestone. Ripens a few days earlier than Elberta.

*Brokaw:* Supposed to be a cross between Peento and the Indian type. Introduced by Mr. I. J. Brokaw, Marion Co., Florida. Fruit nearly round, medium or above, greenish yellow mostly covered with red; flesh white or greenish white streaked with red, tender, juicy, sweet and delicious; pit medium size, cling.

*Brown Early:* Originated with Orrin Brown, Stevensville, Mich. Report of Michigan Horticultural Society, 1893. Tree hardy, drooping habit of growth. Fruit medium size, roundish, slightly compressed toward the suture, creamy white mottled with red, pubescence rather dense; flesh creamy white, red at pit, rather firm, juicy, sprightly, vinous, very good; pit rather small, freestone. There is another Brown Early, originated in Ohio. Listed by Hedrick in "The Peaches of New York."

*Burgeon's Yellow:* Probably same as Weed's Late Barnard. "Tree similar to that of Early Rivers and fruit resembles Snow's Orange, ripens about the same time."

*Cameo:* Chance seedling. Introduced by the Texas Nursery Co., Sherman, Texas, about 1901. Fruit very large, yellow; freestone. Ripens in August. One of the finest of the late Elberta type. Better flavor than Elberta.

*Cameo* (Cling): John S. Kerr Nursery Co., Sherman, Texas. A splendid yellow clingstone peach of fine quality, size and appearance. July and August.

*Canuck:* Originated with C. W. Murphy, Lawrence, Kansas. Grown and introduced by him in 1915. From a pit brought from Canada and planted in the fall of 1908. Western Nursery Co., Lawrence, Kansas. Solid flesh, good shipper, fine flavor, rich color, freestone.

*Caprue:* Originated with Luther Bowers, Morgan Hill, Calif. Leonard Coates Nursery Co., Morgan, Calif. "Very late and of superior quality."

*Cloud's Cling:* Originated with A. Cloud, Weatherford, Texas. Western Home Nursery Co., Weatherford, Texas. Tree similar to that of White English.

Fruit very large, nearly round, rich creamy color; flesh firm, sweet; pit small. First half of September.

*Clum:* Seedling of Early Michigan. Originated by Columbus Engle, Pawpaw, Michigan. Wolverine Cooperative Co., Ltd., Pawpaw, Mich. Fruit a freestone equal to Lewis or Early Michigan. Ripens with Early Rivers.

*Coleman's Choice:* Otto Schwill & Co., Memphis, Tenn. "Fine native variety similar to Elberta, better quality, fruit larger and tree hardier and a sure bearer; freestone. Latter part of July.

*Come Johnson:* Excelsior Nurseries, Rome, Georgia. Fruit as large as Elberta, but more highly colored and of better quality, ripening ten days later than Elberta. Yellow fleshed freestone.

*Cook's Freestone:* Originated by I. M. Shront, Owingsville, Ky. Supposed to be a seedling of Old Mixon. Tree enormously productive. Fruit large, greenish with red blush; flesh white and tinged red near pit, firm, juicy, quality good, stone free. Mid-season.

*Crimson Cling:* Originated by R. E. Burton, Vacaville, Calif. Fruit medium size, smooth, yellow with crimson cheek; flesh juicy, sweet, fine flavor, extra good for canning. Ripens with Tuscan.

*Crosby's Early:* Evergreen Nursery, Sagamore, Mich. Not described.

*Crystal:* Bush Bros. Nursery, Hugo, Okla. Fruit white, sweet, juicy; stone cling; tree hardy and prolific. October in Oklahoma.

*Dal's Cling:* Porter-Walton Co., Salt Lake City, Utah. Fruit large, deep red, delicious flavor, extremely desirable for canning, sweet pickles or preserves.

*Dallas:* Western Home Nursery, Weatherford, Texas. Fruit large, white, cling. August.

*Dalmont Favorite:* Originated by N. L. Dalmont, Plainview, Texas. Fruit medium size, roundish oblong, lopsided, color pale yellow with heavy dull red blush and a few carmine splashes; flesh rich yellow, mild sub-acid, not rich, quality fairly good. Last half of August in Texas.

*Day:* Originated by John Day, Locust Point, Ohio, and introduced by him about 1890. Tree very hardy and a most reliable cropper. Fruit large, yellow, fine quality, freestone. Between Late Crawford and Smock.

*Day's Nonpareil:* Same as Day.

*Diamond King:* Chance seedling. Originated at Kinmundy, Illinois, about 1884. Farina Nurseries, Farina, Ill. Fruit resembles Elberta but is larger, better in flavor and ripens ten days later; freestone.

*Dr. Worcester:* Originated by Dr. Worcester, Middletown, N. Y. Woodlawn Nurseries, Rochester, N. Y. Tree vigorous, healthy, productive, hardy, late bloomer. Fruit very large, yellow; flesh yellow, very juicy, rich and sugary. Flavor of Crawford. Good shipper and good keeper.

*Early Elberta:* Stark Brothers Fruit Book, 1906. Seedling of Elberta from a pit planted by Stark Bros. who sent the little seedling tree to Dr. Sumner Gleason, Brigham City, Utah, where it fruited in 1903. Introduced by Stark Brothers. The fruit is a yellow fleshed freestone as large as Elberta, of the same shape and as highly colored but better in quality and from a week to ten days earlier in season.

*Early Market:* Bush Bros. Nurseries, Hugo, Okla. Originated in Greyson County, Texas. Tree very hardy and prolific; fruit medium large, very firm, good flavor; clingstone. "An improved Wheeler, ripens 15 days ahead of Early Wheeler and is a better peach in every way."

*Early Wonder:* E. W. Jones Nursery Co., Woodlawn, Va. This is Mayflower.

*Elberta Improved:* Seedling of Elberta. Originated by Grammill and Smith, Wetumka, Hughes Co., Okla., and introduced by them in 1916. Tree a more reliable cropper than Elberta. Fruit larger, sweeter, and juicier, than Elberta.

*Elberta Rose:* Seedling of Elberta. Originated by J. A. Floyd, Fairmont, N. C., and introduced by him in 1917. Fruit very large, red; flesh firm, fine flavor. A week later than Elberta.

*Eleanor Semmes:* R. E. Buchanan, Memphis, Tenn. Fruit Yellow; freestone. August.

*Ella Hord:* Originated with C. P. Dietrich & Bros., Maysville, Kentucky. W. W. Clark's Nursery, Sharpsburg, Ky. Fruit large, golden yellow with red cheek; flesh yellow, fine texture, melting, juicy, good quality; freestone. Middle of August in Kentucky.

*El Paso:* Seedling of Routh Cling x Elberta. Originated by J. M. Howell & Son, Weatherford, Texas. Fruit large, yellow; flesh juicy, sweet, clingstone, rather tender for long shipments. Last half of July in Texas.

*Emperor:* The Barnes Bros. Nursery Co., Yalesville, Conn. Fruit very large, shape of Crawford Late, yellow with red cheek; flesh yellow, pit small, freestone. Tree hardy. Very late.

*Fitzhugh:* Originated with J. C. Fitzhugh, Batesville, Ark. Introduced by Hoops Bros. & Thomas Co., Westchester, Pa. in 1908. Fruit white with pink blush, fine flavor. In appearance similar to Sneed but ripens ten days earlier.

*Fitzhugh Lee:* Otto Schwill & Co., Memphis, Tenn. Fruit large, creamy white with blush; flesh white, very juicy, excellent. August.

*General Funston:* Farmers' Nursery Co., Troy, Ohio. Not described.

*Gilbert:* Originated by J. W. Stubenrauch, Mexia, Texas. "Similar to Tena but is a clingstone." Ripens with Elberta.

*Gill:* Fruit medium size, globular, flattened at ends, rich yellow, shaded with rich purplish red; flesh yellow, slightly stained red at pit, sweet, vinous, rich, good. August 20 in Texas.

*Gillingham:* Oregon Nursery Co., Orenco, Oregon. Originated with Mrs. Eugenia Gillingham, Salem, Oregon. Fruit large, yellow, of the Crawford type and of equal if not superior quality; freestone.

*Glenita:* Originated by J. D. Robinson, Washington, D. C. Fruit large, color pale yellow blushed and mottled with thin bright red and dark carmine; flesh white, red at pit, mild subacid, fair quality. July 25 to August 10.

*Hall's Seedling:* Sunny Slope Nursery, Hannibal, Mo. Large, creamy white, very sweet, cling; hardy. September. Said to reproduce true from seed. There was another Hall's Seedling peach which originated with F. F. Hall, Lewiston, N. Y. but the original tree died in 1913 and evidently the variety was never propagated.

*Hauss Cling:* Originated with F. Hauss, Oswald, Calif., in 1896. Seedling of Phillips Cling. Silva-Bergtholdt Co., Newcastle, Calif. Introduced by Johnson Bros. Nursery, Sutter Co., Calif., in 1913. Fruit large, yellow; flesh yellow to the pit, fine grain, excellent quality; pit small, cling. Fruit is similar to Phillips and the tree is as productive. Especially valuable for canning. Between Tuscan and California Cling.

*Helen:* Seedling of Salway. Originated by H. A. Bassford, Vacaville, Calif. and introduced by M. Sharpe, Vacaville, Calif. in 1914. Tree thrifty, productive. Fruit large, round, yellow with red blush; flesh yellow, coarse, dry, quality good; pit medium, free. November.

*Henry Berter:* Received from H. G. Hardison, Byron, Ga. on June 15, 1916. Supposed to be a cross between a native seedling and Carman. Fruit medium size, roundish, to oblong, lopsided, pale yellow, beautiful mottled, with bright and dark red, flesh greenish white, quality fair, clingstone. Ripens May 20-25.

*Herold's October:* Kirkman Nurseries, Fresno, Calif. Fruit large, light yellow; freestone. Very late.

*Hobbs Cling:* Kirkman Nurseries, Fresno, Calif. Fruit large, white with red cheek, very attractive, excellent quality; flesh white; clingstone. Season three weeks ahead of Early Crawford.

*Hoffman:* Originated with Joseph Hoffman, Chewsville, Md. Introduced by Mountain View Nursery Co., Williamsport, Md., in 1912. Fruit large, white with red cheek; flesh white, fine flavor, freestone, good shipper. Ripens just before Salway.

*Home Beauty:* Jackson County Nurseries, Winder, Ga. "A fine early winter variety. Fruit large, round, yellow, striped with red, tender, juicy and of fine flavor. September to November."

*Honeycomb:* Chance seedling. Bush Bros. Nurseries, Hugo, Okla. Tree hardy and prolific. Fruit very large; beautiful yellow with red cheek; flesh firm, sweet; good keeper and good shipper.

*Hudson's October:* Originated with Gaines, Cole & Co., State Line, Miss. Newton Nurseries, Newton, Miss. Fruit large, oblong, white with pale red cheek, good quality. Almost identical with Stinson's October, but better suited to the South.

*Improved Crawford:* Seedling of Crawford. Introduced by Cash Nurseries, Sebastopol, Calif., in 1917. "Larger and better flavor than Early Crawford. Pit does not split. Two weeks later than Early Crawford. Freestone."

*Indiana Beauty:* Monroe Nursery Co., Monroe, Mich. Not described.

*Jackson:* Old Dominion Nurseries, Richmond, Va. Fruit large, rich red; flesh white, very juicy, freestone. Ripens after Alexander.

*Jackson's Prolific:* Not described. Listed in the Florida Agriculturist, May 15, 1889.

*Japanese Dwarf:* Orange County Nursery Co., Anaheim, Calif. "Medium size, white skin with red blush; flesh white and juicy, one of the earliest varieties. Early June."

*Jeff Davis* (of Louisiana): Jennings Nursery, Jennings, La. This seems to be an old variety whose name was lost and it was renamed Jeff Davis. Tree vigorous. Fruit semi-cling. First half of June. Seems to be both worm and rot proof.

*Jessie:* Originated with J. H. Giles, Winder, Ga. Jackson County Nurseries, Winder, Ga. Fruit very large, golden yellow streaked with red; flesh yellow firm, rich, excellent quality; cling. First part of August.

*Joe:* Originated by J. W. Stubenrauch, Mexia, Texas. Fruit very large, yellow, clingstone. Not as hardy in bud as Tena or Gilbert.

*Johanna:* Sunny Slope Nursery, Hannibal, Mo. Large, white, freestone, with bright red cheek. September 20 to October 1.

*J. Van:* Seedling of Elberta. J. Van Lindley Nursery Co., Pomona, N. C. Skin rich yellow well covered with red; flesh yellow, very good quality; pit small, free. A week later than Elberta.

*Katie:* Originated by J. W. Stubenrauch, Mexia, Texas. (Not the same Katie mentioned by Hedrick in "The Peaches of New York"). Fruit very large, yellow, freestone, good quality. Last of August and first of September, in Texas.

*Lady Engle:* Introduced from Europe. Southern Oregon Nursery, Yoncalla, Oregon. Fruit medium size, yellow with red cheek, freestone. Early.

*Large Red Free:* Reed Nursery Co., Hanover, Indiana. This seems to be an old variety renamed Large Red Free because the original name was lost. Not described.

*Late Honey:* Seedling of Honey. Originated with Cibolo Nursery, Cibolo, Texas. Similar to Honey but ripens ten days later.

*Lecsville:* J. Van Lindley Nursery, Pomona, N. C. Tree productive; fruit beautiful red; flesh cream color, quality excellent; freestone. Ripens between Connett and Hiley.

*Lent Golden:* Received from Mr. Lent, Sorrento, Fla. on June 25, 1916. Fruit medium size, globular lopsided, deep yellow with bright red blush, flesh rich yellow, pleasant, moderately rich, good, freestone.

*Lewkins Honey:* Armstrong Nurseries, Ontario, Calif. Fruit medium size, oval, whitish yellow with blush; flesh creamy white, juicy, melting, very sweet, rich, very good quality. Season August in California.

*Liberty:* Chance seedling of Lola. Originated at the New Jersey Agr. Exp. Station, New Brunswick, N. J. Name published in Voorhees Farmer of October, 1918. Tree vigorous, as hardy as Carman. Fruit medium size, round; flesh white. Ripens a few days before Carman.

*Liberty:* Seedling of Tribble's Pride. Originated by Tribble Bros., Elk Grove, Calif., and introduced by them in 1917 but name was probably not published

then. Tree medium size, very productive, hardy; fruit very large, round, white with red blush; flesh amber color, very sweet, very good quality; pit small, free. July.

*Liberty Belle:* Sunny Slope Nursery, Hannibal, Mo. Yellow cling, hardy as an oak and extra good. September 1 to 15.

*Littlejohn:* Originated by R. P. Littlejohn, Marshall, Texas. Fruit large, roundish oval, somewhat lopsided, rich dark yellow, washed and mottled with bright red and marked with narrow dark carmine splashes, very attractive; flesh rich yellow with much red stain, rich pleasant subacid, nearly sweet when fully ripe, good. August 10 in Texas.

*Longhina:* From J. W. Stubenrauch, Mexia, Texas, on August 21, 1915. Fruit medium large, globular, rich yellow with purple red stripes; flesh yellow, very good, freestone. Said to be more hardy in bud than Elberta and a late bloomer.

*Louella Berta:* W. F. Seedling of Elberta. Originated with J. W. Shadow, Adairsville, Ga., and introduced by him in 1902. Cedar Hill Nursery and Orchard Co., Winchester, Tenn. Fruit very large, white with beautiful red cheek; flesh firm, excellent quality. Tree vigorous, productive. Season about the same as Carman.

*Lula Crawford:* A. W. Steinbring, New Braunfels, Texas. Tree a strong grower, and sure bearer. Fruit of best quality resembling Thurber but ripens a few days earlier.

*Luton Free:* Bush Bros. Nurseries, Hugo, Okla. Fruit large, firm. "By far the richest and most beautiful peach we have seen ripen in June." Tree hardy.

*McClure:* Orange County Nursery Co., Anaheim, Calif. Fruit large, creamy white, nearly covered with brilliant crimson; flesh white tinged red around pit, "deliciously flavored." August.

*McCoy's Free:* Winfield Nurseries, Winfield, Kan. Fruit large, yellow with dark red cheek, flesh fine grain, excellent quality; freestone. Tree low spreading, very productive. Two weeks after Elberta.

*Mammoth Yellow:* Sunny Slope Nursery, Hannibal, Mo. Cross between Great Elberta and Mammoth Heath. Large, yellow, freestone.

*Marion Hayward:* Originated by W. W. Symmes, Cincinnati, Ohio, as a chance seedling. A handsome peach of good form and size, resembling Chairs. Fruit large to very large, yellow with crimson blush; flesh yellow, streaked with red, texture smooth, good to very good, freestone. September.

*May Honey:* Seedling of Honey. Originated with Cibolo Nurseries, Cibolo, Texas, and introduced by this firm in 1915. Fruit similar to Honey. Ripens in May in Texas.

*May Queen:* Island Nurseries and Fruit Co., Vashon, Wash. "Not subject to leaf curl. Is a little earlier than Amsden's June but is small and of inferior flavor."

*Mealing:* Originated with Dr. W. E. Mealing, North Augusta, S. C., and introduced by him in 1913. Fruitland Nurseries, Atlanta, Ga. Fruit medium size, skin yellow washed with crimson shading to deep orange; flesh firm, good quality. First half of September.

*Millard:* Originated by J. W. Stubenrauch, Mexia, Texas. Fruit large, yellow with much red, clingstone.

*Miller's Late:* Originated with I. S. Miller, Ontario, Calif. Introduced in 1908. Armstrong Nurseries, Ontario, Calif. "A late variety of good flavor and quality, freestone, flesh white. October."

*Milton Snow:* Chance seedling on the ranch of Mr. Milton, Parlier, Calif. Fresno Nursery Co., Fresno, Calif. Fruit white with red blush; flesh white, delicious; freestone. Middle of July.

*Ming Tomb:* Originated with Tribble Bros., Elk Grove, Calif., from a seed sent from China. Tree exceptionally thrifty, very productive, hardy. "Best and largest of all peaches." Fruit largest size, round, white with faint blush; flesh white, very firm, aromatic, sweet, quality unexcelled; pit small, cling. August.

*Minnie Stanford:* Chance seedling originating at Lorena, Texas. Waxahachie Nursery Co., Waxahachie, Texas. "Fruit large, yellow, oblong, splendid quality, good shipper, clingstone."

*Mojave:* Originated by W. W. Williams, Byron, Ga. Cumberland Nurseries, Winchester, Tenn. Fruit white; freestone. Similar to Hiley but two weeks earlier.

*Morris Late:* Originated in Shelby County, Tenn. Otto Schwill & Co., Memphis, Tenn. Fruit large, clingstone. October.

*Morris October:* Otto Schwill & Co., Memphis, Tenn. "One of the best. October 1."

*Mother's:* Originated by Tribble Bros., Elk Grove, Calif. and introduced by them in 1912. Seedling of Tribble's Pride. Tree large, hardy, productive; fruit large, nearly round, beautiful red on creamy ground; flesh white, firm, splendid quality; pit medium, free. August.

*Mt. Hood:* Grown locally at The Dalles, Oregon. Not described.

*Neal's Hybrid:* Peento x Honey. Originated by Dr. J. C. Neal, Ainshe, Levy Co., Florida. Fruit round, color greenish yellow, washed with red; flesh white, subacid, melting, juicy, good quality; pit medium size, cling.

*Needham's Early:* Western Home Nursery, Weatherford, Texas. "Large, greenish white, red cheek, good flavor, good shipper. A valuable new peach identical with Wheeler. Cling. June 10 to 20."

*Oakwood:* Monroe Nursery, Monroe, Mich. Not described.

*Omega:* Originated by Dr. C. S. Webster, White City, Kansas, and introduced by him in 1915. Tree and fruit buds very hardy. Fruit resembles Champion in size and color but is of better flavor. Ripens three weeks after Alpha.

*Orange Heath:* Western Home Nursery, Weatherford, Texas. "A large, white cling. A seedling from Heath Cling. About ten days later. September 20."

*Oyama:* Seedling of Routh Cling. Originated by J. M. Howell and Son, Weatherford, Texas, and introduced by them in 1904. Fruit very large, yellow; flesh yellow, juicy, subacid; clingstone. Middle of August.

*Pace or Columbia:* Not described. Listed in The Horticulturist, 1857, Page 178.

*Palora:* A chance seedling of Muir introduced by F. A. Dixon, Gridley, Calif. in 1915. Fruit medium size, round, yellow; flesh yellow, fine texture, good, clingstone. August.

*Pearl:* Seedling of Peento. Originated by a Mrs. Selma, Florida. Listed in the Florida Agriculturist May 15, 1889. Not described.

*Peerless Peach:* Seedling of Chinese Cling. Originated with Otto Locke, New Braunfels, Texas. Comal Springs Nursery, New Braunfels, Texas. Tree a compact, vigorous grower. Fruit very large, white with red blush; cling. Better than Chinese Cling. Middle of July.

*Perfection:* E. W. Jones Nursery Co., Woodlawn, Va. Originated near Weston Umatilla County, Oregon. Fruit very large, yellow with red blush; flesh yellow, fine grained, red at pit. First half of September.

*Pride of Maryland:* Higgins Nurseries, Ringoes, N. J. Tree much like Champion. Fruit as large and round as Champion; white flesh; freestone. Ripens with Reeves. This is suspected of being identical with Ray.

*Queen of Dixie:* Cumberland Nurseries, Winchester, Tenn. This variety is supposed to have originated at Marietta, Ga. It is similar to Yellow Swan and Arp, and said to be the earliest of the yellow varieties.

*Rafael Cling:* Chance seedling. Introduced by M. Sharpe, Vacaville, Calif., in 1917. Tree thrifty, very hardy and productive. Fruit large, round, yellow; flesh yellow, fine texture, sweet, juicy, quality good; pit small, cling. August.

*Rebecca:* Fruit medium size, honey-shaped, light yellow washed with red; flesh meaty, subacid, clingstone.

*Red Beauty:* Spokane Nursery, Spokane, Washington. Not described.

*Red July:* Same as Jackson.

*Rio Grande:* Seedling of Waldo. Originated by W. C. Griffing, McAllen, Texas. Introduced by Griffing Bros., Port Arthur, Texas, about 1912. Tree vig-

orous, begins fruiting second year from planting, very productive. Fruit medium size, roundish oblong, creamy yellow shaded with red; flesh creamy white, red at pit, nearly sweet. Middle of May in southern Texas.

*Roby's Extra Fine:* Whole Root Nursery, Oakville, Kentucky. "Clingstone, color white and ripens in October."

*Round Tuscan Cling:* Chico Nursery Co., Chico, Calif. "Very large, perfectly round, handsomely colored, very productive and prized by canners on account of its superior canning quality. July 13 to 27."

*Routh Cling:* Originated on the Routh farm in Collin County, Texas. Introduced by J. M. Howell, Weatherford, Texas, about 1875. Fruit very large, yellow, flesh very firm, clingstone. Last half of July.

*Rushing Winter:* Originated on the farm of W. E. Rushing, Crittenden Co., Kentucky. People's Nursery Co., Smithville, Tenn. "The latest peach known. It is large, juicy and sweet as any August peach and will keep until Christmas. Has the flavor of Heath Cling."

*S. & A.:* Originated by Stigers & Apgar, Lebanon, N. J. Introduced by C. A. Conover & Son, Lebanon, N. J., in 1914. "Large yellow peach, very dry and mealy, making it an extra fine shipper as it will stand up for a long time, very good. September 1."

*Salberta:* Supposed to be a cross between Elberta and Salway. Originated with W. C. Rofkar, Catawba Island, Ohio. Fremont Nursery, Fremont, Ohio. Tree very hardy in bud and a heavy and sure bearer. Fruit large, yellow, finest quality; freestone. Ripens three weeks after Elberta.

*Santa Claus:* Bush Bros Nurseries, Hugo, Okla. "Largest peach known, a large cream with red blush, firm, cling." If picked at time of first frost in November is said to keep until the holidays.

*Saratoga:* L. G. Tingle, Pittsville, Md. "A fine, late, large, yellow clingstone."

*Selma Cling:* Originated on the Levis ranch near Selma, Calif., about 1878. Fancher Creek Nurseries, Fresno, Calif. Fruit beautiful golden yellow, uniform in size, somewhat flattened, slightly colored when exposed to the sun; flesh cream yellow, fine grain, excellent flavor; pit small, cling. Ripens between Tuscan and Phillips.

*September:* Originated in Newton County, Miss. Newton Nurseries, Newton, Miss. "Large, yellow, red cheek, clingstone, ripening September 1."

*September Mammoth:* Originated in Monroe, Mich. Greening Nursery Co., Monroe, Mich. "The size is really enormous. The largest peach without doubt. It is larger than Elberta and flavor is much finer. Flesh yellow; pit medium; color of skin yellow with deep red blush."

*Sharpe:* Seedling of Salway. Originated by M. Sharpe, Vacaville, Calif., and introduced by him in 1918. Tree thrifty, hardy and productive; fruit large, round, white; flesh white, fine texture, juicy, sweet, high quality; pit small, free. September.

*Shipp:* Leonard Coates Nursery Co., Morgan Hill, Calif. "Very attractive, early peach, red skin, flesh yellowish. Ripens before or with Hale."

*Shipper's Late Red:* Originated with Union Orchard and Nursery Co., Martinsville, Ind., about 1895. Tree very vigorous, healthy and productive. Fruit very large, yellow overspread with bright beautiful red. Two or three weeks later than Elberta.

*Silver Cling:* Bush Brothers Nurseries, Hugo, Okla. "Grows well on the thinnest clay soil. Fruit medium to very large, white to gray with silver bloom; very firm, juicy, sweet, good keeper; pit small, cling; tree hardy, prolific. August and early September."

*Silver Cross:* Name mentioned in the Florida Agriculturist, May 15, 1889. Not described.

*Sims Cling:* Originated with W. A. Sims, Farmersville, Calif., and introduced by Fancher Creek Nurseries, Fresno, Calif., in 1908.

*Sixteen Ounce:* Chance Seedling. Originated near Indianapolis, Ind. Introduced in 1916 by Bridgeport Nurseries, Bridgeport, Ind. Fruit large, shape of Elberta, bright yellow with deep blush; flesh rich golden yellow; tree thrifty and productive. Middle of September.

*Skinner:* Received from P. J. Berckmans Company, Augusta, Ga., July 15, 1916. Fruit medium size, globular conic, rich yellow with dark red mottling and darker broken stripes, flesh rich yellow, pleasant, vinous, very sweet, very good, freestone. Fruit grown at Mayfield, Ga.

*Snow Ball:* Chance seedling. Originated at Cedar Valley, Travis Co., Texas. Introduced by Austin Nursery, Austin, Texas, in 1919. Fruit round, white, firm, cling; good keeper and good shipper.

*Spencer:* Originated with J. F. Spencer, Waxahachie, Texas, and introduced by the Waxahachie Nursery Co., Waxahachie, Texas, in 1912. "Large; flesh creamy white with richest flavoring; free."

*Strawberry Cling:* Morris & Snow Seed Co., Los Angeles, Calif. "Very good early white peach, skin creamy white partly covered with red; flesh white, red near the pit, juicy, rich flavor."

*Strickland Honey:* Corinth Nurseries, Corinth, Miss. "Very fine, cling. Ripe in August. Very sweet."

*Sunflower:* Received from the Ince Nursery Company, Lawrence, Kansas on August 7, 1915. Fruit large, globular, faint blush, flesh white, freestone.

*Superb:* Bush Bros. Nurseries, Hugo, Okla. Tree hardy, prolific; fruit large, creamy white with red blush, firm, sweet, good flavor, freestone. Ripens before Elberta.

*Taylor Cling:* Chipola Nursery, Apalachicola, Florida. "Tree a very strong grower, heavy and regular bearer. Fruit large, pointed at apex, lovely peach tint when ripe." Not the Taylor described by Hedrick in "Peaches of New York."

*Tena:* Originated by J. W. Stubenrauch, Mexia, Texas. "Highly colored, fine quality, yellow freestone. Ripens about the time of Elberta. Buds very hardy."

*The Cracker:* Tree very hardy, good grower, productive. Fruit large, rich yellow mostly covered with carmine; flesh rich yellow, fine grain, sprightly, rich, good quality; freestone. Description taken from Florida Dispatch, Farmer & Fruit Grower, December 5, 1889.

*The J. M. Mack:* Seedling of Hale Early by Heath Cling. Originated by J. M. Mack, Fallbrook, Calif. Fruited first in 1917, not yet introduced. "Tree ordinary, fruit finest flavor that has ever been produced, in a class by itself." Tree productive; fruit large, light cream color with slight blush; flesh white; pit small, free. Midseason.

*The Prize:* This seems to be an old variety renamed. Fruit rather large, very red; flesh snow white, sweet, rich fine flavor; pit small free. Description taken from Florida Dispatch, Farmer and Fruit Grower, December 5, 1889. The name "Prize" was also used for a yellow fleshed variety.

*Tornado:* Received from P. J. Berckmans Company, Augusta, Ga., on July 25, 1916. Fruit very large, globular pointed. Rich yellow, beautifully mottled with red, flesh rich yellow, tinted red, red at pit, white acid, pleasant, good quality, freestone. The flesh is firm and this variety ought to be a good shipper. The season is the same as Elberta. This fruit was grown at Mayfield, Ga.

*Tribble's Pride:* Originated with A. E. Bond, Elk Grove, Calif., and introduced by Tribble Bros., Elk Grove, Calif. Tree very large, very productive, hardy. Fruit large, nearly round, white with red blush; flesh marbled, crisp, excellent; pit medium, free. August.

*Tuscan:* Fruit received from Chico Gardens, Chico, Calif., on August 3, 1915. Fruit large, yellow, flesh yellow; freestone.

*Waldo:* Originated with T. J. Godbey, Waldo, Florida. The Florida Agriculturalist, May 22, 1889.

*Waldo Prolific:* Same as Waldo.

*Western White June:* Pleasant Valley Nurseries, McMinnville, Tenn. Tree thrifty, productive; body of tree orange colored, twigs greenish, blossoms pale red; fruit white, size of Lone Star, juicy. First part of June in Tennessee.

*Wharton's C. of R. D.:* Wharton Springs Nursery Co., Smithville, Tenn. Not described.

*Whitford:* Arlington Nurseries, Arlington, Neb. Originated by C. A. Whitford, Arlington, Neb. Golden yellow, sometimes slightly blushed; freestone, rich, and delicious, hardy. September.

*Wilma:* Seedling of Elberta. Originated with W. C. Rofkar, Catawba Island, Ohio. W. B. Cole, Painesville, Ohio. Tree vigorous, productive. Fruit yellow, freestone. Ten days after Elberta.

*Winstone Seedling:* Seedling of Late Crawford. Originated by Mr. Winstone, Ottawa County, Ohio. Fremont Nursery, Fremont, Ohio. Resembles Late Crawford in every way but the tree is much hardier, extra hardy in bud, and a heavy bearer. Fine quality.

*Woodrow Wilson:* John S. Kerr Nursery Co., Sherman, Texas. Originated about 1898 in West Grayson County, Texas. Fruit medium size, yellow with red cheek; flesh yellow, subacid, excellent, semi-cling. June 1 in north Texas.

*Yuba City Cling:* Originated near Yuba City, Calif. Fresno Nursery Company, Fresno, Calif. Tree vigorous and productive. Fruit large, uniform; skin snow white; flesh white, firm, good flavor; pit small, cling. Early September. No longer propagated.

## PLUM

*Admiral:* Originated by M. Sharpe, Vacaville, Calif. Fruit large, globular, reddish purple, freestone.

*Aetna:* State Nursery & Seed Company, Helena, Montana. "A most prolific red plum of medium size and very hardy."

*Amarilla:* Originated by M. Sharpe, Vacaville, Calif., and introduced by him in 1918. Tree productive. Fruit large, oval, yellow; flesh yellow, fine grained, good quality; pit small, free. August.

*American Wild Goose:* Same as Wild Goose.

*Anita:* Seedling of Tragedy. Originated by M. Sharpe, Vacaville, Calif., introduced by him in 1916. Fruit large, oval, purplish blue to dark blue, russet dots, suture usually a line; flesh greenish yellow, tender, medium firm, juicy, sweet, pleasant, rich, very good; freestone. July.

*Assiniboine:* Oscar W. Hill & Company, Bismarck, N. D. "An extremely hardy and thrifty variety; fruit large, sweet, juicy."

*Autumn Special:* Bush Brothers Nurseries, Hugo, Oklahoma Fruit medium large, very rich, meaty, solid, good shippers. September and October.

*Banana:* Myrobolan by triflora. Originated by R. E. Burton, Vacaville, California; introduced by M. Sharpe of same place in 1916. Tree very thrifty; fruit medium, round, yellow; flesh yellow, fine grained, good flavor and quality; clingstone; July.

*Banana:* Tribble Nurseries, Lodi, California. Fruit medium size, round, dark red; flesh yellow, very rich, flavor of a fine banana; July.

*Beauty:* Hybrid parentage. Originated and introduced by Luther Burbank. Tree upright, vigorous, productive; fruit large, oval, crimson; flesh light crimson shaded amber, quite juicy, delicious flavor. Season last of June at Santa Rosa, California, and third week in May in Vaca Valley, California.

*Becky Smith:* Originated in 1912 and introduced in 1918 by M. Sharpe, Vacaville, California. Triflora. Tree thrifty, best on peach stock; fruit large, round oblate, light garnet with thin blue bloom, many russet dots and veins; skin thick, tough; flesh pale yellow, mealy, moderately juicy, firm, fine texture, high flavor, quality excellent; semi-cling. August.

*Black Prince:* Seedling of Tragedy. Originated by M. Sharpe, Vacaville, California. Fruit medium large, roundish-oblong, angular, dark blue nearly black; flesh greenish, medium coarse, slightly stringy, juicy, quality fair; semi-cling to freestone.

*Blue Gown:* Seedling of Satsuma. Originated by R. E. Burton, Vacaville, California, in 1908 and introduced in 1916 by M. Sharpe of the same place.

Fruit medium size, round, blue; flesh yellow, fine texture, sweet, good; clingstone. August.

*Bruce:* Chance seedling originating with A. L. Bruce, Clarendon, Texas. Austin Nursery, Austin, Texas. Fruit large, red; tree productive.

*Burton:* Originated by R. E. Burton, Vacaville, California, and introduced by him in 1911. Triflora type. Tree productive. Fruit large, round, red; flesh yellow, fine grain, subacid, high quality; pit small, cling. September.

*Burwood (Williams):* Capital City Nurseries, Des Moines, Iowa. "The largest and best plum in America, hardy, fruitful and practically free from rot. Tree resembles a thrifty young Early Richmond cherry. Fruit roundish, very large, yellow almost entirely overlaid with red; flesh yellowish, firm as a peach, tender, juicy, and of the very highest quality, good shipper. Early September."

*California Blue:* Originated by W. W. Smith, Vacaville, California, and introduced by J. E. Bergtholdt, Newcastle, California, in 1914. Domestica type. Tree hardy and productive. Fruit large, round, blue; flesh yellow, coarse, sweet, good; pit small, free. June.

*Champa Sand Cherry:* Open pollenated seedling of Sioux. Originated by N. E. Hansen, Brookings, S. D. and introduced by him in 1912. Tree very large, very hardy, very productive, bears on one-year shoots. Fruit large, roundish, black; flesh green, tender, sprightly subacid, good; pit small, semi-cling. Very early.

*Champion: (Prune).* Received from M. Sharpe, Vacaville, California, on August 17, 1915. Originated by R. E. Burton, Vacaville, California. Fruit above medium, oval, purplish red to dark purple; flesh greenish yellow, firm, rather coarse, juicy, mild sub-acid to sweet; freestone. The name of this variety should be changed because the name "Champion" appears in Hedrick's "Plums of New York."

*Chinese Apricot Plum:* Same as Prunus Simonii.

*Chipola:* Originated in western Florida. Introduced in 1915. Chipola Nursery, Apalachicola, Florida. Tree strong, upright grower; fruit large, jucy, fine flavor; delicate sun-burst color with some small specks; pit small.

*Choice:* Luther Burbank, Santa Rosa, California. Twentieth Century Fruits. "Another American seedling. Tree enormous, upright grower and great bearer. Fruit globular, above two inches in diameter; pure lemon yellow, clingstone; flesh golden yellow, firm, rich, subacid; superlatively handsome, extra good keeper, and no doubt will be one of the best of plums for shipping as well as one of the hardiest trees known. Ripe July 25 to August 5."

*Chugg:* Moore's Nurseries, Ogden, Utah. "One of the largest and best of the native plums."

*Cikana:* Dakota Sand Cherry x Gold Plum. Originated by N. E. Hansen, Brookings, S. D. and introduced by him in 1912. Tree vigorous, hardy, productive, should be grown in bush form, fruits on one-year wood. Fruit one inch in diameter, round, glossy black; flesh green, slightly red at pit, tender, subacid, very good; pit very small, cling. Late.

*Clarice:* Triflora. Originated by M. Sharpe, Vacaville, California, and introduced by him in 1916. Fruit medium size, heart shaped, yellow; flesh yellow, fine texture, acid, quality good; pit small, cling. September.

*Community Prune:* Bush Brothers Nurseries, Hugo, Oklahoma. "The best and only succesful prune for this climate. Crossed with plum to make it hardy, yet it is a real prune."

*Conquest:* New Stoneless Prune: Luther Burbank, Santa Rosa, California. Twentieth Century Fruits. "The tree is vigorous, healthy, rapid grower and unusually productive. The fruit is very similar to its civilized parent, the common French prune, in form, size, color and golden, sweet, rich flesh. The stone has been eliminated wholly with the exception of a tiny speck. Ripens with French prune." Introduced in 1911.

*Cree:* Manitoba wild plum x Combination. Originated by N. E. Hansen, Brookings, S. D. Fruit large, roundish, red; flesh yellow, firm, pleasant subacid, very good, clingstone. Season early. Tree vigorous, hardy and productive.

*Dick Damson:* Chance seedling. Originated with Houston Deck, Sarcoxie, Mo.

*Dolores:* Seedling of Santa Rosa, triflora type. Originated by M. Sharpe, Vacaville, California, and introduced by him in 1916. Fruit round-conic, medium size, pale yellow almost entirely covered with dark purplish red; flesh yellow, moderately firm, rather coarse, juicy, sweet, good quality; pit small, cling. August.

*Duchess:* Seedling of Grand Duke. Originated by R. E. Burton, Vacaville, California, and introduced by him in 1915. Domestica type. Tree hardy, productive. Fruit large, oval, blue; flesh yellow, fine grain, acid, good; pit small, free. August.

*Earliana:* Seedling of Tragedy and Clyman, domestica type. Originated by R. E. Burton, Vacaville, California. Fruit large, round-oblong, dark purplish black; flesh greenish, translucent, mild subacid, fair quality; pit large, free.

*Early June:* Pines Plantation Nursery, Hatfield, Arkansas. Original trees taken from Kentucky to Arkansas in 1840 and grown locally. Wild Goose type, does best grown from sprouts. Fruits large, red, juicy, not so pointed as Wild Goose. Season last of June.

*Elliot:* (P. Americana x P. Triflora). Minnesota State Fruit Breeding Farm. Introduced in 1914. Fruit large, oval, yellow with red blush; flesh yellow, fine grained, aromatic, sweet, very good; pit small, cling. Tree hardy, productive. Mid-season.

*Elsie:* Texas Nursery Company, Sherman, Texas. Originated by H. W. Perkins, McKinney, Texas, and introduced by him about 1903. Fruit large, yellow. July.

*Endicott:* (Mammoth Gold). William P. Stark Nurseries, Stark City, Missouri. Originated by G. W. Endicott, Illinois, about thirty years ago, and is a cross between Abundant and Spaulding. Fruit very large, roundish, slightly flattened at end, dark garnet red with faint bloom; flesh light yellow, firm and rich; skin thin, tough.

*English Green Gage:* Moore's Nurseries, Ogden, Utah. "Medium, greenish yellow, fine flavor."

*Enopa:* Sand cherry x Sultan Plum. Originated by N. E. Hansen, Brookings, S. D., and introduced by him in 1908. Fruit medium, round, dark red, with blue bloom; skin thin, free from acerbity; flesh green, flavor pleasant; inferior to Sapa in size and quality.

*Epoch:* Luther Burbank, Santa Rosa, California. Twentieth Century Fruits. "The tree is a compact grower, dwarf, with dark brown wood which always without fail produces ropes of fruit, each fruit one and one-half inches in diameter, beautifully crimson with shades and dots of yellow; flesh pure deep yellow, firm, with a rich cranberry flavor but sweeter, and when ripe very good. Middle of August."

*Erna:* Seedling of Climax. Originated by M. Sharpe, Vacaville, California, and introduced by him in 1918. Triflora type. Fruit large, round, red; flesh yellow, fine texture, good flavor and quality; pit small, semi-cling. July.

*Estella:* Sunny Slope Nursery, Hannibal, Missouri. A native seedling. Introduced by Will S. Hall, Hannibal, Missouri. Rich red on yellow ground, sweet, juicy.

*Eyami:* Sand cherry x Sultan Plum. Originated by N. E. Hansen, Brookings, S. D. and introduced by him in 1908. Tree productive. Fruit medium size, round, dark red with semi-transparent skin; skin thin; flesh green, pleasant; pit large. Inferior to Sapa and Opata.

*Ezaptan:* Sand cherry x Sultan plum. Originated by N. E. Hansen, Brookings, S. D. and introduced by him in 1911. Fruit small, dark purple with grayish overcast; flesh black-purple-red; skin thin, free from acerbity; juice rich red; quality delicious.

*Flickinger:* Leonard Coates Nursery Company, Morgan Hill, California. Not described. "A new plum of Burbank, strongly recommended."

*Geewhiz:* Luther Burbank, Santa Rosa, California. Twentieth Century Fruits. "Fruit globular, two inches in diameter, crimson blush with numerous crim-

son dots on yellow ground; flesh firm, pale amber, apricot-like in texture, exquisitely rich, freestone, good keeper, ripens early — July 25 to August 10."

*General Pershing:* Seedling of Standard prune. Originated by M. Sharpe, Vacaville, California, and introduced by him in 1918. Domestica type, unites well on all stocks. Fruit large, oval, blue; flesh yellow, fine texture, acid, quality good; pit small, free. August.

*Grundolosa:* Originated by J. D. Grundel, Martinez, California. Typical prune shape, greenish yellow, partly overspread with dull purple-red. Flesh greenish yellow, nearly sweet, pleasant, good.

*Henry Berter:* .Fruit received from Green Holomon, Lizelle, Georgia, on May 26, 1916. Fruit medium size, globular pointed, yellow turning to pinkish red; flesh yellow; clingstone; fairly good. Japanese.

*Huya:* Originated by N. E. Hansen, Brookings, S. D., and introduced in 1908.

*Improved Gold:* Sonderegger's Nurseries and Seed House, Beatrice, Nebraska. Fruit medium size, oval, red cheek, attractive golden yellow; flesh yellow, juicy, sweet; tree extremely hardy, very productive.

*Improved Wild Goose:* Colorado Seed Company, Denver, Colorado. "Fruit bright red, sweet; very hardy."

*Jewel Carpenter:* Bush Brothers Nurseries, Hugo, Oklahoma. Cross between Triflora and Chickasa. Very large; flesh meaty, juicy, sweet; good shipper. Season very early.

*Kahinta:* Apple x Terry. Originated by N. E. Hansen, Brookings, S. D., and introduced by him in 1912. Tree vigorous, hardy, productive, disease resistant. Fruit one and one-half inches in diameter, roundish, slightly oval, dark red; flesh yellow, firm, sweet, excellent; pit small, free. Mid season.

*Kimball:* Originated as a chance seedling with Dr. Edwin Kimball, Haywards, California. Fruit large, irregular oval, slightly pointed, greenish yellow, entirely washed with light or dark purple; lilac bloom; skin medium thick, tough; flesh greenish transparent, firm, rather coarse, juicy, good; pit large, free.

*Kiowa:* Prunis Watsoni x Wolf. Originated by N. E. Hansen, Brookings, S. D. Introduced in 1917. Fruit medium size, roundish, bright dark red; flesh yellow, pleasant, good, freestone. Tree hardy, vigorous and productive. Season very late.

*Larson:* Arlington Nurseries, Arlington, Nebraska. Originated by Mr. Larson, Washington County, Nebraska, from seed brought from Denmark. Fruit very large, red, best quality; tree hardy and productive.

*Late Orange:* Received from M. Sharpe, Vacaville, California, on August 20, 1915. Fruit large, globular, oval, yellow, freestone. The name of this variety should be changed because the name "Late Orange" is given to a plum originated by Thomas Rivers about 1897. This plum is described in Hedrick's "Plums of New York."

*Liberty:* Chance seedling. Originated by Tribble Brothers, Elk Grove, California. Tree very hardy and productive; fruit large, heart shape, yellow turning to deep red. Flesh yellow, fine texture, good flavor, splendid quality; pit very small, cling. May.

*Liberty (German) Prune:* German Prune renamed. Shenandoah Nurseries, Shenandoah, Iowa. Not described.

*Liberty Prune:* Woodlawn Nurseries, Rochester, N. Y. "Best of all prunes for drying. A strain of the old German prune which we have improved until we can now offer one that is larger, more uniform in size than the old variety. Flesh is juicy, rich, delicious; very productive. September."

*Mammoth:* Seedling of Simoni. Originated by R. E. Burton, Vacaville, California. Introduced by Leonard Coates, Morgan Hill, California. 1915. Fruit large, irregular round, yellow mottled and washed with dark, rich claret red; flesh yellowish, tough, firm; pit medium, cling. July.

*Metheley:* Fruit received from Tribble Nurseries, Elk Grove and Lodi, California, on June 22, 1915. Fruit dull red becoming purplish, large, conical; flesh light to dark purple red; clingstone; fair quality. Originated at Pietermaritzburg,

Natal, South Africa. Probably a cross between Satsuma and one of the Myrobalan group.

*Millard:* Chance seedling. Originated with C. D. Tribble, Elk Grove, California. Tree vigorous grower, foliage dense, bark reddish brown, very productive; fruit large, oval, deep blue with white dots all over; flesh yellow, crisp, splendid quality; pit very small. July.

*Monitor:* (P. Triflora x P. Nigra?) Minnesota State Fruit Breeding Farm. Introduced in 1920. Fruit very large, roundish oval, yellow with red blush; flesh golden yellow, fine grained, aromatic, pleasant, very good; pit small, cling. Tree hardy, very productive. Mid season.

*Monthalia:* Austin Nursery, Austin, Texas. Originated as a chance seedling with Mr. Poppe, Monthalia, Texas. Fruit large, round, yellow and red; reliable bearer.

*Nixie:* Luther Burbank, Santa Rosa, California. Twentieth Century Fruits. "Fruit nearly globular, one and one-half inches in diameter, most brilliant scarlet; flesh deep golden yellow, firm, exceedingly sweet, and almost incomparably delicious; freestone. Last half of August."

*Ogibwa:* Shiro x Manitoba wild plum. Originated by N. E. Hansen, Brookings, S. D. Introduced in 1917. Fruit large, round conic, red; flesh yellow, firm, very good, subacid, clingstone. Season early. Tree vigorous, hardy and productive.

*Okiya:* Sand cherry x Gold Plum. Originated by N. E. Hansen, Brookings, S. D., and introduced by him in 1908. Fruit small, dark-red, roundish; flesh green, excellent quality.

*Olga:* Seedling of Wickson. Originated by C. D. Tribble, Elk Grove, California. Tree vigorous grower, foliage resembles Wickson, very productive; fruit very large, roundish, heart shape, yellow covered with red; flesh yellow, fine texture, best quality; pit small, plain. July and August.

*Owanka:* Sand cherry x Gold Plum. Originated by N. E. Hansen, Brookings, S. D., and introduced by him in 1908. Fruit medium size, dark red; flesh yellow; skin very bitter which caused the variety to be discarded.

*Oziya:* Red June x DeSoto. Originated by N. E. Hansen, Brookings, S. D., and introduced by him in 1912. Tree vigorous, hardy, productive. Fruit one and five-eighths inches in diameter, round, bright red; flesh bright yellow, tender, sweet, excellent; pit small, cling. Very early.

*Pasha:* Luther Burbank, Santa Rosa, California. Twentieth Century Fruits. "Tree strong grower, tremendously productive. Fruit seven by seven and one-half inches in circumference, oval, light crimson; flesh yellow, rich, juicy and sweet; freestone. Ripens August 10 to 20. Originated in 1897."

*Patten's XX:* Originated with C. G. Patten, Charles City, Iowa. A hybrid between Burbank and some native variety. Clonton Falls Nursery Company, Owatonna, Minnesota. "Of large size, fine quality and firmness, and especially valuable on account of its being a regular and reliable bearer in the North."

*Pembina:* Manitoba Wild Plum x Red June. Originated by N. E. Hansen, Brookings, S. D. Introduced in 1917. Fruit large, roundish, red; flesh yellow, firm, pleasant subacid, very good, clingstone. Tree vigorous, hardy, and productive. Season early.

*Pride of Florida:* Originated by a Mrs. Stump, Palatka, Florida, about 1880. Medium size, globular, pale claret, to dark claret; flesh pale yellow, clingstone. In appearance seems to be a native but has the flavor of the Japanese type.

*Prize:* Seedling of Bartlett, triflora type. Originated by Luther Burbank. Fruit very large, oval, pointed; rich lemon yellow washed with carmine; lilac bloom; flesh yellowish, firm, moderately juicy, rather coarse, sweet, poor quality; pit medium, free.

*Progressive:* Originated by Bush Brothers Nurseries, Hugo, Oklahoma. "Undoubtedly the largest plum in the world and very choice in every way. Ripens from June 1 to July 15.

*Prunego:* Lonsdale Nursery, Lonsdale, Minnesota. Cross between Burbank and DeSoto. Tree very hardy; fruit very large, fleshy like Burbank, round like DeSoto, flavor excellent.

*Prunlew:* Portland Seed Company, Portland, Oregon. Hungarian by Bradshaw. Originated by H. A. Lewis, Portland, Oregon. Fruit medium to large, firm, color lighter than Hungarian; flesh golden yellow with delicious prune flavor. Ten days earlier than Bradshaw.

*Rayburn:* Seedling of Tragedy. Originated by Chas. Rayburn, Placer County, California. Domestica type. Fruit medium size, oval, blue; flesh yellow, fine texture, sweet, high quality; pit medium, free. June.

*Red Wing:* (Minnesota No. 12) Burbank x Wolf. Minnesota State Fruit Breeding Farm. Introduced in 1914. Fruit large, long oval, yellow with red blush; flesh golden yellow, tender, pleasant, aromatic, very good; pit large, free. Tree hardy, productive. Season August 20 to September 10.

*Reliance:* Van Dusen Nurseries, Geneva, New York. Fruit red; flesh red, good.

*Roadside (Williams):* Capital City Nurseries, Des Moines, Iowa. "One-third English Morello cherry; thinner skin with less astringency than any other plum. Large, round, bright red, very fine quality. Last of September."

*San Soto:* Originated by N. E. Hansen, Brookings, S. D. Capital City Nurseries, Des Moines, Iowa. Sand cherry x DeSoto plum. Fruit small, round, black; flesh yellowish green.

*Senate:* Gill Bros. Seed Company, Portland, Oregon. Not described.

*Shors:* Marble City Nursery Company, Knoxville, Tennessee. Not described.

*Skiddoo:* Farmers Seed and Nursery Company, Faribault, Minnesota. Cross between American and Japanese. Tree hardy; fruit large; flesh firm, flavor fine; pit small.

*Stanapa:* Sand cherry x Prunus Pissardi. Originated by N. E. Hansen, Brookings, S. D., and introduced by him in 1909. A purple leaf sand cherry, probably useful for ornamental planting.

*Stanley:* Originated by R. E. Burton, Vacaville, California. Introduced by M. Sharpe, Vacaville, Californinia, 1914. Triflora type. Fruit medium size, round, red; flesh yellow, fine texture, sweet, quality good; pit small, cling. July.

*Strang:* Cross between Abundance and Burbank. Originated by Wm. Strang, Piggott, Arkansas. Introduced by Stark Bros. Nurseries, 1914. Fruit large, red, resembling Burbank but handsomer and of better quality. Ripens just after Red June.

*Stuart Prune:* Said to be "a cross between the French and Tragedy prunes into the Silver prune, the Silver prune being the mother parent." Originated by J. F. Stuart, Ripon, California. Flesh very fine grain; skin same as French prune; pit small, dries same as French prune.

*Superior:* Bush Brothers, Hugo, Oklahoma. Triflora crossed with Chickasa. Originated by Bush Brothers near Denison, Texas. Prettier shape, larger and richer than Jewel Carpenter. Solid red skin. Very fine for every use.

*Superlative:* Originated by R. E. Burton, Vacaville, California, and introduced by him in 1915. Fruit above medium, oval, purplish red to dark purple; flesh greenish yellow, firm, coarse, mild subacid to sweet.

*Tama:* Underwood Farms, Lake City, Minnesota. "Tree is healthy and vigorous in growth. Fruit is largest of any American plum that has yet been introduced and proved worthy; flesh firm, but juicy, and of excellent quality. Firmness makes it a good shipper. Colored rich purplish red. Average specimens run five inches in circumference, hangs to tree well."

*Tecumseh:* Shiro x Surprise. Originated by N. E. Hansen, Brookings, S. D., and introduced by him in 1918. Tree vigorous, hardy, productive, disease resistant; fruit large, round conical, red; flesh yellow, firm, pleasant subacid, very good; pit medium size. Mid season. About 1897 the name Tecumseh was given to a plum which was previously named Hughes Late.

*Teton:* Found wild by N. E. Hansen, Brookings, S. D., near Campbell, Campbell County, S. D., in 1904, and introduced by him in 1912. Tree vigorous, spreading, hardy, productive, disease resistant; fruit one and three-eighths inches in diameter, round, red; flesh yellow; firm, subacid, good for native plum; skin thick; pit medium, practically free. Mid season.

*Toka:* Wild Plum x Prunus Simoni. Originated by N. E. Hansen, Brookings, S. D., and introduced by him in 1911. Tree very upright in habit, remarkably vigorous and productive.

*Tokata:* Originated by N. E. Hansen, Brookings, S. D., and introduced by him in 1912. Prunus Simoni x DeSoto. Fruit roundish with flat apex; medium size; freestone.

*Tonka:* (Minnesota No. 21) Burbank x Wolf. Minnesota State Fruit Breeding Farm. Introduced about 1914. Fruit large, nearly round, triflora type, yellow with red blush; flesh yellow, fine, very good, nearly freestone. Tree hardy, productive. Season August 20 to September 10.

*Topa:* From native mixed seed. Originated by N. E. Hansen, Brookings, S. D., and introduced in 1907. Fruit, large, handsome; tree low.

*True Blue:* Seedling of Tragedy. Originated by R. E. Burton, Vacaville, California, and introduced by him in 1917. Domestica type. Fruit medium size, round, blue; flesh yellow, fine texture, sweet, quality good; pit small, free, August.

*Ulatis:* Originated by M. Sharpe, Vacaville, California, and introduced by him in 1918. Triflora type. Tree thrifty, does well on all stocks, productive; fruit medium size, round, yellow washed with red; flesh yellow, fine texture, sweet, quality good; pit small, cling. September.

*Underwood:* (Minnesota No. 91) Shiro x Wyant. Minnesota State Fruit Breeding Farm. Introduced about 1917. Fruit very large, roundish, yellow with red blush; flesh golden yellow, fine texture, aromatic, good; pit small, cling. Tree hardy and productive. Season first of August.

*Upright:* Originated by R. E. Burton, Vacaville, California, and introduced by him in 1915. Triflora type. Tree very upright and thrifty, productive; fruit medium size, roundish conic, light to very dark purplish red; flesh yellow stained red, firm, meaty, rather tender, flavor quite acid, quality fair; pit small, semi-clung. July.

*Vacaville:* Originated at Vacaville, California. Chico Nursery Company, Chico, California. Fruit large, oval, purple; flesh yellow, firm, excellent flavor; pit small. Season June 20 to July 5.

*Vesta:* Luther Burbank, Santa Rosa, California. Twentieth Century Fruits. "Fruit very large, oval, two by two and one-fourth inches in diameter, handsomely marbled, crimson and orange; freestone; firm, sweet, delicious."

*Victory:* Luther Burbank, Santa Rosa, California. Twentieth Century Fruits. "Seedling of America. Tree a good strong grower, excelling most of the native plums, good regular bearer. Fruit nearly globular, pure crimson; flesh pale amber, peach-like in texture, dry, rich, sweet, delicious; stone small, half cling. Ripe July 20 to August 5."

*Wachampa:* Sand cherry x Sultan Plum. Originated by N. E. Hansen, Brookings, S. D., and introduced by him in 1910. Much like Sapa but a stronger grower and fruit smaller, one inch in diameter. Fruit dark purple; flesh and juice dark purple; skin bitter.

*Wade's October:* Originated by Captain F. S. Wade, Elgin, Texas. Austin Nursery, Austin, Texas. Tree very productive; fruit medium size, bluish red. Season September and October.

*Wahanka:* Originated by N. E. Hansen, Brookings, South Dakota. Not described.

*Waneta:* Apple x Terry. Originated by N. E. Hansen, Brookings, South Dakota. Introduced in 1912. Fruit very large, round slightly pointed, red; flesh yellow, firm, sweet, delicious, quality excellent, semi-cling. Tree very vigorous, hardy, and productive. Mid season.

*Wilma:* Cross of Grand Duke by Burbank. Originated by M. Sharpe, Vacaville, California, and introduced by him in 1917. Tree shows characteristics of both parents, prolific and productive; fruit large, round, dark blue; flesh yellow, fine texture, quality excellent; pit small, semi-cling. August.

*Wilson:* Seedling of Burbank. Originated by R. E. Burton, Vacaville, California, and introduced by him in 1912. Triflora group. Tree productive. Fruit large, round, red; flesh yellow, fine grain, sweet, good; pit small, cling. July.

The name Wilson was used for a Wisconsin plum in 1897, as stated in Plums of New York by Hedrick.

*Winnipeg:* Originated from seed of native plums from Manitoba, B. C. Introduced by N. E. Hansen, Brookings, S. D., in 1908.

*Winsboro:* Foster Nurseries, Denton, Texas. Tree very strong and vigorous. Fruit medium to large, generally round, glowing red; flesh yellow, good quality. Early.

*Woodman:* Sunny Slope Nursery, Hannibal, Missouri. Rich, sweet, productive, hardy.

## PLUMCOT

*Apex:* Originated by Luther Burbank, Santa Rosa, Calif. Tree a good upright grower, does well on plum, peach, apricot or almond stocks. Fruit very large, globular, deep pink to light crimson; flesh yellow, rich, aromatic, flavor unusual but pleasant. May.

*Corona:* Luther Burbank, Santa Rosa, Calif. Twentieth Century Fruits. "Fruit beautiful, large, golden yellow with velvety skin and with a red cheek; flesh yellow, fairly firm, sweet, delicious; clingstone. Tree a strong, upright grower, productive. Ripens here July 25th."

*Francis I:* Originated by Mrs. Francis Johnson, Sherman, Texas. Bush Brothers Nursery, Hugo, Okla. Tree hardy, very productive. Fruit very large, golden yellow. August.

*Poe's Royal Cot:* Originated by a Mr. Poe of California. Introduced by the Cash Nurseries, Sebastopol, Calif. in 1916. Tree more hardy than the apricot. Fruit smaller than the apricot, distinct flavor of both apricot and plum. Blossoms two to four weeks after apricots.

*Sharpe:* Originated by M. Sharpe, Vacaville, Calif. Leonard Coates Nursery Company, Morgan Hill, Calif. Fruit very large.

*Smith:* Originated by W. W. Smith, Vacaville, Calif. and introduced by Tribble Bros., Elk Grove, Calif. in 1914. The tree is a shy bearer. Fruit large, ovate, yellow; flesh yellow, fine texture, sweet, highest quality; pit small, cling. July.

*Stanford:* Cross between Royal apricot and Normand plum. Originated by R. E. Burton, Vacaville, Calif., and introduced by Leonard Coates Nursery Co., Morgan Hill, Calif. in 1916. Tree thrifty and productive. Fruit large, roundish lopsided; apex sunken; rich yellow with deep rich red blush; skin thick, tough, sour; flesh rich yellow, juicy, moderately fine, firm until fully ripe, pleasant apricot flavor, sweet and rich, good to very good; pit small, cling. July.

*Triumph:* Luther Burbank, Santa Rosa, Calif. Twentieth Century Fruits. "Tree productive, of weeping habit, with long, slender branches. Fruit apricot-like in form, six inches around, with a purple velvety skin, finely dotted and mottled scarlet; flesh firm, apricot-like in texture, deep crimson with lighter shades nearer the stone, rich apricot flavor with plum accompaniment. One of the most unique of all fruits. Ripens August 15."

*Velvet:* Originated by R. E. Burton, Vacaville, Calif., and introduced by M. Sharpe, Vacaville, Calif. in 1917. Tree not productive. Fruit large, ovate, purple; flesh yellow, fine texture, acid, good quality; pit small, cling. August.

## APRICOT

*Baby Lewis:* Winfield Nurseries, Winfield, Kansas. Originated in Oregon. Fruit almost round, very large, rich yellow, free from woody tissue, excellent. Last half of July.

*Bennet:* Winfield Nursery, Winfield, Kansas. Originated in Utah. Often as large as Elberta peach, golden yellow with slight red blush, oblong resembling Montgamet in shape; flesh clear of woodiness, honey sweet.

*Blanch:* Winfield Nurseries, Winfield, Kansas. A chance seedling from Russia, light yellow with firm flesh, rich and sweet, without woody fiber. Fruit large. Tree hardy.

*Cambron:* Winchester Nursery Co., Winchester, Tenn. Not described.
*Dr. Wells:* Weedpatch Nursery, Arvin, Calif. "Earliest, May".
*Early May:* Illinois Nursery, Makanda, Ill. Fruit yellow, rich, juicy, freestone, very early. Russian type.
*Japan Mammoth:* Leonard Coates Nursery Co., Morgan Hill, Calif. Fruit very large, fine quality, rather late. Tree productive.
*Lewis:* Russellville Nursery Co., Portland, Oregon. Originated with H. A. Lewis, Russellville, Oregon, about 1895 from a seed of a Russian apricot. Fruited first in 1898 and introduced by Mr. Lewis about 1900. Fruit large. Flesh not stringy, but mellow, juicy, rich and sweet. Tree vigorous and productive. July and August.
*Lincoln:* Seedling of Royal. Introduced by M. Sharpe, Vacaville, California in 1916. Tree thrifty; fruit large, ovate, yellow; flesh yellow, fine texture, sweet, good quality; pit medium size, free. June.
*Sharpe:* Originated by M. Sharpe, Vacaville, Calif. Fruit very large, round ovate, deep yellow with tinge of red; flesh rich dark yellow, somewhat fibrous, juicy, mildly sweet, quality good; pit medium size, free. Ripens with Royal.
*Talbert:* Introduced by C. M. Hobbs & Sons, Bridgeport, Indiana in 1916. Tree hardy, annual bearer; fruit medium, oval, slightly flattened, solid golden yellow; flesh orange yellow, moderately juicy, very sweet when fully ripe; pit free. Season middle of July.
*Yard:* Seedling of Moorpark. Originated by Tribble Bros., Elk Grove, Calif. Tree very hardy and productive; fruit very large, flat, light yellow; flesh yellow, fine texture, high quality; pit medium, free. July.

## NECTARINE

*Cameron:* Winchester Nursery Company, Winchester, Tennessee. Not described.
*Elbank:* Originated by L. C. Gammill, Watumka, Oklahoma, from a pit of an Elberta peach. Size medium, orange yellow with bright scarlet streaks around stem end, nearly round; flesh juicy, sweet, quality good; stone cling.
*Elbur:* Originated by L. C. Gammell of Watumka, Oklahoma. Seedling of Elberta. Not described.
*Grady:* Originated in Bullock County, Alabama. J. Van Lindley Nursery Company, Pomona, North Carolina. Size nearly equal to Elberta peach, light red on yellow ground, quality very fine. August.
*Japan:* Winchester Nursery Company, Winchester, Tennessee. Not described.
*Jaune de Padoue:* Introduced by Leonard Coates Nursery Company, Morgan Hill, California. Fruit very large, yellow. Late in season.
*Miller:* Sunny Slope Nursery, Hannibal, Missouri. Not described.
*Smith:* Originated by W. W. Smith. Introduced by M. Sharpe, Vacaville, California in 1915. Fruit large, ovate, red; flesh red, acid, good; pit medium size, cling. July.
*Taylor:* Winchester Nursery Company, Winchester, Tennessee. Not described.
*Traveler:* Originated by Tribble Brothers, Elk Grove, California, in 1909 and introduced by them in 1913. Tree large, vigorous, hardy, not productive. Fruit large, round, deep red; flesh amber, fine texture, sweet, good; pit very small, free. August.

## CHERRY

*Black German:* Brought to notice by Stephen Barnes, Sr., about the time of the Civil War. Not known where Mr. Barnes obtained it. Very similar to Black Tartarian. M. Barnes & Co., Groesbeck, Ohio. "Large, purplish black, mild and pleasant, vigorous, erect and beautiful grower, an immense bearer, popular in all parts of the country. First half of June."
*Brodbeck:* S. S. Brodbeck, Gallatin, Mo. Tree very hardy, producing full crop after a winter of 32° below zero. Fruit dark color, round, sweet, vinous; pit small. Ripens a few days after Early Richmond.
*Brummer:* Sunny Slope Nursery, Hannibal, Mo. Not described. Sweet.

*Cass:* Seedling of Napoleon. Originated by a Mr. Benton of Whatcom Co., Washington. Tree resembles Napoleon but is five times as prolific Fruit darker colored than Napoleon. Ripens in July.

*Corvallis:* Received from Mrs. Helen R. Hull, Corvallis, Oregon, on July 5, 1916. Fruit very large, heart-shaped, rich dark red, flesh tinged with purple, good quailty but not so rich and snappy as Bing and Schmidt, semi-cling.

*Early Champion:* Silva-Bergtholdt Co., Newcastle, Calif. "Large, black, very juicy, firm and of fine eating quality. Resembles in some respects the Tartarian but will not average quite as large. Good shipper, productive. Ripens immediately in advance of Tartarian, April 25 to May 10."

*Geante de Hedelfingen:* Introduced from England in 1907 by M. Sharpe, Vacaville, Calif. Tree hardy, productive. Fruit large, ovate, black; flesh red, firm, sweet, high quality; pit medium, cling. June.

*Hackett's Early:* Old Dominion Nurseries, Richmond, Va. Not described.

*Kallich Giant:* Received from Julius Kallich, Portland, Oregon, on July 16, 1914. Fruit very large, heart-shaped to oblong, color claret-black, very good in quality, clingstone, resembles Lambert very closely and is said to be a seedling of Lambert.

*Mason County Seedling:* W. W. Clark's Nursery, Sharpsburg, Ky. "Has all the good qualities of the early Richmond. The tree is a better grower, fruit a little more acid and ten days later." Fruit pale red, flesh pale red, juice pink, quality good.

*Meeker:* Frank S. Platt Co., New Haven, Conn. Introduced by Elm City Nursery Co., New Haven, Conn., about 1903. It does not seem to be propagated now. Not described.

*Monarch:* Smith Bros. Nursery, Centerville, Utah. Hoops Bro. & Thomas Co., West Chester, Pa., describe it as follows: "A magnificent new tart cherry, very large, dark red, fine for canning; tree hardy and productive. July."

*Moscow:* Seedling from Russia imported by N. E. Hansen, Brookings, S. D., in 1906 and introduced in 1917. Fruit medium size, round, bright red; flesh light color, firm, pleasant acid, good, juice light colored, clingstone. Tree productive, vigorous, hardy. Early.

*Nelson:* Information furnished by Prof. L. R. Taft, East Lansing, Mich. "In a lot of nursery trees purchased by C. A. Nelson, Northport, Mich., about 1898, 15 were of an unknown variety and were named Nelson. Tree very vigorous and hardy and early and prolific bearer. Fruit very large, brownish black, late in season and will hang a long time after ripening. Unusually good shipper and holds up well in cold storage."

*Perry:* Originated by Wm. Stewart, Landesburg, Pa. Fruit short, roundish, heart-shaped; suture side flat, other side rounded. Rich dark red with bright red undercolor. Flesh light yellow tinged red, rich, vinous, mild subacid, nearly sweet in very ripe fruits, good to very good.

*Royal Stewart:* Originated in Lane County, Oregon, Albany Nurseries, Albany, Oregon. "Of the *Royal Ann*, Napoleon, type but maturing four to six weeks later." "Is a firmer and better shipping variety than Black Republican."

*Saylor:* The Wragg Nursery Co., Des Moines, Iowa. Fruit white or yellow, very large, sweet; tree very hardy. Introduced from Russia by Prof. J. L. Budd about 1880.

*Sowles Perfection:* Seedling of Wood. Originated with Fred Sowles, Kalamazoo, Mich. Introduced by the Celery City Nurseries, Kalamazoo, Mich., in 1912. Tree strong grower. Fruit large and handsome, being straw color, splashed to fully covered with red, flesh hard and meaty, sweet.

*Sydney:* Originated with Emerson Taylor, East Carmel, Ohio. Rogers Nurseries, Rogers, Ohio. "It is a very large and very productive dark red cherry, fine for eating or cooking. This variety loaded with its large clusters of such large dark red cherries makes a most magnificent showing of fruit." Introduced by Eliphas Cope, Rogers, Ohio, about 1914.

*Tangsi:* Imported by Office of Foreign Seed and Plant Introduction from Tangsi, Province of Chekiang, China, about 1905. "Ripens a week to ten days earlier

than commercial varieties now grown in northern California. March 30 to April 3 in 1914. Fruit size of Early Richmond, flavor excellent."

*Vaughn:* Leonard Coates Nursery Co., Morgan Hill, Calif. "Early, red, sweet and of large size."

*Vaughn's extra Early:* Originated with James Vaughn, near Salem, Oregon, about 1890. Introduced by C. F. Lansing, Oregon, about 1897. Tree large, hardy, regular bearer. Fruit nearly as large as Napoleon, bright red, sweet. Middle of May.

*Wright's Early:* Otto Schwill & Co., Memphis, Tenn. Not described.

*Wright's Mammoth:* Otto Schwill & Co., Memphis, Tenn. Not described.

## CHERRY — PLUM HYBRID

*Zumbra:* A cross of Pin cherry x sweet cherry open pollinated supposedly by Sand cherry. Minnesota State Fruit Breeding Farm. Introduced in 1917. Fruit round, three-fourths inch in diameter, black; flesh green with purple streaks, tender, good; pit small, free. Tree hardy, productive. Early.

## MULBERRY

*Abundance:* Sonderegger's Nurseries and Seed House, Beatrice, Nebr. Tree very productive, strong upright grower, said to be very hardy. Fruit long, glossy black, excellent quality.

## PERSIMMON

*American Seedling:* Bridgeport Nurseries, Bridgeport, Indiana. "Fruit medium size and a good, rich flavor."

*Edoe:* Imported from Japan by Domoto Brothers, Oakland, California, in 1916. California Nursery Company, Niles, California. Not described.

*Edoichi:* Imported from Japan by Domoto Brothers, Oakland, California, in 1916. California Nursery Company, Niles, California. Not described.

*Giant:* Originated by Tribble Brothers, Elk Grove, California, about 1911. Fruited first in 1916. Tree medium grower, with very large elongated leaves, fairly productive. Fruit very large, square shape, skin fine, clear yellow; flesh light yellow, smooth texture, fine flavor, superb quality, practically seedless. October.

*Glidewell:* Originated with Marshall Glidewell, Bridgeport, Indiana, about 1914. Seedling of Ruby. Introduced by Bridgeport Nurseries, Bridgeport, Indiana, about 1918. "Large, oblong, good quality, no astringency, one of the best native persimmons."

*Gold Medal:* Seedling of Hachiya. Originated with W. L. Shales, Placentia, California, in 1908. Tree vigorous grower, large, productive. Fruit large, weighing one pound, pointed, red; flesh orange color, smooth texture, fine quality. November.

*Ramsey:* Originated with F. T. Ramsey & Son, Austin, Texas. Fruited first about 1904. Introduced by this firm in 1917. "Native persimmon, highest quality. Ripens September and October."

*Sato:* Fancher Creek Nurseries, Fresno, California. "A medium sized fruit, good flavor."

*Tribble:* Seedling of Tanenashi. Originated by Tribble Brothers, Elk Grove, California, in 1910, and introduced by them in 1915. Tree medium size, very hardy, very productive. Fruit above medium, flat, yellow turning red when ripe; flesh yellow to brown, texture smooth, flavor sweet, quality splendid; seeds small. October.

## GRAPE

*Adobe Giant:* (Vitis doaniana). Native of Wilbarger Co., Texas. Munson Nurseries, Denison, Texas. "Fine for sandy and limy black soils. Resistant stock."

*Alpha:* Found growing wild by Rev. J. B. Katzner, Collegeville, Minn. in 1901 and introduced by Strand's Nursery, Taylors Falls, Minn. in 1916. Vine very hardy, will stand 40° below zero, very productive, resistant to mildew. Cluster somewhat smaller than Concord, long, cylindrical, tapering; berry blue.

*Archias' Mammoth Concord:* Archias' Seed Store, Sedalia, Mo. "An improved hardy variety of the good old Concord. Very prolific and in all a most valuable grape."

*Arkansas (Seedling):* Arkansas Nursery Co., Fayetteville, Ark. "A large black grape of delicious flavor; very prolific; an annual bearer." The name "Arkansas" was used for another grape in 1893.

*Australis (Vitis solonis):* Munson Nurseries, Denison, Texas. "Resistant stock, especially fine for sandy soils."

*Beltzina:* (Labrusca x vinifera) X (Riparia hybrid and labrusca x vinifera). Originated by Joseph Backman, Altus, Arkansas. Clusters medium size, fairly compact, berry large, round, yellow, quality excellent.

*Betty:* Manito x Thompson Seedless. Originated by S. W. Underhill, Croton-on-Hudson, New York, and introduced by him in 1917. Clusters extra large; berry the size of Delaware, black, seedless; vine hardy in zero temperature. Very early.

*Black Mustang:* Cibolo Nursery, Cibolo, Texas. "The common black kind, fine for dark red wine."

*Blue Black:* Hermann Grape Nurseries, Hermann, Missouri. Plant strong grower, valuable for arbor planting rather than for vineyard use. Bunch medium; berry medium, oval, black, somewhat foxy. Early, not subject to rot.

*Bock's Beauty:* Originated with Capt. Siegfried Bock, Mentz, Colorado County, Texas. Introduced by Eagle Lake Nurseries, Eagle Lake, Texas, in 1915. Fruit similar to Herbemont but slightly larger in cluster and berry, black pulp, juicy and melting. Clusters will remain on the vine until frost. Resistant to rot and needs no spraying.

*Bock's Rot Proof:* Same as Bock's Beauty.

*Caco:* Catawba x Concord. J. T. Lovett Inc., Little Silver, N. J. Vine a very strong, vigorous grower and very prolific. Clusters of good size, compact; berry large, bright wine red. Ripens with Concord or earlier.

*Chasselas Neuschatel:* Armstrong Nurseries, Ontario, California. "An early variety, white, medium size, prolific." July.

*Daisy (of Rocsch):* Same as Early Daisy.

*Dakota:* Pioneer Nursery Co., New Ulm, Minn. Introduced by this Company as a hardy variety. Berries nearly as large as Concord.

*Delliant:* Delaware x Brilliant. Originated by Joseph Backman, Altus, Ark. and introduced by him in 1918. Not described.

*Diamond Jubilee:* Elmsford Nurseries, Elmsford, N. Y. "The variety is a large, black, oval berry which colors up well, has a fine muscat flavor. It makes a nice shapely bunch. A greenhouse grape. From England."

*Dogridge (Vitis champini):* Munson Nurseries, Denison, Texas. "Native of Bell County, Texas. Well adapted for limy and sandy soils. Resistant stock."

*Early Bird (Blue):* Originated by Lucius B. White, Norwood, Mass. Fottler, Fiske, Rawson Co., Boston, Massachusetts. Vine hardy, vigorous. Berry large, oblong, dark blue, excellent quality. Very early. This name was used for a grape by Mr. T. V. Munson some years ago.

*Eleanor:* Seedling of Rothenol. Originated by Munson Nurseries, Denison, Texas, and introduced by this firm in 1917. Cluster medium size. Berry medium to large, rich red, pulp tender, quality splendid. Ripens with Edna.

*Eschol:* Munson Nurseries, Denison, Texas. "The Grape of Eschol introduced from Palestine by General Lew Wallace; cluster very large, berry very large, ovoid, meaty, purplish black." May be same as Terre Promise.

*Extra Early Red:* New Orleans Pecan Nursery Company. "Fully three weeks earlier than any other known variety, ripening June 20; most valuable on account of its earliness and fine table quality."

*Extra Early White:* New Orleans Pecan Nursery Company. "Berries medium, very juicy and sweet, bunch of good size, ripens June 20, fully three weeks earlier than any other known variety."

*Fruitland:* Black Scuppernong seedling. "The grape is large and almost black; grows in short thick clusters, is full of juice and has the flavor of a muscadine." October. Vine prolific. The Florida Agriculturist. Dec. 25, 1889.

*Giant Concord:* Burns City Nursery, Burns City, Indiana. Giant Concord is a synonym of King.

*Globe:* Lindley x Columbian Imperial. Originated by Joseph Backman, Altus, Arkansas. Cluster very large, compact. Berry medium size, round, yellow, quality very good.

*Green Verdel:* Crow Nurseries, Gilroy, California. Not described.

*Hamadan:* Aggeler & Musser Seed Co., Los Angeles, California. Introduced from Persia. "Compares with muscat but much superior in every respect, almost seedless, deliciously sweet and when properly trellised enormously prolific."

*Hubbard:* Brighton x Campbell. T. S. Hubbard Company, Fredonia, N. Y. "Clusters good shape and size; berries large and uniform, averaging with well grown Concord, black; skin thin and tough; pulp sweet, juicy, best quality; ripening about ten days before Concord."

*Hungarian:* Strand's Nursery, Taylor's Falls, Minn. Said to have originated with Carl Stifter, Cokato, Minn. from seed brought by him from Hungary. Vine perfectly hardy; berry medium size, black, sweet, not foxy, bunch fairly large, compact.

*Improved Everbearing:* Bush Bros. Nurseries, Hugo, Oklahoma. "The earliest and latest and all along between times."

*Karum:* Aggeler & Musser Seed Company, Los Angeles, California. Imported from Persia. "A long white grape of delicious flavor, almost seedless, clusters enormously large."

*Marcus:* Seedling of Ellen Scott crossed apparently with Eschol. Originated by Munson Nurseries, Denison, Texas, and introduced by this firm in 1917. Cluster large, cylindrical; berry large, red, pulp very tender, sweet, very good.

*Mathilda:* Seedling of Violet Chasselas probably crossed with Brilliant. Originated by Munson Nurseries, Denison, Texas, and introduced by this firm in 1917. Clusters large, attractive; berry above medium, red, firm with tender pulp, quality very best.

*Melton Constable:* Arthur T. Boddington Company, 128 Chambers Street, New York City. Not described.

*Minnie:* Seedling of Edna probably crossed with Longfellow. Originated by Munson Nurseries, Denison, Texas, and introduced by this firm in 1917. Cluster large, conical, attractive; berry large, white covered with a frost-like bloom, pulp tender, quality very best.

*Monitor:* Pioneer Nursery Company, New Ulm, Minnesota. Introduced by this company as a hardy variety. Berries nearly as large as Concord, and same quality as Beta.

*Nicholson:* Originated near Maccleny, Florida. Fruited first in 1911 and was introduced by Griffing Brothers, Port Arthur, Texas, in 1912. Vine robust, very productive. Berry very large, black. "Seems to be almost identical with Jones but ripens several weeks earlier."

*Nitodal:* Seedling of Sabinal. Not described.

*Ontario:* Winchell x Diamond. Originated by Experiment Station, Geneva, N. Y. Introduced by the New York State Fruit Testing Cooperative Association in 1919. Vine vigorous, hardy, productive, slightly susceptible to mildew. Cluster medium to large, cylindrical, single shouldered, somewhat loose; berry roundish, green, vinous, sweet, very good. Very early.

*Payne:* Sport of Black Malvoise. Originated with Geo. C. Payne, San Jose, California, about 1909. Introduced by Tribble Brothers, Elk Grove, Calif., in 1915. Vine very productive. Cluster medium size, long, loose; berry large, ovate, black, extra good quality. Last half of August.

*Pierce Giant:* Originated with Mr. Pierce, San Jose, California. Introduced by C. C. Morse, San Francisco, California, about 1908. Said to be a sport of Isabella. John Lewis Childs, Floral Park, N. Y. Vine vigorous, hardy; clusters large; berry large, black, pulp tender and melting and of superb flavor, skin tough, making it a good shipper. "Keeps perfectly into January."

*Portland:* Champion x Lutie. Originated by Experiment Station, Geneva, N. Y. Introduced by the New York State Fruit Testing Cooperative Association in 1919. Vine vigorous, hardy, healthy, productive. Clusters medium size, tapering, usually loose; berries large, roundish, green, flavor neutral becoming foxy, very good. Very early.

*Red Emperor:* Comal Springs Nursery, New Braunfels, Texas. Similar to Tokaya. Later in season. Bunches large and longer than Tokaya, but berries not quite so large. Flesh solid. Plant very strong grower.

*Rio Grande Concord:* Eltweed Pomeroy, Donna, Texas. Synonym of Lukfata.

*Roberts Wild White:* (Vitis vulpina). Found wild on the property of Mr. Roberts, New Ulm, Minnesota, about 1911. Introduced by Wm. Pfaender Jr., New Ulm, Minnesota, in 1912. It is a white or reddish wild grape and is very sweet. Not much larger than our native Fox grape."

*Rothenol:* Cross of Armlong with Jefferson. Originated by Munson Nurseries, Denison, Texas, about 1914. Not described. Was not introduced.

*Sabinal:* A wild variety of Vitis Champini x Brilliant. Originated by Munson Nurseries, Denison, Texas. Not described.

*Salamander:* Seedling of Sabinal. Munson Nurseries, Denison, Texas. Vine vigorous and healthy, hardy, prolific; cluster, medium size, compact; berry medium size with melting pulp and quality of Delaware.

*Star:* Sunny Slope Nursery, Hannibal, Missouri. Extremely hardy, immensely productive, quality unexcelled; berry large and sweet.

*Stockwood Golden Hambro:* Seedling of Black Hambro x White Sweetwater. Originated by a Mr. Bushbee, near Luton, England. Vine similar to that of Black Hambro. Cluster large, loose, branching, shouldered, six to nine inches long; berry large, oval, pale yellow changing to pale amber, flesh melting, very juicy, remarkably rich, sugary and vinous. The Horticulturist, 1856, Page 76.

*Sueltor:* Pioneer Nursery Company, New Ulm, Minnesota. Introduced by this Company as a hardy variety. Berries nearly as large as Concord.

*Texas Arbor Black:* Not described. Erath County Nursery, Dublin, Texas.

*Texas Arbor White:* Erath County Nursery, Dublin, Texas. Not described.

*The Belle:* Supposed to be a cross between Concord and Catskill. Originated in Illinois. L. J. Farmer, Pulaski, N. Y. Vine very vigorous, very productive. Bunch medium size, compact and shorter than Concord and less shouldered; berry large, pale red, good flavor, ripens early.

*The Mammoth:* Imported from Georgetown, British Guiana, S. A. by G. H. Poe, Kenton, Ohio about 1899. Vine strong, productive. Cluster large, compact; berry large, dark blue, pulp very tender, sweet, juicy, parts readily from the seeds. September.

*Volney:* Seedling of Ellen Scott apparently crossed with Muscat Rose. Originated by Munson Nurseries, Denison, Texas, and introduced by this firm in 1917. Cluster very large; berry large, slightly oval, very delicious with flavor like the vinifera type, color about like Ellen Scott. Season a week later than Ellen Scott.

*White Diamond:* H. W. Buckbee, Rockford, Illinois. "Valuable for all sections of the United States. Best white, healthy and perfectly hardy."

*White Mustang:* Cibolo Nursery, Cibolo, Texas. "This is a fine strong growing vine, fine for arbors, wine is of light color like California white wines, just as good a bearer as any wild Black Mustang grape, much sweeter. They must be grown from layers, will not grow from cuttings like other grapes."

*Wild Black:* Pioneer Nursery Company, New Ulm, Minnesota. Not described.

*Wild White:* Originated with Mr. Roberts, near New Ulm, Minnesota, about 1911. Pioneer Nursery Company, New Ulm, Minnesota. "This is a sweet grape, size same as Wild Black, but a larger bunch."

## BUSH FRUITS

### Blackberry

*Black Loganberry:* Synonym of Mammoth.

*Boschen's Early:* Originated with a Mr. Boschen, Toronto, Kansas. Plant bushy, a little tender if in an exposed place and winter is severe. Berry resembles Early Harvest but is large and coreless, good shipper, jet black.

*Cazadero:* Was found on Cazadero Mt., Clackamas County, Oregon, by Fred Gosser, Oregon Nursery Company, Orenco, Oregon. Plant thornless, prolific. "Perfect in self pollination. Retains the wild spicy flavor of the wild blackberry. The vines carry berries virtually from the ground to the tip of the two-year-old canes."

*Cory's Thornless:* Discovered by Martin Meuli in Mountain Pass, Tuolumne County, California, 1909. Propagated by W. C. Cory of the same place. Ekstein Nurseries, Modesto, California. Plants very vigorous, often growing twenty to thirty feet in a season, thornless, very productive. Berry exceedingly large, flavor very much like the wild blackberry of California, almost seedless, core small and firm, less acid than the loganberry. Season three weeks earlier than most blackberries.

*Delicious:* Tenth or twelfth generation seedling of Himalaya. Originated by Luther Burbank, Santa Rosa, California, and introduced by him in 1912. "Plants astoundingly vigorous, thorny, medium hardy, enormously productive; fruit medium size, shape of Himalaya, black, flesh black, sweet, superb quality." August and September in California.

*Dublin Best:* Erath County Nursery, Dublin, Texas. "Apparently a wild plant found on the farm of Mr. Tackett and introduced by S. P. Sitton, Dublin, Texas."

*Early Albany:* Bridgman Nursery Company, Bridgman, Michigan. Not described.

*Favorite Trailing:* Rosebud Nursery, Winner, S. D. Plant very productive, quite hardy, but needs some protection; blooms a month later than apple or cherry trees. Fruit large, beautiful, good quality.

*Favorite Trailing Blackberry:* Same as Favorite Trailing.

*Georgia Mammoth:* Originated with W. D. Beatie, Atlanta, Georgia. Sneed Nurseries, Morrow, Georgia. Plant strong, upright, branches long and drooping and often root at the tips, not very thorny, productive, do not sucker. Fruit large, jet black, very glossy, never turns red, without any hard core, small seeds, extra fine quality and a peculiarly rich aroma. Early, about with Wilson.

*Green's New Hardy Blackberry:* Originated with Green's Nursery, Rochester, N. Y. and was introduced by this company. Plants hardy, vigorous, productive; fruit large, high quality, tender to the core.

*Humboldt Berry:* Originated by S. L. Watkins, Pleasant Valley, California, and introduced by him in 1916. Seedling of Rubus Ursinus. "It is extremely early and of high flavor and great productiveness."

*Macatawa:* (Everbearing) Giant Himalaya x Eldorado. Originated by Alfred Mitting, Holland, Michigan, in 1909. Introduced in 1912. Fruit very large, oblong, sweet, coreless and almost seedless, very solid, jet black.

*Mark Twain:* Sunny Slope Nursery, Hannibal, Missouri. Big, black, glossy berries, sweet and melting, no hard core.

*New Hardy Tartarian:* Farmer's Seed and Nursery Company, Faribault, Minnesota. Of special value in northern states on account of extreme hardiness. Plants strong, free from rust, very productive. Berry above medium, brilliant black, rich and melting with practically no core, sweet, extra fine quality. Season very long.

*Mack's Soft Core:* Crandall x Gardena Dewberry. Originated by J. M. Mack, Fallbrook, California. Introduced in 1917. Plant hardy and productive. Berry medium size, spicy, excellent, midseason.

*Mack's Strawberry Flavored Blackberry:* Cuthbert x Himalaya. Originated by J. M. Mack, Fallbrook, California. Introduced in 1917. Plant extremely

vigorous, very hardy, productive; berry medium, roundish, black, strawberry flavor, excellent quality. Everbearing.

*Mammoth Thornless:* Is Cory's Thornless.

*Miller:* Originated by D. J. Miller, Akron, Ohio. Storrs & Harrison Company, Paynesville, Ohio. Plant hardy, robust, very prolific. Fruit very large, sweet, juicy, no core.

*New Cazadero:* Synonym of Cazadero.

*Reid:* Lang Floral and Nursery Company, Dallas, Texas. Plant hardy, vigorous, upright, almost free from suckers. Fruit large, delicious. Early.

*Santa Rosa:* Originated by Luther Burbank, Santa Rosa, California, and introduced by him in 1912. Plant exceedingly vigorous, growing 25 feet or more a year. Propagated by rooting tips, thornless, "enormously productive." Fruit medium to large, ordinary blackberry shape, black; flesh black, firm, sweet, delicious, excellent quality. Late.

*Sebastopol:* Originated by Luther Burbank, Santa Rosa, California, and introduced by him in 1912. Plant thornless. Fruit a little larger than Santa Rosa and ripens two weeks later.

*Scruggs:* E. W. Townsend, Salisbury, Maryland. Not described.

*Snowbank:* Tenth generation seedling of Iceberg. Originated by Luther Burbank, Santa Rosa, California, and introduced by him in 1912. Bush upright, productive. Fruit medium size, usual blackberry shape, color snow white, texture soft; flesh white, good, mid season.

*The Queen:* Texas Nursery Company, Sherman, Texas. Native of north Texas. Fruit large; plant productive, strong, upright grower after first year. Early.

*Tribble:* Originated near Elk Grove, California. Introduced by Claude Tribble, Elk Grove, California. "Cane is like Logan but ripens earlier." Three weeks earlier than Mammoth.

*Trinity Early:* Erath County Nursery, Dublin, Texas. Not described.

### Dewberry

*Guadalupe:* Comal Springs Nursery, New Braunfels, Texas. Native wild plant. Berries large, oblong, sweet, darkest color. Early. Plants vigorous.

*Mortgage Lifter:* Aggeler & Musser Seed Co., Los Angeles, Calif. "The great merits of this variety are its extreme earliness and its enormous yield of large fruit."

*Northey Berry:* A selected type of the wild dewberry of northern Florida. S. L. Watkins, Pleasant Valley, Calif. Is a perfect flowering variety and produces enormous crops when planted alone. Succeeds well in the Southern States and in the Pacific Coast states. Very early.

### Raspberry

*Abundance:* Originated by H. J. Schild, Ionia, Michigan. Introduced by Pioneer Nursery Company, New Ulm, Minnesota. Plant very hardy, productive; purple type. Fruit large, dark red with purplish tinge.

*Adams' Black Perfection:* Originated by Geo. Adams, Smithville, Ontario. Brown Brothers, Ontario, Canada. Plants hardy, vigorous, productive. Fruit large, firm, rich, black, splendid shipper. Extra early.

*Brighton:* Originated by Wm. Saunders, London, Ontario, and introduced by the Central Experimental Farm, Ottawa, Canada in 1907. Fruit above medium, roundish or slightly conical, bright red, moderately firm, moderately juicy, mildly subacid, good quality. A hardy, early, vigorous and productive variety.

*Bruneau:* Bobbink & Atkins, Rutherford, N. J. "Everbearing, with very large, long, red fruits; quite firm yet deliciously juicy and sweet, with a good mellow flavor; bears continually until frost."

*Count:* Seedling of Biggar Seedling. Originated by Wm. Saunders, London, Ontario, and introduced by the Central Experimental Farm, Ottawa, Canada, in 1907. Fruit large, roundish, bright red, moderately firm, juicy, briskly

subacid, with a pleasant but not high flavor, good. A hardy, early, vigorous and productive variety.

*Empire:* Ruby x Coutant. Originated by L. E. Wardwell, Marlboro, N. Y. and introduced by him in 1916. Canes stocky, vigorous, tall, upright, nearly smooth, hardy, very productive, has medium number of suckers. Berry large, roundish conic, medium red to dark red, firm, juicy, mild, rich sweet flavor, very good quality. Early to mid season.

*Erskine Park:* Originated on the estate of Geo. Westinghouse near Lee, Massachusetts. Was discovered by E. J. Norman, Supt. of Westinghouse estate. Supposed to be a seedling of Cuthbert. Introduced by Rosedale Nurseries, Tarrytown, N. Y. about 1911. This variety was not catalogued for several years until in 1919 the Rosedale Nurseries listed it as Erskine Park Everbearing and it was also reintroduced in 1919 by L. J. Farmer, Pulaski, N. Y. Fruit large, red, productive. Everbearing.

*Erskine Park Everbearing:* Same as Erskine Park.

*Galloway's Black Special:* Galloway Brothers, Waterloo, Iowa. Plants vigorous, stocky, very productive. Berry very large, firm, black.

*Honey Sweet:* Originated with A. B. Katkamier, Macedon, N. Y., about 1912. Plants productive, hardy. Berry large, glossy black, firm, sweet. Early midseason.

*Hoosier:* Wisconsin State Horticultural Society, Report 1914, page 127. Black, about the same as Kansas, perhaps a better grower and hardier.

*Hyde:* Wisconsin Nurseries, Union Grove, Wisconsin. "A strong, sturdy grower, throwing out many laterals and fruiting to the tips from every lateral, immense cropper, while the fruit is extraordinarily large and handsome, firm and of the highest quality, a deeper, richer red when fully ripe."

*Jumbo:* Synonym of Ward.

*Jumbo:* Synonym of Hyde.

*Lathan:* (Minnesota No. 4) King x Loudon. Minnesota State Fruit Breeding Farm. Introduced in 1912. Fruit large, roundish, red, firm, aromatic, good. Plants hardy and productive. Early to midseason.

*Mammoth:* Portland Seed Company, Portland, Oregon. Black, good quality.

*Milla:* This is Miller.

*Mildred:* Tipton Nursery, Little Rock, Arkansas. Plants strong, stocky, prolific, endures hot weather and drouths. Berry bright red, very large, high quality.

*Newman:* (Newman No. 23) (Eaton x King?). Originated by C. P. Newman, Town of LaSalle, Quebec. Not yet introduced. Fruit large, roundish, bright red, firm, moderately juicy, subacid to sweet, sprightly, good. Midseason. Plants very vigorous, productive and hardy. Excellent for canning.

*Ontario:* Second generation of Superlative x Loudon. Originated by the New York State Agricultural Experiment Station, Geneva, N. Y., in 1909 and introduced by this Station in 1919. Plants vigorous, stocky, smooth, upright, spreading, very hardy and productive. Berry large, broadly conic to roundish, medium red, firm, flesh red, mild to pleasantly sprightly, good quality. Early midseason.

*Oronoco:* From wild plants brought from the Oronoco River region, in South America. Introduced by Morris & Snow Seed Company, Los Angeles, California, in 1914. "Very large, evergreen, strong grower. Will grow ten feet high and bears clusters of yellow fruit of good quality."

*Peerless:* Originated with John Millet, Bismarck, N. D. Oscar H. Will & Co., Bismarck, North Dakota. Plants very hardy, vigorous, growing eight to ten feet if supported, climbing habit, very productive. Fruit large, good quality.

*Peerless Climbing:* Same as Peerless.

*Quillen:* Cumberland x Hopkins. Originated by Chas. Quillen, Monrovia, Indiana. Bridgeport Nurseries, Bridgeport, Indiana. "Has proved to be more disease proof than other varieties of blackcaps. The largest and most prolific of all blackcap varieties. Ripens a little later than Cumberland, Kansas and Gregg."

*Scheepers Giant Everbearing Raspberry la France:* John Scheepers, Inc., 2 Stone Street, New York, N. Y. Not described.

*Shepard's Pride:* Alfred Mitting, Holland, Michigan. Introduced by Mr. Shepard of Wisconsin. No description.

*Sioux:* Rosebud Nursery, Winner, S. D. Selected from wild plants on the Sioux Indian Reservation, very hardy.

*Souvenir de Desire Bruneau:* Synonym of Bruneau.

*Victory:* Seedling of Cuthbert. O. A. D. Baldwin, Bridgman, Michigan. Plants very hardy, vigorous. Berry very large, bright red, high quality. Season a week earlier and two weeks later than Cuthbert.

*Williams:* J. T. Lovett, Little Silver, N. J. Plants stocky, hardy, productive. Berry large, nearly round, crimson, rich and sprightly in flavor.

### Currant

*Climax:* Bulletin 222, Ontario Dept. of Agriculture. 1914. Fruit black. Plant strong grower and productive. Season medium to late.

*Everybody's Currant:* J. T. Lovett, Little Silver, N. J. "Bunch and berries of good to large size; color bright sparkling red and of excellent quality. The plant is of strong growth with tough leathery foliage and wonderfully prolific."

*Giant Ruby:* H. W. Buckbee, Rockford, Illinois. Bush hardy, very productive. Fruit light red, very large, clusters very large.

*Utah Black:* Porter-Walton Co., Salt Lake City, Utah. "Black, rich, fine for jellies and wines, productive and vigorous."

*White Wine:* H. W. Buckbee, Rockford, Illinois. Plant vigorous, very productive. Fruit larger and clusters longer than White Grape. Sweet and rich. Very hardy.

### Gooseberry

*Copland:* Originated by P. Copland, Johnstown, Licking Co., Ohio, and introduced by him. First fruited in 1868. Plants vigorous, stocky, upright, very prolific. Berry very large, pale yellow, very good. Catalog of F. H. Burglehaus, Sumner, Washington.

*Dr. Van Fleet:* Originated by Dr. W. Van Fleet. (Houghton x Industry) x Keepsake. J. T. Lovett, Little Silver, New Jersey. Bush vigorous and enormously prolific. Berry large, nearly round, light red, skin, pulp tender, seeds few; flavor rich, quality very good.

*Holland:* Originated with C. W. Visscher, Holland, Michigan. Introduced by L. J. Farmer, Pulaski, N. Y. in 1919. Berry large, white, fine flavor.

*Mabel:* Originated by Wm. Saunders, London, Ontario, and introduced by the Central Experimental Farm, Ottawa, Canada. Has proven hardy and very productive at Ottawa, giving a higher average yield than either Downing or Pearl, and has not mildewed. Fruit above medium, averaging larger than Downing or Pearl, roundish to oval, pale green, translucent, sweet but not high flavor, medium to good. Mid-season.

*Milford:* Seedling of Downing. Originated by Pioneer Nursery Co., New Ulm, Minn. First fruited in 1913 and introduced by this firm in 1914. Plant hardy, very productive. Fruit medium size. No longer propagated because Carrie is superior to it.

*Premier:* Introduced from England about 1897. Brown Brothers, Ontario, Canada. Bush strong grower, productive. Fruit round, as large as Industry, greenish yellow, quality excellent, resembles Whitesmith. Free from mildew.

*Pride of Michigan:* Peach Belt Nurseries, Bangor, Michigan. "The berry resembles Downing in size, color and quality, but the bush is much more vigorous, healthy and hardy and will produce more fruit."

*Smithers:* State Nursery and Seed Co., Helena, Montana. "A purple variety of medium size, very prolific and hardy."

*Treble:* Albert F. Etter, Ettersburg, Calif. Said to be a hybrid gooseberry with Champion as one parent. Plant very vigorous, productive, stands hot weather well.

### Juneberry

*Improved Dwarf:* Arkansas Nursery Co., Fayetteville, Arkansas. Bush strong grower up to seven or eight feet high, very hardy. Berry reddish purple changing to bluish black, flavor mild, rich, subacid.

*Success:* Northern Nursery Co., Ipswich, S. D. Bush hardy, productive. Berry larger than the native Juneberry, less seedy and juicier, good for pies, canning and jelly.

### Elderberry

*Adams' Improved Elderberry:* L. J. Farmer, Pulaski, N. Y. "A hardy and prolific bush bearing large pulpy berries with few seeds."

### Balloonberry

*Cardinal:* Originated by Luther Burbank, Santa Rosa, Calif. and introduced by him in 1912. Plant upright, stiff, strong grower, somewhat spiney, productive. Fruit larger than raspberry, cardinal red color; flesh yellowish red, mild flavor, quality good. Ripens with strawberries.

### Blueberry

*Harding:* Jos. J. White Inc., New Lisbon, N. J. Berry dark blue with thin bloom, sweet, skin very tender, seeds small, fine for home use and nearby markets but probably not a good long distance shipper. Plants vigorous and productive.

*Ozark:* Native of Ozark Mountains. Arkansas Nursery Co., Fayetteville, Ark. Bush very hardy, strong grower, prolific. Berry fine flavor.

*Rubol:* Jos. J. White Inc., New Lisbon, N. J. Plants vigorous, productive. Berry beautiful blue with heavy bloom, seeds small, pleasant tart flavor. Good shipper.

*Sam:* Jos. J. White Inc., New Lisbon, N. J. Introduced in 1920. Propagated from a wild bush located in 1916 in the Pine Barrens of central New Jersey. Fruit very large, three-fourths inch in diameter, beautiful blue, fine flavor.

## STRAWBERRY

*Addison:* P. President x Marshall. Originated by the N. Y. State Agr.. Exp. Station, Geneva, N. Y. See Bulletin No. 447. Plants vigorous, very healthy, productive. Berries medium to very large, conical to blunt wedge, necked, very glossy, attractive medium red, apex obtuse, often indented. Flesh red, juicy, medium to firm, mild subacid, good, calyx rather large. Midseason. Distributed for testing in 1917.

*Aishkum:* S. Black Beauty x Pan American. Originated by H. J. Schild, Ionia, Mich., and introduced by him in 1918. "Indian strain of everbearing strawberries." Fair to good plant maker, productive, everbearing.

*Akasa:* P. Originated by H. J. Schild, Ionia, Mich. Fair to good plant maker, productive. "Indian strain of everbearing strawberry."

*Albert:* 1895 catalog of M. Crawford, Cuyahoga Falls, O. "One of the best late strawberries of recent continental introduction. Plant a good grower and bearer. Flavor excellent."

*Alden:* P. President x Marshall. Originated by the N. Y. State Agr. Exp. Station, Geneva, N. Y. in 1907. See Bulletin No. 447. Plants large, productive; fruit stems long, branching, prostrate; calyx large, leafy. Fruit large, roundish conic to broad conic, sometimes slightly necked, bright glossy red, apex blunt; flesh light red, whitish toward center, juicy, medium to firm, pleasant, quality good. Mid-season. Distributed for testing in 1917.

*Angola:* P. President x Marshall. Originated by N. Y. State Agr. Exp. Station, Geneva, N. Y. in 1907. See Bulletin No. 447. Plants vigorous, healthy, very productive. Fruit stems long, thick, single, prostrate; calyx medium size. Fruit medium to very large, roundish conic to blunt wedge, glossy, attractive,

medium to light red, apex very obtuse, seeds somewhat raised; flesh light red, sometimes whitish toward center, very juicy, moderately firm, slightly acid, good. Midseason. Distributed for testing in 1917.

*Arabine:* Fottler, Fiske & Rawson Co., Boston, Mass. Originated by S. H. Warren, Auburndale, Mass. "Berries are exceedingly large, of a bright red color and fine quality. Very productive and a vigorous grower. Early."

*Arcade:* S. President x Marshall. Originated by N. Y. State Agr. Exp. Station, Geneva, N. Y. in 1907. See Bulletin No. 447. Plants vigorous, productive. Fruit stems long, thick, branching, semi-erect; calyx medium size. Fruit large, conic to slightly wedge, often necked, attractive, glossy, medium red, apex somewhat pointed; flesh light red, sometimes whitish toward center, very juicy, rather firm, pleasant, somewhat acid, good. Midseason. Distributed for testing in 1917.

*Argyle:* S. President x Marshall. Originated by N. Y. State Agr. Exp. Station, Geneva, N. Y. in 1907. See Bulletin No. 447. Plants vigorous, healthy, productive. Fruit stems medium to long, moderately stout, semi-erect to prostrate, single; calyx small. Fruit above medium to very large, roundish conic, the largest berries irregularly furrowed, glossy, attractive, medium to dark red, apex obtuse, seeds even or slightly raised; flesh light red, somewhat whitish toward center, juicy, firm, mild, sweet, high flavor. Midseason. Distributed for testing in 1917.

*Ashton:* S. President x Marshall. Originated by N. Y. Agr. Exp. Station, Geneva, N. Y. in 1907. See Bulletin No. 447. Plants vigorous, healthy, productive. Fruit stems short to medium, thick, semi-erect to erect, single; calyx small; seeds prominent, raised. Fruit roundish, conic, surface of largest berries irregularly furrowed, glossy, attractive, medium to dark red, apex obtuse; flesh variable in color, juicy, firm, somewhat acid, good. Midseason. Distributed for testing in 1917.

*Athens:* S. President x Marshall. Originated by N. Y. State Agr. Exp. Station, Geneva, N. Y. in 1907. See Bulletin No. 447. Plants vigorous, usually healthy, very productive. Fruit stems medium to long, thick, semi-erect, branching; calyx medium; seeds usually sunken. Fruit large irregular wedge to irregular conic, usually necked, the largest berries furrowed, bright red to dark red, glossy, attractive; flesh not uniform in color, very juicy, firm, pleasant, acid, good. Midseason. Distributed for testing in 1917.

*Aurora:* S. Seedling of Prolific. Originated by N. Y. State Agr. Exp. Station, Geneva, N. Y. in 1907. See Bulletin No. 447. Plants very vigorous, moderately productive. Fruit stems rather short, thick, semi-erect, branching; calyx large, leafy; seeds usually sunken. Fruit large, long conic to long wedge, usually not necked, glossy, attractive, medium red, apex pointed; flesh well colored, juicy, firm, agreeably acid, good. Late midseason. Distributed for testing in 1917.

*Banner:* Armstrong Nurseries, Ontario, Calif. Plants productive; berry firm, deep red, attractive, sweet, good keeper. Considered by some to be Marshall, by others to be an Improved Marshall, and by still others to be the New Oregon.

*Barnes' Self-Fertile:* S. Boonville Nurseries, Boonville, Missouri. "The best berry for home use, ripens over a long season."

*Beaderarena:* P. Beaderwood x Point Arena. Originated by A. F. Etter, Ettersburg, Calif. Plant has the distinct characters of the Beach type, productive, capable of thriving on poor, sandy soils, deep rooting and heat resisting. Fruit fairly large and ruby red, flavor distinctive, unlike any other variety. Blossoms nearly pistillate.

*Beal:* Originated by Tice C. Kevitt, Athens, N. J. Plants vigorous, deep rooted, very productive. Fruit symmetrical, quite large, firm, high quality, "most luscious and aromatic of all strawberries."

*Bedarena:* Introduced by R. M. Kellogg, Three Rivers, Mich., in 1919. Apparently the same as Beaderarena.

*Bedford Champion:* James Brand & Co., Vancouver, British Columbia. Plants productive; fruit large. Midseason.

*Benson:* S. The W. F. Allen Co., Salisbury, Md. Plants vigorous, very productive. Berries large, scarlet red, excellent quality. Midseason.

*Big Valley:* This is claimed to be New York by the W. F. Allen Co., Salisbury, Md.

*Billy Sunday:* S. R. M. Kellogg Co., Three Rivers, Mich. Originated by D. P. Yost, Lancaster, Ohio and introduced by him in 1915. Plants vigorous, productive, over a long season. Fruit stems long, erect. Fruit large, very sweet, delicious. Midseason.

*Breck's Abundant:* S. John Breck & Sons, Boston, Mass. Fruit large, flavor tart. Plants very productive. Medium early.

*Bushel Basket:* S. Originated with E. C. Ercanbrack. Introduced by A. B. Katkamier, Macedon, N. Y. Was first called Auburn, then Ercanbrack, and recently the name was changed to Bushel Basket. Under the name of Ercanbrack it was given the Barry Gold Medal by the Western New York Horticultural Society. Plants very vigorous, immensely productive. Berry extra large, beautiful bright red, sprightly.

*Califor:* Introduced by Albert F. Etter, Ettersburg, Calif., in 1918. Plants fairly vigorous, very productive, everbearing. Berry dark red, with a "black cap raspberry flavor."

*Campbell's Early:* S. Willard B. Kille, Swedesboro, N. J. Originated in Cumberland County, N. J. Berry sweet, good, firm, good shipper. Plants large, strong, productive. Early.

*Cand:* P. Originated by H. N. Cand, Knoxville, Tenn. Introduced in 1913.

*Charles I:* S. O. A. D. Baldwin, Bridgman, Mich. Fruit large, regular in form, good color and quality. Plants deep rooted, strong, productive. Very early.

*Chesapeake Wonder:* S. Moore Seed Company, Philadelphia, Pa. Plants vigorous but multiply sparingly. Berries very large, heartshaped with pointed tip or coxcomb shape, bright, lively crimson; seeds prominent. Also called "Pride of New York" in the New York markets.

*Chinook:* S. Originated by H. J. Schild, Ionia, Michigan. Indian strain of everbearing strawberry. Not described.

*Chippewa:* P. Black Beauty x Pan American. Originated by A. B. Sibert, Rochester, Indiana, and introduced by H. J. Schild, Ionia, Mich. in 1919. Berry large, dark red, fine quality. The name "Chippewa" was given to a variety originated by E. M. Beuchley, Greenville, Ohio, and introduced about 1909. The Chippewa of Mr. Schild ought to be renamed.

*Cooney (W. E. N.):* S. Originated by John Semple, Oconomowoc, Wisc. Introduced by the White Ulm Nursery Co., Oconomowoc, Wis., in 1910. Plants vigorous. Fruit large, fairly firm; flesh red, good. Season very late about ten days after Gandy.

*Delecto:* Originated with Albert F. Etter, Ettersburg, Calif., and introduced in 1918. Berries very large, red, very good. Plants vigorous, resistant to heat and very late to bloom.

*Duluth:* (Minnesota No. 1017) Pan American x Dunlap. Minnesota State Fruit Breeding Farm. Introduced about 1913. Fruit large, conical, dark red; flesh red, subacid, good. Plants hardy and very productive. Everbearing.

*Earliest Ripe:* John A. Salzer Seed Co., LaCrosse, Wisc. "Earliest, most delicious, finely flavored, quick ripening, drought resisting, hardiest, early big berry on our trial ground."

*Early Michigan:* S. Hopedale Nursery, Hopedale, Illinois. Earlier than Bubach and a better fruiter.

*Early Woodrow:* S. The W. F. Allen Co., Salisbury, Md. Introduced by Wilkins & Co., Salisbury, Md. in 1915. Fruit large, high color, exceedingly firm, good shipper. Early.

*Eaton:* Originated by A. V. Eaton, Lafayette, Indiana. Introduced in spring of 1920. Plant very strong; berry very large, cone shaped.

*Eurisko:* S. Albert F. Etter, Ettersburg, Calif. Introduced by R. M. Kellogg, Three Rivers, Mich. in 1919. Plant very strong grower, productive, deep rooting. Fruit deep red with golden seeds; flesh very red. Everbearing.

*Exquisite:* Luther Burbank, Santa Rosa, Calif. Plants unusually vigorous and fairly productive. Fruit large, conical, sometimes flattened, very delicious.

*Fantastic:* Albert F. Etter, Ettersburg, Calif. Plant strong, robust grower. Has all sorts of fantastic shaped berries of deepest red.

*Fendalemo:* Albert F. Etter, Ettersburg, Calif. Plant strong grower. Berry large, deepest red, good quality.

*Ferris Improved Progressive:* Originated by earl Ferris Nursery Co., Hampton, Iowa. Seedling of Progressive. Said to be superior to Progressive.

*Fillbasket:* S. Bulletin 401, p. 180, Experiment Station, Geneva, N. Y. Fruit medium in size, oblong conic to wedge shape, dull light red, colors unevenly; flesh whitish toward center, sweet, pleasant, good. Plant inferior in size and vigor. Late.

*Friendship:* S. Said to be a seedling of Corsican. Found by J. F. Nickerson, Chatham, Mass. Fruit variable in size, long wedged to long conic, strongly necked, medium to light red, dull; apex pointed; flesh medium red to the center, juicy, moderately firm, tart, flavor not pleasant, poor. Plants moderately vigorous, very productive. Midseason.

*Giant Ruby:* P. Burnett Bros., 92 Chambers St., New York, N. Y. Plants vigorous, very productive. Berries very large, excellent flavor. Midseason.

*Grand Marie:* S. Originated in Michigan in 1905. Fruit large, conical or wedge shape, dark, rich, glossy red, good quality.

*Grand Prize:* S. Chance seedling. Originated with H. L. McConnell & Son, Port Burwell, Ontario, and introduced by them in 1915. Plants robust; fruit stems short, stout. Fruit similar in size and form to Pocomoke, rich red; flesh dark red, firm, high quality. Begins to ripen with Williams.

*Greensboro Favorite:* Originated by R. G. Thomas, Guilford Co., N. C. Greensboro Nurseries, Greensboro, N. C. Introduced by John A. Young, Greensboro, N. C. in 1905. Plants strong, deeply rooted. Fruit stems long, upright. Berry medium to large, rich red color, excellent flavor.

*Hall's Beauty:* Originated with Armstrong Nurseries, Ontario, Calif. "Plants make a clean and healthy growth, yielding an abundance of good sized, well shaped, evenly colored berries of exceptionally rich, aromatic flavor."

*Hiawatha:* (of Warren). Fottler, Fiske, Rawson Co., Boston, Mass. Originated by S. H. Warren, Auburndale, Mass. "This new sort ripens a few days ahead of the Commonwealth which it surpasses in size, color and flavor."

*Honeymoon:* S. Black Beauty by Pan American. Originated by H. J. Schild, Ionia, Mich. and introduced by him in 1919. Everbearing variety.

*Hoüsmann:* Introduced in 1914. Berry large, irregular roundish to wedge shape, crimson, good. Medium early.

*Hoyoneta:* P. Originated by H. J. Schild, Ionia, Michigan. Indian strain of everbearing strawberry. Not described.

*Ideal (of Cooper):* S. Introduced by Samuel Cooper, Delavan, N. Y. in 1917. Plants strong, healthy, very long rooted. Berries large, dark red, never misshapen, rather tart. Everbearing.

*Inince:* P. H. J. Schild, Ionia, Mich. Heavy producer, berries large, everbearing.

*Iroquois:* P. Originated by H. J. Schild, Ionia, Michigan. Indian strain of everbearing strawberry. Not described.

*Jewell's Improved:* S. Seedling of Miller. Underwood Farm, Lake City, Minn. Fruit large, uniform in size, dark red, firm, excellent quality, good shipper. Plants very productive. In 1880 there was another variety named Jewell's Improved.

*Joe Crampton:* S. Fruit variable in size, very irregular, blunt conic to wedge, sometimes necked, whitish towards center, very juicy, firm, sprightly, good. Plants not vigorous, not productive, fruit stems medium length; slender; erect; single. Very late.

*Joe Johnson:* Same as Big Joe and Jo.

*John H. Cook:* Originated by Dr. W. VanFleet. Introduced by J. T. Lovett, Little Silver, N. J. Berries nearly round, often irregular, blood red, very firm, exquisite quality. Plants vigorous. Early.

*Kellko:* S. Introduced by R. M. Kellogg Co., Three Rivers, Mich. in 1919. Plants vigorous. Berry large, dark red, highly flavored. Late.

*Kellogg's Big Late:* P. Originated by Geo. W. Davis, Brazil, Ind. Introduced by R. M. Kellogg Co., Three Rivers, Mich. in 1917. Plants vigorous. Fruit stems long. Berry deep scarlet; calyx bright green; seeds yellow, flavor mild and sweet. Late.

*Kentucky Wonder:* S. Moore Seed House, Philadelphia, Pa. Plant vigorous with large, dark green foliage, very productive. Fruit stems tall, stout, erect. Fruit dark glossy red, very sweet, delicious. Midseason to late.

*Kikapoo:* P. Originated by H. J. Schild, Ionia, Michigan. Indian strain of everbearing strawberry. Not described.

*King Wealthy:* S. Originated by a Mr. King in Jackson County, Mich. E. W. Potter, Leslie, Mich. Plant hardy, prolific. Berry cone shaped, dark red, firm, handsome and attractive with large green calyx, fine flavor. Late.

*Kokomis:* P. Originated by H. J. Schild, Ionia, Michigan. Indian strain of everbearing strawberry. Not described.

*Kosato:* S. Introduced by H. J. Schild, Ionia, Mich., in 1919. Plants productive. "Indian strain of everbearing strawberry."

*Lady Corneille:* S. Fruit above medium, furrowed, wedge to blunt conic, necked, often dark red, apex slightly pointed; flesh light red, whitish towards center, juicy, firm, sprightly, almost tart, fair. Plants vigorous, not productive. Medium early.

*Liberty Bell:* Seedling of Gandy. J. T. Garrison & Sons, Woodstown, N. J. Plants thrifty, very productive, resemble Gandy in appearance. Fruit twice as large and firm as Gandy.

*Louis Ella:* S. Originated by Louis Graton, Whitman, Mass. Berry dark red, flesh rich red, calyx bright green. "Berry regular in form, very uniform in size and excellent in flavor."

*Loyal:* Seedling of Superb. Originated by Wm. Pfaender, New Ulm, Minn. Pioneer Nursery Co., New Ulm, Minn. Berry large, good quality. Everbearing.

*Lucky Strike:* E. W. Townsend, Salisbury, Md. Plants large, vigorous. Berries extra large, rich dark red; flesh red, firm, quality very good.

*Lupton:* New Jersey State Horticultural Society Proceedings 1915. "A very large bright berry."

*McGregor's Earliest:* McGregor Bros Co., Springfield, Ohio. Plants vigorous, very productive. Fruit round. "Beautiful berries of very rich and delicious flavor." Very early.

*Mackinaw:* S. Originated by H. J. Schild, Ionia, Michigan. Indian strain of everbearing strawberry. Not described.

*Mammoth Cliff:* Oak Dale Berry Farm, Judsonia, Ark. Size and color of Klondike. Is sold for Klondike but is said to be more prolific. Midseason.

*Mandaw:* S. Originated by H. J. Schild, Ionia, Michigan. Indian strain of everbearing strawberry. Not described.

*Marshall Improved:* S. Fruit medium to large, irregular, roundish conic, light red, dull, apex obtuse; flesh light red, whitish towards center, medium juicy and firm, mild sub-acid, fair. Plants medium vigorous and medium productive. Fruit stems short, thick, erect, branching. Early.

*Maryland:* S. Found in Anne Arundel Co., Maryland, in 1902. Franklin Davis Nursery Co., Baltimore, Md. Plant strong, upright grower, healthy. Fruit large, conical, dark red, finest quality. Ripens with Tubbs.

*Mecosta:* S. Originated by H. J. Schild, Ionia, Mich. Productive. "Indian strain of everbearing strawberry."

*Merveille de France:* Seedling of Alpine and some large fruited variety. Originated in France. Thus far it does not seem to have been successfully grown in the United States. Southern Fruit Grower, December, 1919.

*Messenger:* Tingle's Small Fruit Catalog, Pittsville, Md. Introduced by this firm. Berry extra large, well colored, very firm, excellent flavor, good shipper. Plant exceedingly vigorous. Early to midseason.

*Minnehaha:* S. (Minnesota No. 935). Minnesota State Fruit Breeding Farm. Introduced in 1916. Fruit very large, wedge shaped, medium dark red; flesh red, firm, tart, good. Plants hardy, very productive. Late.

*Minnesota:* (Minnesota No. 3). Dunlap x Pocamoke. Minnesota State Fruit Breeding Farm. Introduced about 1912. Berry large, conical or obtuse, color medium red; flesh red to light red, sweet, fine texture, good. Early.

*Moki:* S. Originated by H. J. Schild, Ionia, Michigan. Indian strain of everbearing strawberry. Not described.

*Nellis Triumph:* Originated with J. H. Nellis, Paterson, N. J. Willard B. Kille, Swedesboro, N. J. Plants vigorous, productive. Medium early.

*Neverfail:* Bubach by Superb. Originated by D. J. Miller, Millersburg, Ohio in 1913. Introduced by L. J. Farmer, Pulaski, N. Y. in 1919. Plants vigorous, productive, said to be three times as productive as Superb. Berry resembles Superb; flesh dark red, flavor excellent. Everbearing.

*Newark (of Emmons):* Introduced from France. Emmons & Co., Newark, New York. Plants vigorous, very productive. Fruit extra large, very dark red; flesh red, firm, flavor of wild strawberry.

*New Shuckless Wonder:* H. W. Buckbee, Rockford, Ill. Plant short, stocky, very thrifty, very prolific. Berry bright red with long neck, very firm, contains no acid, has very few seeds, calyx parting easily.

*Nokomis:* P. Originated by A. B. Sibert, Rochester, Ind. H. J. Schild, Ionia, Mich. Indian strain of everbearing strawberries. "Early, also fruits in the fall, very large, dark red in color, fine quality."

*Nor-j:* Introduced in 1918 by Albert F. Etter, Ettersburg, Calif. "A berry of the Beach type of flavor, exceedingly large, pink in color with white flesh like Rose Ettersburg; exceedingly productive."

*Northfield:* C. W. Atwater & Son, Agawam, Mass. Plants vigorous, productive. Fruit stems stout, upright. Berry large, bright red; flesh red, firm, spicy flavor. Late.

*North Jersey:* North Jersey Nurseries, Milburn, N. J. Berry medium large, round, pointed, glossy, rich dark red, high quality, very productive.

*Ogeewaw:* S. Seedling of Battenburg. Introduced by H. J. Schild, Ionia, Mich. in 1919. Berry large to very large, very firm, dark red, good quality, good shipper. "Indian strain of everbearing strawberry." Very late.

*Old Hickory:* Originated with Edward Overman, Fairmount, Ind. C. N. Flansburgh & Son, Jackson, Mich. Plants fairly vigorous, productive. Berry medium size, firm, attractive color.

*Omaha:* S. Originated by H. J. Schild, Ionia, Michigan. Indian strain of everbearing strawberry. Not described.

*Oregon Plum:* Silva Bergtholdt Co., Newcastle, Calif. Plants vigorous and prolific. Berry large, conical, highly colored, fine flavor. First crop ripens April 20 to May 15 and second crop June 10 to August 1 in California.

*Osawanda:* S. Originated by H. J. Schild, Ionia, Michigan. Indian strain of everbearing strawberry. Not described.

*Osceola:* P. Originated by H. J. Schild, Ionia, Michigan. Indian strain of everbearing strawberry. Not described.

*Oscoda:* P. Originated by H. J. Schild, Ionia, Michigan. Indian strain of everbearing strawberry. Not described.

*Oseemeek:* S. Originated by H. J. Schild, Ionia, Michigan. Indian strain of everbearing strawberry. Not described.

*Ossie:* Introduced by Albert F. Etter, Ettersburg, Calif. in 1918. "A variety that has a very low growing plant and produces exceedingly large and very showy berries of superlative quality. It is very likely it will be a success on fairly rich ground. It is very productive and a real beauty."

*Peerless:* Originated by Samuel Cooper, Delavan, N. Y. and introduced by him in 1915. Said to be larger, more productive and attractive than Superb. Everbearing.

*Pewamo:* S. Originated by H. J. Schild, Ionia, Mich. Heavy producer. Berries large. "Indian strain of everbearing strawberry."

*Pitchers Overland:* S. Arctic Nursery and Fruit Farm, Buchanan, Mich. Plants vigorous. Berry large, round, dark red; flesh firm, dark red, good shipper.

*Pittsville:* Tingle's Small Fruit Catalog, Pittsville, Md. Midseason variety, resembling Senator Dunlap but not so dark in color. Flesh very firm; plants vigorous, very deep rooted.

*Pokagon:* S. Originated by H. J. Schild, Ionia, Mich., in 1915 and introduced by him in 1919. Seedling of Battenburg. "Indian strain of everbearing strawberry." Berry large to very large, very firm, dark red, good quality, good shipper. Very late.

*Pontiac:* P. Originated by H. J. Schild, Ionia, Michigan. Heavy producer. Berries large. "Indian strain of everbearing strawberry."

*Pride:* S. Capital City Nurseries, Des Moines, Iowa. "A fine dark red, large, oblong berry produced on a vigorous, healthy plant."

*Pride of New York:* This name is given to Chesapeake Wonder on the New York markets.

*Purity:* J. T. Lovett, Little Silver, N. J. Berry round, quite small, pure white, "exceedingly fragrant and exquisitely delicious."

*Ramona:* P. Originated by H. J. Schild, Ionia, Michigan. Indian strain of everbearing strawberry. Not described.

*Ravenna:* S. Introduced by the Sumner Nursery, Sumner, Iowa. Plants vigorous, healthy. Berry of Warfield type, large, very red, even size.

*Roosevelt (of Warren):* Fottler, Fiske, Rawson Co., Boston, Mass. Originated by S. H. Warren, Auburndale, Mass. "A midseason variety, plant vigorous and strong. Fruit is much larger than Marshall but similar in shape, color being a somewhat lighter crimson."

*Rumark:* S. Introduced by R. M. Kellogg Co., Three Rivers, Mich. in 1919. Plants vigorous, several times more productive than Chesapeake. Berries almost as large as Chesapeake and of better flavor and higher quality, dark red.

*Sachem:* S. Originated by H. J. Schild, Ionia, Mich. Heavy producer, berries large. "Indian strain of everbearing strawberry."

*Sagamore:* S. Originated by H. J. Schild, Ionia, Michigan. Indian strain of everbearing strawberry. Not described.

*Saginaw:* P. Originated by H. J. Schild, Ionia, Michigan. Indian strain of everbearing strawberry. Not described.

*St. Fiacre:* Seedling of Alpine and some large fruited variety. Originated in France. Thus far it does not seem to have been successfully grown in the United States. Southern Fruit Grower, December, 1919.

*St. Martin (of Graton):* Originated by Louis Graton, Whitman, Mass. Plant very strong grower. Berry large to very large, blunt, conical, rich deep red; flesh tender, flavor equal to Marshall; seeds small with reddish tinge.

*Santee:* P. Originated by H. J. Schild, Ionia, Michigan. Indian strain of everbearing strawberry. Not described.

*Sciota:* S. Originated by H. J. Schild, Ionia, Mich. "Indian strain of strawberry." Productive. The name Sciota was originally used for a strawberry in 1845.

*Senator Wilson:* S. Originated and introduced by O. R. Gottwold, Sayville, N. Y. Fruit large, rich bright red, excellent quality. Plants vigorous. Early, four days later than Early Ozark.

*Shawano:* P. Originated by H. J. Schild, Ionia, Michigan. Indian strain of everbearing strawberry. Not described.

*Shawkato:* S. Originated by H. J. Schild, Ionia, Mich. Productive. "Indian strain of everbearing strawberry."

*Shoshone:* P. Originated by H. J. Schild, Ionia, Michigan. Indian strain of everbearing strawberry. Not described.

*Silvery:* P. Originated in 1906 by the Central Experimental Farm, Ottawa, Canada. Introduced in 1913. Berry large, roundish to wedge shape, obtuse, dark crimson, firm, good, medium light.

*Sionilli:* S. Originated by R. M. Sears of Illinois. Introduced by R. M. Kellogg Co., Three Rivers, Mich. in 1918. Plants very vigorous, very productive. Berry extra large, very dark red, flesh dark red, "supremely delicious flavor."

*Teton:* P. Originated by H. J. Schild, Ionia, Michigan. Indian strain of everbearing strawberry. Not described.

*The Best:* S. Introduced by L. J. Farmer, Pulaski, N. Y. in 1918. Plants very vigorous, extremely productive. Berry large, glossy, very firm, fine flavor. Very late.

*Topenabee:* P. Originated by H. J. Schild, Ionia, Michigan. Indian strain of everbearing strawberry. Not described.

*Top Notch:* Leamon G. Tingle, Pittsville, Md. Plants strong, very productive. Berry as large as Superb. Everbearing.

*Totem:* P. Originated by H. J. Schild, Ionia, Michigan. Indian strain of everbearing strawberry. Not described.

*Vestal's Earliest Strawberry:* J. W. Vestal & Son, Little Rock, Ark. Berry round, "of very rich and delicious flavor." Early.

*Wabesis:* S. Originated by H. J. Schild, Ionia, Michigan. Plants productive. "Indian strain of everbearing strawberry."

*Wabi:* S. Originated by H. J. Schild, Ionia, Michigan. Productive. "Indian strain of everbearing strawberry."

*Warren:* S. Fruit large, blunt conic, glossy, attractive medium red; apex obtuse; flesh red, juicy, firm, sprightly, good. Plants of medium vigor, productive; fruit stems short, thick, semi-erect to prostrate. Very late.

*Wawbasaw:* S. Originated by H. J. Schild, Ionia, Michigan. Indian strain of everbearing strawberry. Not described.

*Wawbasay:* P. Originated by H. J. Schild, Ionia, Michigan. Indian strain of everbearing strawberry. Not described.

*Waymego:* S. Originated by H. J. Schild, Ionia, Michigan. Berry large to very large, very firm, dark red, glossy, good quality, good shipper. Very late. "Indian strain of everbearing strawberry."

*Wellington Marvel:* Originated by Wellington S. Butler, Merlin, Oregon. Routledge Seed and Floral Co., Portland, Oregon. Introduced by this firm in 1920. "We have never seen an equal of the Wellington Marvel in color, shape, flavor and good qualities. It is unequalled for table and excellent for canning."

*World's Wonder:* S. E. W. Townsend & Son, Salisbury, Md. Plants very vigorous. Fruit not described.

*Yankton:* S. Originated by H. J. Schild, Ionia, Michigan. Indian strain of everbearing strawberry. Not described.

## TROPICAL AND SEMI-TROPICAL FRUITS

### Avocado

*Akbal:* From Guatemala. Office of Foreign Seed and Plant Introduction, U. S. Department of Agriculture. Fruit medium size, weighing about twelve ounces, long and slender, sometimes curved or pyriform, surface quite smooth, green; skin thin; flesh yellow, thin, good quality, no fiber or discoloration; seed medium size, does not rattle in its cavity.

*Barker:* Originated by A. T. Cornwell, Bradentown, Florida, from a seed planted about 1886. Royal Palm Nurseries, Oneco, Florida. This is now said to be the largest avocado tree in Florida, is 60 feet high and 30 feet in spread. Has borne 3,000 fruits at one crop. Fruit resembles Pollock in general appearance, size and quality, but a heavy and constant bearer, and probably more hardy. October to December.

*Bartley:* Originated by W. R. & E. D. Bartley, Santa Anna, California, from seed planted in 1907 and introduced by them in 1916. Fruit large size sometimes weighing two pounds, skin thick, quality good, seed very small.

*Cabnal:* Introduced from Guatemala by W. Popenoe; S. P. I. 44782. Fruit medium size, weighing twelve to sixteen ounces, round, dark green, flesh cream color, firm, quality very good, pit small. March to June.

*Caliente:* Armstrong Nurseries, Ontario, California. "Thin skin, color purple, so far as tested very hardy. Extremely precocious bearer."

*Cantel:* Introduced from Guatemala by W. Popenoe, S. P. I. 44783. Fruit medium size, weighing one pound, skin green; flesh cream color, firm, rich, good; pit small. Midseason.

*Caribou:* Originated by W. A. Spinks, Duarte, California, from a seed planted about 1909. Tree productive, very hardy. Fruit medium size or below, weighing twelve ounces, round, dull green, flesh yellow, smooth texture, quality good. Pit medium size. Spring and summer.

*Colla:* S. P. I. Not described.

*Collins:* Not described.

*Doctor Welden:* Originated by W. A. Spinks, Duarte, California, from seed planted about 1909. Tree fairly vigorous, tender, productive. Fruit medium or below in size, weighing twelve ounces, round, dark green; flesh yellow, texture very smooth, quality extra good; pit medium size. Spring and summer.

*I. X. L.:* Originated with W. A. Spinks, Duarte, California, and fruited first about 1915. Tree small, not vigorous, fairly hardy, rather poor cropper. Fruit very large, weighing two pounds, pear-shaped, green; flesh grayish yellow, texture smooth, quality good; pit medium size. One of the very earliest varieties. February and later.

*Knight:* Introduced from Guatemala in 1914 by E. E. Knight, Yorba Linda, California. Tree large, hardy, productive. Fruit large, weighing twenty-four ounces, round, slightly rough, skin green; flesh yellow tinged green, smooth texture, rich nutty flavor, quality very good; pit medium size, tight in cavity. November to March in Guatemala.

*Kobie:* Originated with W. A. Spinks, Duarte, California, from seed planted about 1909, fruited first in 1916. Tree well formed, of good growth and fairly prolific. Fruit large, weighing twelve to twenty ounces, round, dark purple; flesh yellow, very smooth, extra good quality; pit medium size. Spring and summer.

*Linda:* Introduced from Guatemala by E. E. Knight, Yorba Linda, California. Tree large, productive. Fruit large, weighing two pounds, round, dark purple; flesh yellow tinged green, smooth texture, nutty flavor, very good quality; pit small. Winter.

*Manik:* Introduced from Guatemala by W. Popenoe, S. P. I. Fruit medium, eight to twelve ounces, oval to slender pyriform with a well defined neck, slightly roughened, green, skin moderately thick; flesh rich yellow, quite free from all fiber or discoloration, rich and pleasant in flavor; pit rather large varying to small, quite tight in seed cavity.

*McDonald:* Originated in Hawaii from a seed brought by Admiral Beardsley from Guatemala. Tree quite vigorous, upright. Fruit medium size, roundish to spherical, skin very hard, considerably pitted, dark olive green to purple with many yellowish dots, very thick and woody; flesh yellow tinged green at skin, fine grained, oily and somewhat buttery, rich and nutty; seed fairly large, rather loose in cavity. July to January.

*Meyers:* Originated with W. A. Spinks, Duarte, California, from a seed planted about 1909, fruited first in 1915. Tree fairly vigorous, prolific. Fruit medium to large, twelve to thirty ounces, pear-shaped, bright shining green; flesh grayish yellow, smooth texture, good quality. February and later.

*Monroe:* A seedling from Guatemala. Introduced by B. H. Sharpless, Tustin, California. Fruit large, weighing eighteen to twenty ounces, pear shaped, color green; flesh cream color, smooth texture, rich, good. April to July.

*Paltita:* From a seed obtained in Chile about 1895. "Very hardy, with small fruits but of good quality." Pacific Coast Packer, November 30, 1918.

*Queen:* Imported by E. E. Knight, Yorba Linda, California, from Guatemala in 1914. Tree large, productive. Fruit medium or above, sixteen to twenty-four ounces, obovate, dark purple; flesh golden yellow tinged green at edge, smooth texture, nutty flavor, very good quality; pit small. Winter.

*Rey* Imported by E. E. Knight, Yorba Linda, California, from Guatemala in 1914. Tree medium large, productive. Fruit medium, sixteen ounces, round, green; flesh yellow tinged green at edge, smooth texture, nutty flavor, very good quality; pit medium size. Spring.

*Sharpless* A seedling from Guatemala. Introduced by B. H. Sharpless, Tustin, California. Fruit large, weighing eighteen to twenty-four ounces, pear shaped, maroon color; flesh cream color, smooth, rich, excellent. September to March.

*Spinks:* Probably originated by Lewis Bradbury, Duarte, California, but first fruited by W. A. Spinks, Duarte, California. Fruit large, averaging twenty ounces, pear shaped to nearly round, color shining black-purple; flesh yellow, texture very smooth, flavor excellent, quality best. Tree vigorous and productive.

*Tumin:* Introduced from Guatemala by W. Popenoe, S. P. I. 44627. Tree very productive. Fruit medium size, twelve or fifteen ounces, oblate, purplish black; flesh yellow, flavor rich, quality good; pit large. March to May.

*Waldin:* Originated with B. A. Waldin, Homestead, Fla., from a seed planted in 1909, first fruit produced in 1912. Coral Reef Nursery Company, Homestead, Florida. Fruit green, skin leathery; flesh firm, fine quality; seed unsually tight. December 15 to January 15.

*White:* Grown from a seed brought from Mexico in 1895. Original tree in Santa Barbara, California. "Prolific bearer." Pacific Coast Packer, November 30, 1918.

*Winslow:* (Round Taylor.) Royal Palm Nurseries, Oneco, Florida. "The fruit resembles Taft in general character, averaging ¾ of a pound in weight or over, with thick woody skin, dull green and rough, more nearly round than Taylor; medium sized seed, tight in cavity and creamy flesh of rich, pleasant flavor. Ripens February to June in Florida.

### Banana

*Manzanos* Griffing Nurseries, Port Arthur, Texas. "A favorite Mexican variety. Very large."

### Cactus

*Actual:* Luther Burbank, Santa Rosa, California. "Great producer of almost seedless fruits which are of good medium size, pale yellow, flushed crimson; flesh white, sweet, rich and delicious."

*Banana:* Originated by Luther Burbank, in 1906. Plant strong, upright; thick joints, slightly spiny. Medium hardy, very productive. Fruit large, 4.5x2.5 inches, oval, skin white tinged with crimson; flesh white, sweet, juicy, pleasant and extra good quality. September and October.

*Blanco:* (White) (Ficus indica class). Luther Burbank, Santa Rosa, California. "Received from Mr. Walter Bryant, Tepic, Mexico. Not yet fruited here."

*Catania:* (U. S. 3642) (Ficus indica class). Luther Burbank, Santa Rosa, California. "From village near Catania, Sicily. Strong grower, broad, weeping habit, has not borne fruit here."

*Colorado:* (Red) (Tuna class). Luther Burbank, Santa Rosa, California. "From near Tepic, Mexico. Fruit good, dark red, size and shape of a hen's egg, abundantly produced"

*Corfu:* (Ficus indica class). Luther Burbank, Santa Rosa, California. "This was imported by Mr. E. R. Skelley in 1899 from the Island of Corfu . . . has not borne fruit here."

*Eldorado:* Luther Burbank, Santa Rosa, California. "Fruit of the very best quality. The skin, which peels most readily from the fruit, is olive green beautifully shaded with lemon yellow and rose pink. The flesh is of the palest semi-transparent straw yellow color, firm and with a rich melon-like flavor, and almost seedless."

*Gravity:* Plant spreading, joints large, medium hardy, fairly productive; fruit extra large, thick, oval, sweet, delicious. September and October.

*Guayaquil:* Luther Burbank, Santa Rosa, California. "Originated from some seed sent me from Guayaquil, Ecuador. The strain from which this originated bears large, delicious, yellow fruits."

*Gymnocarpa:* (U. S. 12402) (Ficus indica class). Luther Burbank, Santa Rosa, California. "Fruit red, three inches long by nearly two and one-half inches in diameter, free from bristles; flesh crimson, solid, meaty, superior quality. Promises to be one of the very best for fruiting especially."

*Hayne:* Luther Burbank, Santa Rosa, California. Secured by W. A. Hayne, in Mexico. "Very promising, fruit not seen."

*Malta:* (U. S. 9352) (Ficus indica class). Luther Burbank, Santa Rosa, California. "Fruit nearly four inches long by two inches in diameter, skin yellow turning to light red when fully ripe; flesh salmon with crimson shading, sweet and good, but not of best quality."

*Market:* Originated by Luther Burbank. Plant rather upright, slightly spiny, fairly hardy, exceedingly productive. Fruit medium size, short-oval with flat ends, brilliant crimson; flesh brilliant crimson shaded violet, quality good. September and October.

*Mission (or Hall):* (Ficus indica class). Luther Burbank, Santa Rosa, California. "A good grower of compact, weeping habit. Fruit size of a hen's egg, red, seedy, fair quality."

*Morada:* (Reddish) (Tuna class). Luther Burbank, Santa Rosa, California. "From near Tepic, Mexico. Has not fruited here yet."

*Myers:* Luther Burbank, Santa Rosa, California. "Discovered by Mr. Frank Myers in a garden near Trapuato, Mexico. Said to bear large, white, fine, sweet flavored fruits abundantly."

*Niagara:* Originated by Luther Burbank. Fruit larger than Market.

*Opaline:* Luther Burbank, Santa Rosa, California. "The fruit is of medium size, pale yellow and of fine quality, ripens at the usual time, September, October and November, but remains in good condition here on the plants through the winter until the next year in May."

*Pitella:* Introduced from Antigua, Guatemala, Central America, in 1914 by E. E. Knight, Yorba Linda, California. Plant climbing, thornless, joints triangular; tender, fairly productive. Fruits large, cone shaped, red; flesh red, smooth texture, good quality. August, September and October.

*Quillota:* Luther Burbank, Santa Rosa, California. "Fruit large, handsome, yellow with crimson blush, thin skin which is readily removed, firm, pale greenish, almost white flesh; seeds medium to small; flesh sweet, rich, most excellent. September to April."

*Royal:* Originated by Luther Burbank. Plant strong, spreading, slightly spiny, thick joints, medium hardy, productive. Fruits extra large, long-oval, pinkish white with crimson blush; flesh greenish white, sugary, best quality. September and October.

*Smith (Ficus indica class):* Luther Burbank, Santa Rosa, California. "A most productive variety. Fruit nearly five inches long by two or two and one-fourth inches through, skin thin; flesh crimson, of most excellent quality."

*Sugar:* Originated by Luther Burbank and introduced by him in 1906. Plant and fruit similar to Banana except that the fruit is nearly white and exceedingly sweet.

*Taormina:* (U. S. 9353) (Ficus indica class). Luther Burbank, Santa Rosa, California. "Fruit late, three and one-half inches long by two inches in diameter, pale yellow shaded red; flesh greenish white, very sweet and superb flavor; seeds small; fine for making impenetrable fences."

*Watson:* (Tapuna class). Luther Burbank, Santa Rosa, California. "Fruit size and shape of a hen's egg, bright red, rather seedy but good."

*White Fruit:* (U. S. 3186) (Ficus indica class). Luther Burbank, Santa Rosa, California. "Has not borne fruit here."

### Carob

*Spinks:* Originated by W. A. Spinks, Duarte, Cal. Fruit four to five inches long, shape of large bean, color dark brown.

### Cherimoya

*Deliciosa:* Originated by C. H. Wagner, Hollywood, Cal., in 1913. Armstrong Nurseries, Ontario, Cal. Fruit large, shape irregular, quality good, flavor delicious. Introduced in 1917.

### Ceratonia Siliqua

*Bolser:* Armstrong Nurseries, Ontario, Cal. "Tree a good grower, produces well. Chemical analysis by University of California shows 52 per cent sugar."

*Excelsior:* Originated by H. M. Tommer, Upland, Cal., from seed planted in 1911. Armstrong Nurseries, Ontario, Cal. Introduced in 1918. "The fruit pods are medium size, containing a high percentage of sugar. Tree is an upright grower, with rounded top; the foliage is a beautiful shade of green with a suggestion of gray."

*Spinks:* Armstrong Nurseries, Ontario, Cal. "A splendid bearer, of high percentage sugar pods."

### Feijoa

*Coolidge:* Originated by D. N. Coolidge, Pasadena, Cal., about 1911. Coolidge Rare Plant Gardens, Pasadena, Cal. Fruit very large, of finest quality. Ripens from November to January.

### Fig

*Neverfail:* Winchester Nursery Co., Winchester, Tenn. "Handsome, large fig of fine quality, sure cropper."

*Tribble:* Originated by Tribble Bros., Elk Grove, Cal., from seed of the Imported Greek Necklace fig about 1909, and introduced by this firm. Tree very large, foliage thick and leathery, very productive. Fruit very large, flat, light brown, flesh light amber, texture fine, quality excellent. August and September.

*White Mission:* Mileo Capri x California Mission hybrid. Originated by M. B. Tribble, Elk Grove, Cal., in 1912. Tree medium vigorous, foliage heavy and leathery, very productive. Fruit medium size, shape same as Mission, skin nearly white, flesh reddish amber, texture fine, very sweet, good quality. June to August.

### Guava

*Snow White:* Originated with Capt. J. R. Jones, Anna Maria Key, Florida. Royal Palm Nurseries, Oneco, Florida. "A large, fine, dessert guava, subacid, of finest flavor, comparatively few seeds."

*White Guinea:* Originated with Reasoner Bros., Oneco, Florida, and introduced by them about 1910. "A large size, sweet guava, thick meated, with very few seeds, very fine for sweet pickle, dessert or canning.

### Sapota

*Harvey:* Originated by J. C. Harvey, Sierra Madre, Cal., from seed planted in 1893. Introduced by West India Gardens, Altadena, Cal., in 1912. Fruit large, richly flavored.

## CITRUS FRUITS

### Lemon

*Oneco:* Originated from root stock or orange trees received from Florida. Introduced by Tribble Bros., Elk Grove, Cal., in 1904. Tree vigorous, very hardy, very productive; fruit unusually large, skin rough, yellow, flesh good lemon color, juice abundant, seeds rather numerous, good quality. November.

### Lime

*Red:* R. M. Teague Citrus Nurseries, San Dimas, Cal. Not described.

### Orange

*Mack's Sweet Navel:* Seedling of Washington Navel. Originated by J. M. Mack, Fallbrook, Cal., about 1914. Tree of ordinary growth, productive. Fruit medium size, of usual navel shape and color; texture of flesh good, very sweet; quality good. Early.

*Temple:* Buckeye Nurseries, Tampa, Florida. Resembles a flattened King in shape. Skin semi-loose but not so much as with tangerines, very thin and tough, smooth and susceptible of high polish, very dark red; flesh melting, sweet, aromatic, delicious, deep red, abundant juice. Mid-season to late.

### Pomelo

*Conner's Improved:* Eltweed Pomeroy, Donna, Texas. Probably same as Improved Conner Prolific.

*Improved Prolific:* Eltweed Pomeroy, Donna, Texas. Probably same as Improved Conner Prolific.

*Mack Grace:* Seedling of Marsh Seedless. Originated by Tribble Bros., Elk Grove, Cal. Tree medium strong grower, very productive. Fruit very large, light yellow, skin thin; flesh light colored, very juicy, nearly seedless, quality good. October.

*Ocklawaha Improved Prolific:* Eltweed Pomeroy, Donna, Texas. Probably same as Improved Conner Prolific.

*Prolific:* Eltweed Pomeroy, Donna, Texas. Probably same as Conner Prolific.

### Tangerine

*Algerian:* Same as Dancy. R. M. Teague Citrus Nurseries, San Dimas, Calif.

## NUTS

### Almond

*Batham's Everbearing:* Originated by C. F. Batham, Chico, California, from seed planted in 1897. First fruited about 1901 and introduced by him in 1907. Chico Nursery Co., Chico, Calif. "A new variety of great merit. Nut medium sized, soft shell; kernel plump, heavy and sweet. Abundant and sure bearer."

*California Paper Shell:* Leonard Coates Nursery Co., Morgan Hill., Calif.. Very thin shell, quality good.

*Stuart Prolific:* Ripon Nursery and Improvement Co., Ripon, Calif. "One of the heaviest bearers known. Blossoms with the Nonpareil. Nut softer than the Drake or Texas. Very prolific bearer and a big grower."

*The Frost Proof:* Originated with Wm. Hartman, Livermore, Calif. Introduced by Chico Nursery Co., Chico, Calif., in 1915. "Paper shell softer than Nonpareil, smaller nut but heavier kernel. Tree an upright grower."

### Black Walnut

*Benge:* "A greatly improved black walnut. Tree very vigorous. Nuts very large and well flavored. For streets and avenues it has no equal." The Nut Grower, February, 1919.

*Kinder:* Discovered and named by R. L. McCoy in Pike County, Indiana. Introduced in 1916. Nut large, good cracker, kernels come out in quarters, good quality. Parent tree productive.

*McCoy:* Discovered and named by R. L. McCoy in Spencer County, Indiana. Introduced in 1917. Nut large, shell medium to heavy, good cracker, quality very good. Parent tree productive.

*Miller:* Discovered and named by J. F. Williams in Spencer County, Indiana. Introduced by J. F. Wilkinson in 1917. Nut large, good cracker, quality splendid. Parent tree prolific.

*Ohio:* Originated in Ohio. Named and introduced by J. F. Jones, Lancaster, Pa. Nut medium size, shell thin; kernel full and of excellent quality, good cracker kernels coming out in halves.

*Stabler:* The original tree is on the farm of Priebe Bros. near Triadelphia in Howard County, Maryland. The tree is probably 75 years old and is said to have been grafted when only a few years old with scions brought from Baltimore County, Maryland. The nut is of medium size and an extra good cracker. The quality of the meats is good.

### Butternut

*Aiken:* Originated with S. E. Aiken, Grasmere, N. H. Nut of medium size, good shape, light color, thin shell, good cracker, fine quality.

*Olcott:* Originated in Connecticut.

### Chestnut

*Clafordc:* Received from Italy in 1893. California Nursery Co., Niles, Calif. Not described.

*Emmons' Mammoth Sweet:* Originated by C. W. Stuart, Newark, N. Y. Emmons and Co., Newark, N. Y. Tree very productive. Nut large, exquisite flavor. Is not now being propagated.

*Progress:* Seedling of Rochester. J. F. Jones, Lancaster, Pa. "Nut about the size of Paragon, of extra fine quality, being sweet and of excellent flavor. Tree a good and early bearer."

### Chinese Nut

*Loongan:* Has fruited at the W. A. Spinks Ranch, Duarte, Calif. It is quite different from the Litche nut. Introduced by U. S. Department of Agriculture. Tree slow growing, evergreen, with delicate pointed leaves, resembling those of camphor or cinnamon. Fruit size of small marble, round, dull yellow; flesh semi-transparent to milky, texture like that of grape, flavor rather sweet; pit size of large pea. Winter and early spring.

### Filbert

*Bony Bush:* Originated with Dr. Robert T. Morris, Stamford, Conn., from a nut sent to him from Bohemia. This variety has a thin shell and is of good quality.

*Merribrook:* Originated on the farm of Dr. Robert T. Morris, Stamford, Conn.

*Pearson's Prolific:* Armstrong Nurseries, Ontario, Calif. "An extremely fertile variety useful as a pollenizer."

### Hickory Nut

*Beaver:* Originated in Pennsylvania. Dr. Morris says this variety is much more thrifty on bitternut than on other stocks.

*Calhoun:* Originated in Calhoun County, Illinois.

*Casper:* No description.

*Cedarrapids:* Originated in Iowa.

*Cook:* Brought out through prize offers by Dr. Robert T. Morris, Stamford, Conn., who says there may be two shagbarks under this name. Originated with W. F. Cook, Moscow, Kentucky. Nut is large. Does not do as well on bitternut stock as on shagbark, pignut and mockernut.

*Dennis:* Originated in Iowa.

*Fairbanks:* Originated in Iowa.

*Glover:* Originated in Connecticut

*Laney:* H. cordiformis x H. ovata. Originated in Rochester, N. Y. Introduced by Jno. Dunbar, Rochester, N. Y.

*Manahan:* Originated in Maryland.

*Pleas:* Originated in Oklahoma. Dr. Morris says this variety is much more thrifty on bitternut than on other stocks.

*Siers:* Cross between shagbark and bitternut. Originated in Kentucky. J. F. Jones, Lancaster, Pa. Tree a very rapid grower. Nut large, shell soft, cracking quality good, quality of meats very good. Dr. Morris says this variety is much more thrifty on bitternut than on other stocks.

*Stanley:* Originated in Indiana.

*Taylor:* Brought out by Dr. Robert T. Morris, Stamford, Conn., through prize offers. Original tree on the grounds of S. W. Taylor, Cos Cob, Conn. Very similar to Vest in size, shape, etc. Does not do as well on bitternut stock as on shagbark, pignut and mockernut.

*Vest:* Brought out through prize offers by Dr. Robert T. Morris, Stamford, Conn. Sent in by L. W. Vest, Blacksburg, Va. Nut medium to large, very thin shell, excellent cleavage, high quality. Does not do as well on bitternut stock as on shagbark, pignut and mockernut.

*Wampler:* No description.

**Japanese Walnut**

*Lancaster:* Introduced by J. F. Jones, Lancaster, Pa. Nut heart-shaped, large, smooth, brown, cracking quality especially good, shell opens in halves and kernel drops out whole, quality excellent, resembling the butternut. Tree robust, productive.

*Stranger:* No description.

**Pecan**

*Burkhardt:* Originated in Karnes County, Texas. Introduced by the Austin Nursery Austin, Texas, in 1918. "Long, large, extra well filled kernel."

*Capps:* Originated at Bronwood, Texas, in the Swinden orchard. Proceedings of National Nut Growers' Association, 1917.

*Haralson:* Originated near Goldthwaite, Texas. Proceedings of National Nut Growers' Association, 1917.

*Hollis:* Originated near Lometa, Texas. Tree is now over 100 years old, three and one-half feet in diameter. Largest crop 987 pounds. Average crop for the past 17 years, 300 pounds. Nuts average 40 to the pound. Proceedings of National Nut Growers' Association, 1917.

*Houston:* Originated in Travis County, Texas. Introduced by the Austin Nursery, Austin, Texas, about 1913. Nut large, slightly elongated; kernel very plump.

*John Morris:* Originated near Lometa, Texas, about a quarter of a mile from the Hollis tree. Tree about 30 years old and has produced 436 pounds in one crop. The average yield for the past ten years is 250 pounds. Nuts run about 45 to the pound. Proceedings of National Nut Growers' Association, 1917.

*Llano:* Originated with R. S. Price, Junction, Texas, and named after the Llano River. Tree is said to be a light bearer but the nut has splendid cracking and table qualities.

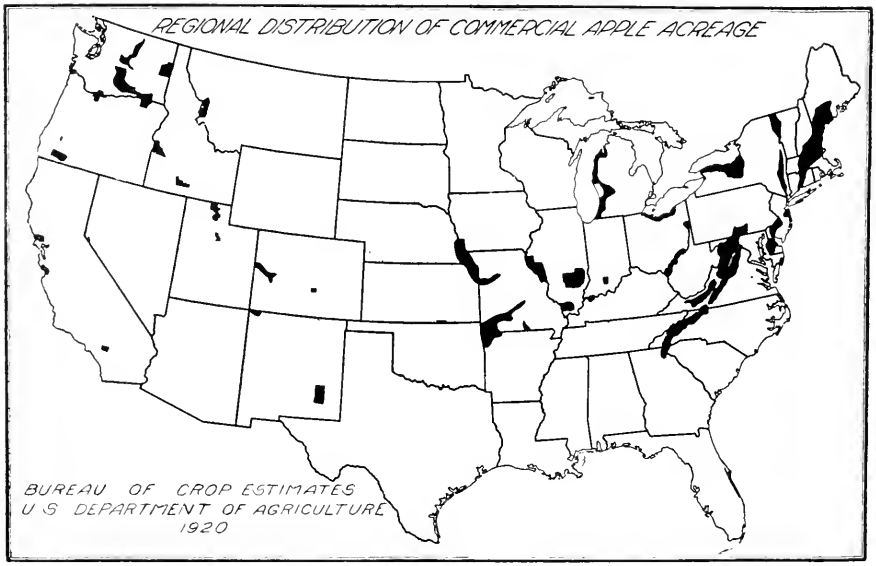
*Mexican Paper Shell:* Imported from Mexico about 1909, by Col. Stuart of Ocean Springs, Miss. First offered to the public in 1919. Christ Reuter's Nursery, New Orleans, La. "One of the thinnest shelled of all pecans, has a delicious flavor and is a regular, heavy bearer."

*Napier:* Originated by Mr. Napier, Menardsville, McCulloch Co., Texas and introduced by the Austin Nursery, Austin, Texas, in 1918. "Elongated, above medium size, fine flavor."

*Sloan:* Originated near Stacy, Texas. The original tree is probably 150 years old, has borne 1,000 pounds a year and has averaged 700 pounds per year for the past 25 years. Nuts average about 60 per pound. Proceedings of the National Nut Growers' Association, 1917.

*The Farley:* Originated by Geo. E. Farley, Marianna, Florida. Introduced by Geo. E. Farley, Marianna, Florida, and W. B. Stone, Thomasville, Georgia, in 1917. Chipola Nursery, Apalachicola, Fla. Tree early bearer, productive, very late to bloom thus escaping spring frosts. Nut large, rather blunt at both ends, very thin shell, fine cracking quality; kernel plump, rich, fine flavor.

*Trott:* Originated near Stacy, Texas. Original tree about 23 years old. Has borne 200 pounds per year and previous to 1917 averaged 100 pounds per year for ten years. Number of nuts per pound about 60. Proceedings of the National Nut Growers' Association, 1917.



## FARM VALUE OF FOUR LEADING FRUIT CROPS OF THE UNITED STATES INCLUDING BOTH COMMERCIAL AND NON-COMMERCIAL CROPS

(U. S. Bureau of Crop Estimates.)

| Kind. | 1919 | 1918 | Average 1913-1917 |
|---|---|---|---|
| Apples | $275,463,000 | $225,562,000 | $166,140,000 |
| Peaches | 97,528,000 | 55,092,000 | 52,721,000 |
| Pears | 24,833,000 | 17,902,000 | 11,075,000 |
| Oranges (Calif. & Fla.) | 64,169,000 | 84,480,000 | No data |
| Total, 4 crops | $461,993,000 | $383,036,000 | ..... |

NOTE. — The values of apples and oranges are based upon prices on December 1; pears, November 15, and peaches, September 15.

## AVERAGE PRICES TO PRODUCERS IN THE UNITED STATES

### Apples

15th of each month. Dollars per barrel.

| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1913 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | $2 73 | $3 00 | $3 37 |
| 1914 | $3 73 | $4 06 | $4 30 | $4 56 | $4 59 | $4 05 | $2 55 | $2 12 | $1 98 | 1 92 | 1 96 | 2 01 |
| 1915 | 2 14 | 2 26 | 2 24 | 2 54 | 2 72 | 2 91 | 2 27 | 1 77 | 1 80 | 2 10 | 2 21 | 2 43 |
| 1916 | 2 71 | 2 80 | 2 78 | 2 87 | 2 98 | 3 02 | 2 60 | 2 31 | 2 30 | 2 61 | 2 93 | 3 26 |
| 1917 | 3 28 | 3 56 | 4 02 | 4 14 | 4 38 | 4 15 | 3 14 | 2 77 | 2 93 | 3 38 | 3 81 | 4 20 |
| 1918 | 4 28 | 4 54 | 4 57 | 4 67 | 5 02 | 4 17 | 3 63 | 3 58 | 3 98 | 4 39 | 1 72 | 4 93 |
| 1919 | 5 25 | 5 84 | 6 91 | 7 58 | 8 10 | 7 49 | 4 79 | 4 66 | 4 73 | 5 50 | 5 98 | 6 97 |
| 1920 | 7 04 | 7 44 | 7 62 | 8 10 | 8 68 | 8 21 | ..... | ..... | ..... | ..... | ..... | ..... |

## AVERAGE PRICES TO PRODUCERS IN THE UNITED STATES

### Apples

15th of each month. Cents per bushel.

| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1910 | 106.4 | 111.2 | 114.0 | 114.3 | 127.1 | 112.0 | 76.9 | 73.8 | 73.6 | 77.4 | 89.3 | 100.2 |
| 1911 | 115.7 | 118.6 | 124.7 | 138.8 | 139.6 | 135.4 | 94.8 | 73.0 | 70.2 | 65.8 | 73.1 | 86.1 |
| 1912 | 92.7 | 98.8 | 103.5 | 114.9 | 128.8 | 108.0 | 82.5 | 67.5 | 62.2 | 61.3 | 63.5 | 72.6 |
| 1913 | 74.3 | 78.4 | 82.4 | 85.0 | 94.0 | 101.2 | 86.0 | 75.2 | 76.5 | 85.6 | 94.4 | 103.6 |
| 1914 | 110.6 | 123.0 | 128.9 | 137.1 | 146.4 | 135.6 | 91.2 | 68.6 | 61.6 | 56.0 | 57.3 | 66.6 |
| 1915 | 69.3 | 73.1 | 73.4 | 80.1 | 90.6 | 90.3 | 78.4 | 61.8 | 58.0 | 66.1 | 72.4 | 77.0 |
| 1916 | 86.1 | 90.5 | 91.2 | 94.8 | 97.5 | 104.9 | 86.5 | 80.7 | 75.6 | 82.5 | 92.0 | 103.4 |
| 1917 | 104.3 | 114.4 | 126.9 | 137.1 | 142.9 | 146.5 | 125.1 | 100.6 | 96.6 | 105.1 | 116.8 | 127.4 |
| 1918 | 132.9 | 138.5 | 142.6 | 143.9 | 155.8 | 144.6 | 125.7 | 114.5 | 118.9 | 129.4 | 138.9 | 150.9 |
| 1919 | 148.9 | 159.8 | 190.1 | 203.5 | 220.8 | 223.4 | 187.6 | 161.4 | 153.2 | 175.6 | 184.9 | 213.9 |
| 1920 | 215.9 | 229.2 | 236.7 | 253.5 | 285.8 | 249.1 | ..... | ..... | ..... | ..... | ..... | ..... |

## AVERAGE PRICES TO PRODUCERS IN THE UNITED STATES

### Pears

15th of each month. Cents per bushel.

| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1910 | 113.5 | 106.4 | 138.2 | 130.5 | 139.6 | ..... | 100.6 | ..... | 100.9 | 98.6 | 100.8 | 122.4 |
| 1911 | ..... | ..... | 108.9 | 134.0 | 138.6 | 126.0 | 128.0 | 118.0 | 103.8 | 97.2 | 85.1 | 111.0 |
| 1912 | ..... | ..... | ..... | ..... | ..... | 113.2 | 122.0 | 106.3 | 100.0 | 83.1 | 79.3 | 92.8 |
| 1913 | 108.0 | ..... | ..... | ..... | ..... | ..... | ..... | 109.9 | 119.3 | 95.6 | 93.0 | 97.9 |
| 1914 | 113.3 | ..... | ..... | ..... | ..... | ..... | ..... | 98.8 | 92.8 | 80.4 | 77.5 | 82.5 |
| 1915 | 100.4 | ..... | ..... | ..... | ..... | ..... | ..... | 80.8 | 83.8 | 82.7 | 89.8 | 89.7 |
| 1916 | 92.4 | ..... | ..... | ..... | ..... | ..... | ..... | 109.0 | 102.7 | 96.9 | 93.3 | 105.6 |
| 1917 | 119.8 | ..... | ..... | ..... | ..... | ..... | ..... | 132.2 | 125.0 | 118.2 | 116.1 | ..... |
| 1918 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 168.4 | 157.8 | 147.5 | 140.1 | 156.6 |
| 1919 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 188.4 | 183.0 | 181.3 | 182.0 | 219.5 |
| 1920 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 195.5 | 197.9 | 184.2 | 170.0 | 164.5 |

## APPLES

**Apples: Total production (bushels) in the United States, 1889-1920**

| Year. | Production. | Year. | Production. | Year. | Production. |
|---|---|---|---|---|---|
| 1889[1] ..... | *143,105,000* | 1899[1] ..... | *175,397,000* | 1909[1] ..... | *146,122,000* |
| 1890 ..... | 80,142,000 | 1900 ..... | 205,930,000 | 1910 ..... | 141,640,000 |
| 1891 ..... | 198,907,000 | 1901 ..... | 135,500,000 | 1911 ..... | 214,020,000 |
| 1892 ..... | 120,536,000 | 1902 ..... | 212,330,000 | 1912 ..... | 235,220,000 |
| 1893 ..... | 114,773,000 | 1903 ..... | 195,680,000 | 1913 ..... | 145,410,000 |
| 1894 ..... | 134,648,000 | 1904 ..... | 233,630,000 | 1914 ..... | 253,200,000 |
| 1895 ..... | 219,600,000 | 1905 ..... | 136,220,000 | 1915 ..... | 230,011,000 |
| 1896 ..... | 232,600,000 | 1906 ..... | 216,720,000 | 1916 ..... | 204,582,000 |
| 1897 ..... | 163,728,000 | 1907 ..... | 119,560,000 | 1917 ..... | 166,749,000 |
| 1898 ..... | 118,061,000 | 1908 ..... | 148,940,000 | 1918 ..... | 169,625,000 |
| | | | | 1919 ..... | 153,238,000 |
| | | | | 1920 ..... | 240,442,000 |

[1] Census figures.

**Estimated annual production of the commercial apple crop in the United States for the years 1916 to 1920, inclusive**

[By commercial crop is meant that portion of the total crop which is sold for consumption as fresh fruit. One barrel is equivalent to three boxes.]

| States | 1920 | 1919 | 1918 | 1917 | 1916 |
|---|---|---|---|---|---|
| | *Barrels* | *Barrels* | *Barrels* | *Barrels* | *Barrels* |
| Maine | 265,000 | 601,000 | 226,000 | 400,000 | 536,000 |
| New Hampshire | 170,000 | 187,000 | 122,000 | 120,000 | 198,000 |
| Vermont | 190,000 | 203,000 | 105,000 | 132,000 | 388,000 |
| Massachusetts | 375,000 | 335,000 | 300,000 | 225,000 | 368,000 |
| Rhode Island | 75,000 | 24,000 | 20,000 | 19,000 | 27,000 |
| Connecticut | 210,000 | 119,000 | 108,000 | 96,000 | 146,000 |
| New York | 9,275,000 | 2,975,000 | 5,950,000 | 2,058,000 | 5,544,000 |
| New Jersey | 1,075,000 | 587,000 | 511,000 | 408,000 | 462,000 |
| Pennsylvania | 2,000,000 | 759,000 | 1,116,000 | 854,000 | 1,225,000 |
| Delaware | 271,000 | 192,000 | 186,000 | 191,000 | 108,000 |
| Maryland | 511,000 | 226,000 | 315,000 | 263,000 | 311,000 |
| Virginia | 2,636,000 | 1,508,000 | 1,766,000 | 1,687,000 | 2,179,000 |
| West Virginia | 1,167,000 | 648,000 | 1,092,000 | 688,000 | 1,140,000 |
| North Carolina | 305,000 | 92,000 | 184,000 | 200,000 | 270,000 |
| Georgia | 118,000 | 57,000 | 117,000 | 120,000 | 111,000 |
| Ohio | 1,363,000 | 364,000 | 902,000 | 503,000 | 747,000 |
| Indiana | 773,000 | 197,000 | 266,000 | 456,000 | 298,000 |
| Illinois | 1,414,000 | 750,000 | 837,000 | 1,554,000 | 1,040,000 |
| Michigan | 3,167,000 | 1,109,000 | 1,495,000 | 515,000 | 1,414,000 |
| Wisconsin | 180,000 | 126,000 | 111,000 | 124,000 | 105,000 |
| Minnesota | 78,000 | 61,000 | 40,000 | 60,000 | 42,000 |
| Iowa | 420,000 | 174,000 | 101,000 | 275,000 | 180,000 |
| Missouri | 1,033,000 | 1,127,000 | 735,000 | 1,128,000 | 675,000 |
| South Dakota | 5,000 | 3,000 | 3,000 | 4,000 | 5,000 |
| Nebraska | 127,000 | 215,000 | 72,000 | 226,000 | 142,000 |
| Kansas | 286,000 | 459,000 | 333,000 | 650,000 | 560,000 |
| Kentucky | 250,000 | 65,000 | 108,000 | 153,000 | 135,000 |
| Tennessee | 312,000 | 87,000 | 218,000 | 192,000 | 147,000 |
| Alabama | 21,000 | 10,000 | 26,000 | 24,000 | 19,000 |
| Texas | 20,000 | 40,000 | 11,000 | 23,000 | 20,000 |
| Oklahoma | 29,000 | 43,000 | 17,000 | 54,000 | 27,000 |
| Arkansas | 724,000 | 1,010,000 | 241,000 | 409,000 | 245,000 |
| Montana | 115,000 | 124,000 | 75,000 | 74,000 | 70,000 |
| Colorado | 736,000 | 828,000 | 527,000 | 701,000 | 677,000 |
| New Mexico | 125,000 | 224,000 | 117,000 | 175,000 | 108,000 |
| Arizona | 10,000 | 16,000 | 15,000 | 16,000 | 17,000 |
| Utah | 196,000 | 121,000 | 163,000 | 184,000 | 24,000 |
| Idaho | 781,000 | 1,200,000 | 112,000 | 873,000 | 170,000 |
| Washington | 3,623,000 | 6,440,000 | 4,296,000 | 4,620,000 | 4,892,000 |
| Oregon | 800,000 | 1,357,000 | 671,000 | 713,000 | 801,000 |
| California | 1,000,000 | 1,511,000 | 1,127,000 | 1,174,000 | 1,174,000 |
| United States | 36,272,000 | 26,174,000 | 24,743,000 | 22,341,000 | 26,747,000 |

## APPLE CROPS OF THE UNITED STATES

**Beginning with 1909**

U. S. Bureau of Crop Estimates

(In thousands of bushels, i. e., 000 omitted)

| State and Division | 1909 | 1910 | 1911 | 1912 | 1913 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maine | 1,212 | 1,183 | 2,267 | 1,800 | 1,000 | 2,467 | 2,160 | 5,040 | 4,275 | 2,010 | 4,680 | 1,930 |
| New Hampshire | 369 | 600 | 533 | 733 | 267 | 667 | 1,058 | 1,596 | 1,035 | 1,155 | 1,510 | 1,320 |
| Vermont | 487 | 900 | 750 | 867 | 233 | 1,067 | 972 | 3,312 | 1,248 | 990 | 1,500 | 1,600 |
| Massachusetts | 850 | 967 | 1,000 | 1,100 | 767 | 1,467 | 2,655 | 3,450 | 2,163 | 2,430 | 3,240 | 3,680 |
| Rhode Island | 71 | 100 | 133 | 100 | 100 | 133 | 176 | 261 | 195 | 189 | 294 | 340 |
| Connecticut | 514 | 600 | 800 | 567 | 700 | 833 | 1,534 | 1,776 | 1,251 | 999 | 1,572 | 2,520 |
| New York | 8,470 | 5,667 | 13,000 | 14,667 | 6,500 | 16,533 | 25,585 | 35,334 | 16,266 | 10,878 | 16,800 | 55,650 |
| New Jersey | 169 | 567 | 1,033 | 567 | 700 | 1,133 | 2,331 | 2,250 | 2,058 | 2,463 | 2,313 | 4,134 |
| Pennsylvania | 3,683 | 3,867 | 6,833 | 4,233 | 3,400 | 7,700 | 15,254 | 18,621 | 11,646 | 16,080 | 7,972 | 23,937 |
| N. Atlantic | 16,124 | 14,450 | 26,350 | 24,633 | 13,667 | 32,000 | 51,725 | 71,610 | 40,137 | 67,194 | 39,881 | 75,111 |
| Delaware | 61 | 117 | 100 | 140 | 60 | 167 | 366 | 432 | 798 | 714 | 750 | 1,017 |
| Maryland | 608 | 900 | 867 | 883 | 433 | 1,167 | 2,400 | 2,511 | 2,559 | 2,034 | 1,944 | 3,330 |
| Virginia | 2,036 | 4,033 | 2,100 | 5,000 | 1,733 | 5,100 | 13,176 | 13,299 | 11,778 | 10,068 | 9,950 | 15,210 |
| West Virginia | 1,408 | 2,367 | 2,600 | 3,433 | 333 | 4,133 | 7,540 | 7,752 | 1,320 | 5,856 | 3,478 | 7,000 |
| North Carolina | 1,592 | 2,400 | 1,200 | 2,533 | 1,000 | 3,000 | 5,916 | 5,589 | 1,500 | 3,588 | 1,108 | 7,900 |
| South Carolina | 121 | 247 | 157 | 200 | 87 | 267 | 663 | 1,179 | 1,635 | 1,407 | 700 | 1,482 |
| Georgia | 299 | 467 | 267 | 467 | 300 | 667 | 1,875 | 1,623 | 1,713 | 1,713 | 636 | 1,764 |
| Florida | 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| S. Atlantic | 6,125 | 10,530 | 7,590 | 12,657 | 3,947 | 11,500 | 31,936 | 32,418 | 27,303 | 25,380 | 18,566 | 37,703 |
| Ohio | 1,555 | 1,967 | 6,233 | 3,533 | 1,600 | 4,433 | 17,952 | 8,601 | 5,760 | 7,005 | 2,806 | 13,193 |
| Indiana | 920 | 1,633 | 2,967 | 1,400 | 2,200 | 1,433 | 11,648 | 3,360 | 4,836 | 1,794 | 1,704 | 6,097 |
| Illinois | 1,031 | 267 | 3,533 | 1,933 | 2,733 | 1,233 | 14,148 | 4,848 | 7,518 | 3,459 | 4,943 | 6,175 |
| Michigan | 4,111 | 1,400 | 4,100 | 5,733 | 2,967 | 5,733 | 9,450 | 9,951 | 4,146 | 9,792 | 6,484 | 16,500 |
| Wisconsin | 744 | 133 | 1,000 | 667 | 1,333 | 733 | 4,418 | 2,604 | 3,090 | 2,811 | 2,087 | 3,650 |
| N. C. E. Miss. R. | 8,360 | 5,400 | 17,833 | 13,267 | 10,833 | 13,567 | 57,616 | 29,364 | 25,350 | 24,861 | 18,024 | 45,615 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Minnesota | 348 | 50 | 433 | 233 | 600 | 233 | 1,235 | 1,266 | 1,446 | 996 | 1,365 | 1,462 |
| Iowa | 2,249 | 67 | 3,167 | 500 | 2,367 | 533 | 9,660 | 3,573 | 3,795 | 1,584 | 1,815 | 4,410 |
| Missouri | 3,323 | 2,533 | 3,867 | 6,400 | 2,633 | 4,167 | 18,869 | 6,003 | 8,070 | 4,245 | 5,773 | 5,082 |
| North Dakota | 1 | | | | | | | | | | | |
| South Dakota | 64 | 10 | 80 | 67 | 107 | 67 | 301 | 348 | 336 | 273 | 302 | 323 |
| Nebraska | 1,107 | 467 | 1,200 | 933 | 767 | 400 | 3,800 | 1,278 | 1,854 | 525 | 1,125 | 750 |
| Kansas | 152 | 2,200 | 800 | 2,233 | 900 | 1,033 | 6,375 | 2,268 | 2,853 | 1,503 | 1,835 | 1,144 |
| N. C. W. Miss. R. | 7,511 | 5,327 | 9,547 | 10,367 | 7,373 | 6,433 | 40,231 | 14,736 | 18,354 | 9,126 | 12,215 | 13,171 |
| Kentucky | 2,456 | 1,767 | 2,033 | 3,200 | 2,300 | 3,000 | 12,510 | 4,416 | 5,802 | 2,799 | 1,480 | 5,780 |
| Tennessee | 1,547 | 1,733 | 967 | 2,967 | 1,300 | 2,867 | 6,076 | 4,299 | 1,170 | 4,050 | 1,560 | 5,304 |
| Alabama | 296 | 333 | 233 | 100 | 300 | 533 | 1,596 | 1,116 | 1,449 | 1,662 | 617 | 1,260 |
| Mississippi | 89 | 110 | 80 | 150 | 123 | 167 | 424 | | | | | 126 |
| Louisiana | 11 | | | | | | | | | | | |
| Texas | 56 | 133 | 67 | 167 | 100 | 167 | 562 | 168 | 357 | 273 | 624 | 351 |
| Oklahoma | 247 | 400 | 350 | 567 | 367 | 500 | 2,340 | 669 | 1,293 | 660 | 1,512 | 548 |
| Arkansas | 765 | 900 | 1,000 | 1,700 | 1,333 | 1,667 | 3,550 | 1,593 | 2,574 | 1,290 | 4,250 | 3,620 |
| S. Central | 5,467 | 5,377 | 4,730 | 9,150 | 5,823 | 8,900 | 27,058 | 12,561 | 15,645 | 10,734 | 10,043 | 16,989 |
| Montana | 189 | 140 | 300 | 300 | 280 | 300 | 1,040 | 768 | 1,044 | 792 | 1,289 | 1,155 |
| Wyoming | 6 | 3 | 7 | 10 | 10 | | | | | | | |
| Colorado | 1,186 | 500 | 900 | 1,033 | 1,100 | 1,500 | 2,080 | 2,541 | 2,190 | 2,067 | 3,418 | 2,760 |
| New Mexico | 139 | 113 | 227 | 250 | 217 | 300 | 820 | 459 | 879 | 912 | 1,329 | 566 |
| Arizona | 21 | 33 | 37 | 43 | 30 | 32 | 120 | 138 | 129 | 138 | 154 | 100 |
| Utah | 117 | 137 | 153 | 227 | 203 | 267 | 427 | 99 | 906 | 786 | 779 | 918 |
| Nevada | 25 | 53 | 33 | 87 | 53 | 67 | 120 | | | | | |
| Idaho | 220 | 117 | 400 | 550 | 467 | 567 | 1,720 | 738 | 3,843 | 1,200 | 4,350 | 3,631 |
| Washington | 891 | 1,933 | 1,167 | 2,567 | 2,300 | 2,767 | 7,300 | 17,658 | 19,830 | 16,491 | 23,190 | 13,420 |
| Oregon | 611 | 1,267 | 500 | 1,367 | 1,167 | 1,200 | 3,128 | 3,855 | 1,335 | 3,381 | 5,579 | 3,300 |
| California | 1,615 | 1,533 | 1,567 | 1,900 | 1,000 | 2,000 | 4,690 | 6,930 | 6,804 | 6,560 | 8,640 | 6,003 |
| Far Western | 5,085 | 6,130 | 5,290 | 8,333 | 6,827 | 9,000 | 21,445 | 33,186 | 39,960 | 32,330 | 48,728 | 31,853 |
| United States | 48,707 | 47,213 | 71,340 | 78,407 | 48,170 | 84,400 | 230,011 | 193,905 | 166,749 | 169,625 | 147,457 | 240,442 |

## APPLES — Continued

**Estimated annual production by regions of the commercial apple crop in the United States, 1917-1919**

| Regions. | 1917 | 1918 | 1919 |
|---|---|---|---|
| | *Barrels.*[1] | *Barrels.* | *Barrels.* |
| Western New York | 1,118,000 | 4,800,000 | 1,728,000 |
| New England | 750,000 | 645,000 | 1,120,000 |
| Hudson Valley | 1,074,000 | 647,000 | 1,050,000 |
| Shenandoah-Cumberland district | 2,080,000 | 2,600,000 | 1,980,000 |
| Piedmont district | 578,000 | 465,000 | 551,000 |
| South Ohio Rome Beauty district | 121,000 | 558,000 | 184,000 |
| Western Michigan | 350,000 | 760,000 | 912,000 |
| Southern and Western Illinois | 1,320,000 | 800,000 | 705,000 |
| Ozark | 793,000 | 404,000 | 1,395,000 |
| Arkansas River region | 197,000 | 123,000 | 135,000 |
| Missouri River region | 1,239,000 | 630,000 | 990,000 |
| Pacific Northwest | 6,313,000 | 5,037,000 | 9,128,000 |
| Colorado | 701,000 | 527,000 | 828,000 |
| California | 1,174,000 | 1,127,000 | 1,511,000 |

[1] 1 barrel is equivalent to 3 boxes.

## PEACHES

**Peaches: Production (bushels) in the United States, 1889-1920**

| Year. | Production. | Year. | Production. | Year. | Production. |
|---|---|---|---|---|---|
| 1889[1] | *36,368,000* | 1906 | 44,104,000 | 1913 | 39,707,000 |
| 1899[1] | *15,433,000* | 1907 | 22,527,000 | 1914 | 54,109,000 |
| 1900 | 49,438,000 | 1908 | 48,145,000 | 1915 | 64,097,000 |
| 1901 | 46,445,000 | 1909[1] | *35,470,000* | 1916 | 37,505,000 |
| 1902 | 37,831,000 | 1910 | 48,171,000 | 1917 | 45,066,000 |
| 1903 | 28,850,000 | 1911 | 34,880,000 | 1918 | 33,094,000 |
| 1904 | 41,070,000 | 1912 | 52,343,000 | 1919 | 49,578,000 |
| 1905 | 36,634,000 | | | 1920 | 43,697,000 |

[1] Census figures.

**Estimated production of the commercial peach crop, 1917-1920**

| States. | 1920 | 1919 | 1918 | 1917 |
|---|---|---|---|---|
| | *Bushels.* | *Bushels.* | *Bushels.* | *Bushels.* |
| New Hampshire | 1,000 | 11,000 | 0 | 14,000 |
| Massachusetts | 2,000 | 49,000 | 0 | 36,000 |
| Connecticut | 17,000 | 53,000 | 0 | 273,000 |
| New York | 1,730,000 | 780,000 | 525,000 | 3,617,000 |
| New Jersey | 834,000 | 683,000 | 640,000 | 711,000 |
| Pennsylvania | 610,000 | 467,000 | 258,000 | 665,000 |
| Delaware | 159,000 | 175,000 | 101,000 | 166,000 |
| Maryland | 556,000 | 287,000 | 144,000 | 639,000 |
| Virginia | 191,000 | 201,000 | 90,000 | 119,000 |
| West Virginia | 665,000 | 529,000 | 459,000 | 675,000 |
| North Carolina | 153,000 | 92,000 | 90,000 | 150,000 |
| South Carolina | 103,000 | 35,000 | 102,000 | 113,000 |
| Georgia | 2,127,000 | 2,964,000 | 3,255,000 | 1,512,000 |
| Ohio | 919,000 | 173,000 | 87,000 | 188,000 |
| Indiana | 77,000 | 14,000 | 0 | 31,000 |
| Illinois | 256,000 | 261,000 | 0 | 171,000 |
| Michigan | 638,000 | 120,000 | 54,000 | 236,000 |
| Missouri | 152,000 | 139,000 | 0 | 218,000 |
| Kentucky | 62,000 | 15,000 | 4,000 | 44,000 |
| Tennessee | 155,000 | 119,000 | 100,000 | 65,000 |
| Alabama | 75,000 | 109,000 | 138,000 | 69,000 |
| Mississippi | 0 | 0 | 0 | 0 |
| Texas | 158,000 | 880,000 | 767,000 | 456,000 |
| Oklahoma | 22,000 | 345,000 | 77,000 | 287,000 |
| Arkansas | 34,000 | 1,360,000 | 87,000 | 849,000 |
| Colorado | 439,000 | 676,000 | 719,000 | 822,000 |
| New Mexico | 5,000 | 75,000 | 27,000 | 99,000 |
| Utah | 578,000 | 830,000 | 735,000 | 956,000 |
| Idaho | 33,000 | 163,000 | 42,000 | 158,000 |
| Washington | 497,000 | 1,417,000 | 402,000 | 1,223,000 |
| Oregon | 46,000 | 171,000 | 31,000 | 114,000 |
| California[1] | 13,486,000 | 16,268,000 | 11,663,000 | 14,151,000 |
| Total | 24,780,000 | 29,461,000 | 20,597,000 | 28,927,000 |

[1] Attention is called to the fact that approximately 90 per cent of the California peach crop is either canned or dried.

## PEACHES — ESTIMATES OF PRODUCTION, 1899-1908

(Bushels, 000 omitted.)

| State or Territory | 1899 (Census) | 1900 | 1901 | 1902 | 1903 | 1904 | 1905 | 1906 | 1907 | 1908 |
|---|---|---|---|---|---|---|---|---|---|---|
| Maine | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| New Hampshire | 6 | 30 | 8 | 50 | 20 | 40 | 35 | 30 | 20 | 45 |
| Vermont | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Massachusetts | 28 | 140 | 100 | 150 | 35 | 70 | 120 | 90 | 25 | 100 |
| Rhode Island | 6 | 8 | 13 | 14 | 2 | 5 | 12 | 13 | 5 | 12 |
| Connecticut | 62 | 140 | 280 | 230 | 50 | 110 | 240 | 200 | 50 | 220 |
| New York | 467 | 1,500 | 850 | 550 | 670 | 675 | 1,650 | 920 | 400 | 1,470 |
| New Jersey | 621 | 1,900 | 1,200 | 1,300 | 350 | 700 | 1,000 | 1,000 | 450 | 800 |
| Pennsylvania | 143 | 1,400 | 1,700 | 1,350 | 900 | 700 | 1,500 | 1,000 | 600 | 1,500 |
| North Atlantic. | 1,336 | 5,121 | 4,154 | 3,647 | 2,030 | 2,303 | 4,560 | 3,256 | 1,553 | 4,150 |
| Delaware | 10 | 250 | 170 | 185 | 45 | 135 | 15 | 100 | 35 | 100 |
| Maryland | 172 | 1,900 | 1,300 | 1,140 | 600 | 950 | 600 | 850 | 250 | 750 |
| Virginia | 357 | 1,900 | 1,350 | 850 | 800 | 850 | 950 | 800 | 300 | 900 |
| West Virginia | 18 | 700 | 800 | 250 | 180 | 700 | 335 | 500 | 150 | 650 |
| North Carolina | 371 | 1,550 | 1,150 | 1,050 | 1,100 | 1,350 | 1,200 | 1,100 | 550 | 1,100 |
| South Carolina | 129 | 800 | 650 | 600 | 750 | 700 | 650 | 700 | 170 | 1,100 |
| Georgia | 260 | 5,000 | 3,340 | 3,370 | 2,100 | 5,000 | 3,025 | 3,720 | 1,125 | 5,032 |
| Florida | 92 | 190 | 160 | 190 | 110 | 180 | 140 | 150 | 80 | 160 |
| South Atlantic. | 1,412 | 12,290 | 8,920 | 7,635 | 5,685 | 9,865 | 6,910 | 7,920 | 2,660 | 10,080 |
| Ohio | 241 | 1,900 | 3,800 | 1,100 | 1,050 | 1,900 | 2,000 | 1,100 | 680 | 2,050 |
| Indiana | 69 | 900 | 1,600 | 180 | 400 | 630 | 1,000 | 820 | 450 | 1,190 |
| Illinois | 67 | 1,600 | 2,100 | 300 | 450 | 700 | 750 | 2,150 | 770 | 1,750 |
| Michigan | 310 | 2,200 | 2,250 | 2,200 | 1,500 | 1,000 | 2,450 | 1,400 | 700 | 1,800 |
| Wisconsin | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| N. C. E. Miss. R. | 717 | 6,600 | 9,750 | 3,780 | 3,400 | 4,230 | 6,200 | 5,470 | 2,600 | 6,790 |
| Minnesota | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Iowa | 5 | 190 | 180 | 50 | 180 | 70 | 30 | 300 | 100 | 170 |
| Missouri | 61 | 2,250 | 2,700 | 1,200 | 850 | 2,500 | 650 | 4,000 | 500 | 2,200 |
| North Dakota | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| South Dakota | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Nebraska | 9 | 80 | 120 | 60 | 30 | 200 | 30 | 180 | 70 | 150 |
| Kansas | 138 | 650 | 700 | 350 | 250 | 650 | 180 | 950 | 30 | 650 |
| N. C. W. Miss. R. | 213 | 3,170 | 3,700 | 1,660 | 1,310 | 3,420 | 890 | 5,430 | 700 | 3,170 |
| Kentucky | 35 | 2,100 | 2,500 | 500 | 650 | 1,700 | 1,570 | 1,700 | 550 | 1,670 |
| Tennessee | 78 | 1,900 | 1,800 | 1,100 | 900 | 1,450 | 670 | 2,400 | 450 | 1,700 |
| Alabama | 185 | 2,300 | 1,850 | 1,850 | 1,250 | 2,600 | 870 | 2,100 | 650 | 2,150 |
| Mississippi | 252 | 2,300 | 1,700 | 1,650 | 1,150 | 2,100 | 900 | 1,500 | 600 | 1,650 |
| Louisiana | 154 | 520 | 410 | 450 | 300 | 560 | 480 | 450 | 250 | 510 |
| Texas | 1,400 | 2,900 | 1,560 | 2,200 | 1,600 | 1,850 | 2,600 | 1,900 | 1,700 | 2,300 |
| Oklahoma | 305 | 780 | 710 | 1,000 | 700 | 500 | 740 | 1,200 | 800 | 830 |
| Arkansas | 334 | 1,600 | 1,550 | 2,200 | 500 | 2,500 | 2,200 | 2,300 | 2,400 | 2,700 |
| South Central. | 2,743 | 14,400 | 12,080 | 10,950 | 7,050 | 13,260 | 10,030 | 13,550 | 7,400 | 13,510 |
| Montana | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Wyoming | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Colorado | 47 | 180 | 250 | 390 | 350 | 580 | 150 | 800 | 40 | 360 |
| New Mexico | 76 | 130 | 80 | 130 | 90 | 80 | 100 | 120 | 10 | 100 |
| Arizona | 38 | 36 | 39 | 44 | 50 | 23 | 46 | 32 | 30 | 48 |
| Utah | 85 | 230 | 220 | 190 | 220 | 250 | 160 | 260 | 90 | 190 |
| Nevada | 3 | 1 | 6 | 5 | 5 | 4 | 3 | 6 | 4 | 2 |
| Idaho | 18 | 100 | 30 | 60 | 60 | 90 | 40 | 60 | 50 | 80 |
| Washington | 81 | 190 | 200 | 170 | 210 | 250 | 190 | 200 | 240 | 270 |
| Oregon | 101 | 240 | 180 | 240 | 240 | 290 | 220 | 190 | 250 | 250 |
| California | 8,563 | 6,750 | 6,836 | 8,930 | 8,150 | 6,425 | 7,135 | 6,810 | 6,900 | 9,146 |
| Far Western | 9,012 | 7,857 | 7,841 | 10,159 | 9,375 | 7,992 | 8,044 | 8,478 | 7,614 | 10,446 |
| United States. | 15,433 | 49,438 | 46,445 | 37,831 | 28,850 | 41,070 | 36,634 | 44,104 | 22,527 | 48,146 |

Note: — Census figures for 1899. For other years, interpretation of percentage estimates of Bureau of Crop Estimates, Census figures being used as basis.

## PEACH CROP OF THE UNITED STATES

**Beginning with 1909**

U. S. Bureau of Crop Estimates

(In thousands of bushels, i. e., 000 omitted)

| State and Division | 1909 | 1910 | 1911 | 1912 | 1913 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maine | 2 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| New Hampshire | 23 | 56 | ..... | ..... | 44 | 3 | 58 | 21 | 46 | ..... | 43 | ..... |
| Vermont | 2 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Massachusetts | 92 | 68 | 97 | 51 | 105 | 31 | 152 | 66 | 144 | ..... | 160 | 4 |
| Rhode Island | 18 | 18 | 22 | 16 | 29 | 14 | 29 | 14 | ..... | ..... | ..... | ..... |
| Connecticut | 270 | 291 | 249 | 128 | 263 | 142 | 335 | 134 | 390 | ..... | 200 | 10 |
| New York | 1,736 | 1,762 | 1,536 | 1,400 | 1,742 | 530 | 2,106 | 1,238 | 4,823 | 700 | 1,648 | 2,307 |
| New Jersey | 441 | 810 | 440 | 638 | 483 | 1,140 | 1,275 | 680 | 990 | 832 | 1,018 | 1,056 |
| Pennsylvania | 1,024 | 1,533 | 1,096 | 660 | 922 | 1,541 | 2,044 | 1,069 | 1,848 | 720 | 1,200 | 1,744 |
| North Atlantic | 3,608 | 4,538 | 3,440 | 2,893 | 3,588 | 3,401 | 5,999 | 3,231 | 8,241 | 2,252 | 4,269 | 5,121 |
| Delaware | 17 | 810 | 249 | 521 | 312 | 608 | 842 | 346 | 324 | 136 | 277 | 248 |
| Maryland | 325 | 1,080 | 492 | 672 | 480 | 1,032 | 1,248 | 600 | 1,038 | 235 | 731 | 897 |
| Virginia | 243 | 1,075 | 318 | 1,058 | 312 | 911 | 1,358 | 669 | 928 | 510 | 928 | 1,470 |
| West Virginia | 329 | 598 | 230 | 788 | 132 | 886 | 1,164 | 520 | 900 | 680 | 760 | 992 |
| North Carolina | 1,344 | 1,955 | 437 | 2,093 | 598 | 1,863 | 1,955 | 897 | 1,978 | 1,150 | 713 | 1,909 |
| South Carolina | 643 | 1,204 | 649 | 1,020 | 405 | 1,166 | 861 | 545 | 1,030 | 998 | 466 | 1,110 |
| Georgia | 2,555 | 5,395 | 2,145 | 6,175 | 1,950 | 5,785 | 5,330 | 3,510 | 3,668 | 6,092 | 5,895 | 3,799 |
| Florida | 115 | 178 | 126 | 190 | 112 | 188 | 177 | 119 | ..... | ..... | ..... | ..... |
| South Atlantic | 5,571 | 12,295 | 4,646 | 12,517 | 4,301 | 12,439 | 12,938 | 7,197 | 9,866 | 9,801 | 9,770 | 10,425 |
| Ohio | 1,036 | 1,239 | 1,735 | 1,055 | 931 | 1,653 | 2,148 | 1,350 | 341 | 174 | 428 | 2,241 |
| Indiana | 1,171 | 703 | 1,147 | 185 | 1,276 | 1,128 | 648 | 888 | 518 | ..... | 150 | 957 |
| Illinois | 1,223 | 140 | 2,310 | 82 | 1,998 | 1,755 | 874 | 780 | 461 | ..... | 790 | 1,350 |
| Michigan | 1,687 | 1,215 | 2,228 | 700 | 1,539 | 1,247 | 2,360 | 2,010 | 744 | 85 | 480 | 1,500 |
| Wisconsin | 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| N. C. E. Miss. R. | 5,121 | 3,297 | 7,420 | 2,022 | 5,744 | 5,783 | 6,330 | 5,028 | 2,064 | 259 | 1,848 | 5,748 |

## PEACH CROP OF THE UNITED STATES — Concluded

| State and Division | 1909 | 1910 | 1911 | 1912 | 1913 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Minnesota | 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Iowa | 23 | 16 | 240 | 24 | 632 | 472 | 112 | 64 | ..... | ..... | 3 | 135 |
| Missouri | 1,485 | 1,410 | 2,700 | 900 | 4,320 | 3,780 | 3,300 | 1,050 | 728 | ..... | 828 | 798 |
| North Dakota | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| South Dakota | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Nebraska | 110 | 150 | 36 | 240 | 210 | 192 | 120 | 30 | ..... | ..... | ..... | 5 |
| Kansas | 25 | 2,432 | 851 | 2,016 | 875 | 1,760 | 2,442 | 150 | ..... | ..... | 80 | 70 |
| N. C. W. Miss. R. | 1,644 | 4,038 | 3,827 | 3,180 | 6,037 | 6,204 | 5,974 | 1,294 | 728 | ..... | 911 | 1,008 |
| Kentucky | 1,623 | 770 | 770 | 1,210 | 1,430 | 1,980 | 1,320 | 880 | 1,100 | 110 | 726 | 1,560 |
| Tennessee | 1,579 | 1,440 | 360 | 2,820 | 1,110 | 2,640 | 2,460 | 900 | 595 | 833 | 978 | 1,000 |
| Alabama | 1,417 | 1,980 | 840 | 2,760 | 1,140 | 2,310 | 2,640 | 1,110 | 1,281 | 2,440 | 1,678 | 1,508 |
| Mississippi | 1,157 | 1,340 | 460 | 1,800 | 1,020 | 1,440 | 1,540 | 400 | ..... | ..... | 800 | 425 |
| Louisiana | 291 | 488 | 190 | 693 | 460 | 356 | 456 | 587 | ..... | ..... | ..... | ..... |
| Texas | 730 | 3,100 | 1,204 | 4,140 | 2,107 | 1,196 | 4,081 | 2,860 | 1,728 | 2,333 | 2,760 | 480 |
| Oklahoma | 358 | 1,460 | 656 | 2,121 | 860 | 220 | 2,408 | 230 | 798 | 167 | 1,007 | 61 |
| Arkansas | 1,902 | 2,000 | 2,346 | 1,524 | 3,120 | 3,180 | 5,940 | 750 | 1,824 | 217 | 3,639 | 117 |
| South Central | 9,057 | 12,878 | 6,826 | 20,068 | 11,277 | 13,322 | 20,845 | 7,717 | 7,326 | 6,100 | 10,788 | 5,151 |
| Montana | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Wyoming | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Colorado | 692 | 346 | 363 | 1,035 | 360 | 1,025 | 650 | 105 | 1,096 | 959 | 840 | 585 |
| New Mexico | 32 | 50 | 86 | 84 | 52 | 106 | 154 | 40 | 124 | 34 | 145 | 6 |
| Arizona | 50 | 12 | 51 | 54 | 57 | 60 | 60 | 56 | ..... | ..... | ..... | ..... |
| Utah | 113 | 195 | 208 | 323 | 284 | 380 | 212 | 84 | 1,365 | 1,050 | 1,500 | 825 |
| Nevada | 3 | 2 | 10 | 10 | 8 | 9 | 7 | 1 | ..... | ..... | ..... | ..... |
| Idaho | 19 | 60 | 81 | 112 | 92 | 120 | 162 | 25 | 211 | 51 | 350 | 40 |
| Washington | 84 | 348 | 320 | 445 | 446 | 486 | 566 | 415 | 1,747 | 575 | 1,899 | 423 |
| Oregon | 179 | 317 | 190 | 292 | 311 | 387 | 432 | 276 | 273 | 93 | 514 | 100 |
| California | 9,267 | 9,765 | 7,412 | 9,308 | 7,150 | 10,387 | 9,768 | 11,733 | 15,724 | 11,920 | 17,600 | 13,800 |
| Far Western | 10,469 | 11,125 | 8,721 | 11,663 | 8,760 | 12,960 | 12,011 | 13,035 | 20,540 | 14,682 | 22,848 | 15,779 |
| United States | 35,470 | 48,171 | 34,880 | 52,343 | 39,707 | 54,109 | 64,097 | 37,505 | 48,765 | 33,094 | 50,434 | 43,697 |

## CRANBERRIES

| State and Year. | Acreage. | Average yield per acre. | Production. | Average farm price per barrel, Dec. 1. | Farm value, Dec. 1. |
|---|---|---|---|---|---|
| Massachusetts | 13,200 | 20.8 | 275,000 | $13.50 | $3,712,000 |
| New Jersey | 9,800 | 12.4 | 122,000 | 10.50 | 1,281,000 |
| Wisconsin | 1,900 | 17.9 | 34,000 | 9.40 | 320,000 |
| Total of above | 24,900 | 17.3 | 431,000 | $12.32 | $5,313,000 |
| 1919 | 25,600 | 22.1 | 566,000 | $8.37 | $4,735,000 |
| 1918 | 25,400 | 13.9 | 352,000 | 10.77 | 3,791,000 |
| 1917 | 18,200 | 13.7 | 249,000 | 10.24 | 2,550,000 |
| 1916 | 26,200 | 18.0 | 471,000 | 7.32 | 3,449,000 |
| 1915 | 23,100 | 19.1 | 441,000 | 6.59 | 2,908,000 |
| 1914 | 22,000 | 31.7 | 697,000 | 3.97 | 2,766,000 |

## PEARS

**Pears: Production (bushels) in the United States, 1889-1920**

| Year. | Production. | Year. | Production. |
|---|---|---|---|
| 1889[1] | *3,064,000* | 1914 | 12,086,000 |
| 1899[1] | *6,625,000* | 1915 | 11,216,000 |
| 1909[1] | *8,841,000* | 1916 | 11,874,000 |
| 1910 | 10,431,000 | 1917 | 13,281,000 |
| 1911 | 11,450,000 | 1918 | 15,472,000 |
| 1912 | 11,843,000 | 1919 | 13,902,000 |
| 1913 | 10,108,000 | 1920 | 17,279,000 |

[1] Census figures.

## PEAR CROP OF THE UNITED STATES

**Beginning with 1909**

U. S. Bureau of Crop Estimates

(In thousands of bushels, i. e., 000 omitted)

| State and Division | 1909 | 1910 | 1911 | 1912 | 1913 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maine | 39 | 35 | 42 | 38 | 32 | 40 | 30 | 36 | 21 | 20 | 44 | 30 |
| New Hampshire | 21 | 22 | 21 | 19 | 21 | 22 | 18 | 25 | 19 | 15 | 25 | 25 |
| Vermont | 21 | 23 | 25 | 20 | 20 | 17 | 17 | 24 | 11 | 13 | 18 | 19 |
| Massachusetts | 96 | 91 | 111 | 71 | 121 | 98 | 75 | 111 | 71 | 77 | 115 | 109 |
| Rhode Island | 12 | 12 | 11 | 11 | 16 | 13 | 10 | 11 | 7 | 10 | 12 | 12 |
| Connecticut | 41 | 46 | 46 | 32 | 55 | 43 | 36 | 46 | 29 | 34 | 47 | 47 |
| New York | 1,343 | 1,530 | 1,886 | 1,128 | 2,016 | 1,298 | 1,375 | 1,675 | 1,708 | 1,352 | 1,530 | 2,375 |
| New Jersey | 163 | 910 | 970 | 719 | 598 | 876 | 596 | 687 | 590 | 650 | 500 | 843 |
| Pennsylvania | 379 | 570 | 646 | 118 | 156 | 608 | 491 | 509 | 148 | 518 | 355 | 701 |
| North Atlantic | 2,118 | 3,242 | 3,767 | 2,186 | 3,338 | 3,015 | 2,651 | 3,130 | 2,910 | 2,689 | 2,646 | 4,161 |
| Delaware | 105 | 301 | 262 | 315 | 77 | 210 | 228 | 161 | 291 | 238 | 200 | 287 |
| Maryland | 368 | 609 | 455 | 646 | 221 | 560 | 483 | 378 | 525 | 455 | 420 | 616 |
| Virginia | 74 | 221 | 122 | 282 | 68 | 231 | 261 | 122 | 191 | 119 | 190 | 296 |
| West Virginia | 30 | 49 | 19 | 76 | 11 | 72 | 63 | 12 | 33 | 33 | 40 | 66 |
| North Carolina | 84 | 161 | 52 | 207 | 58 | 187 | 150 | 75 | 150 | 108 | 84 | 184 |
| South Carolina | 66 | 108 | 52 | 117 | 42 | 109 | 91 | 56 | 100 | 98 | 81 | 98 |
| Georgia | 150 | 260 | 111 | 212 | 118 | 208 | 203 | 135 | 140 | 188 | 152 | 148 |
| Florida | 98 | 153 | 88 | 73 | 58 | 112 | 101 | 51 | 46 | 132 | 70 | 30 |
| South Atlantic | 975 | 1,865 | 1,191 | 1,898 | 656 | 1,692 | 1,583 | 1,026 | 1,482 | 1,371 | 1,237 | 1,725 |
| Ohio | 375 | 360 | 736 | 624 | 100 | 544 | 560 | 376 | 334 | 304 | 218 | 662 |
| Indiana | 320 | 292 | 585 | 118 | 474 | 122 | 110 | 351 | 410 | 260 | 188 | 663 |
| Illinois | 249 | 32 | 199 | 118 | 422 | 422 | 196 | 351 | 456 | 302 | 436 | 603 |
| Michigan | 666 | 456 | 829 | 540 | 707 | 840 | 550 | 1,007 | 1,080 | 704 | 426 | 1,100 |
| Wisconsin | 13 | 2 | 18 | 13 | 22 | 22 | 23 | 26 | ..... | ..... | ..... | 26 |
| N. C. E. Miss. R. | 1,623 | 1,142 | 2,667 | 2,073 | 2,025 | 2,250 | 2,039 | 2,111 | 2,280 | 1,570 | 1,268 | 3,054 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Minnesota | | | | | | | | | | | | |
| Iowa | 44 | 1 | 57 | 60 | 102 | 84 | 106 | 63 | 82 | 32 | 58 | 120 |
| Missouri | 143 | 67 | 148 | 332 | 184 | 283 | 294 | 164 | 265 | 112 | 280 | 272 |
| North Dakota | | | | | | | | | | | | |
| South Dakota | | | | | | | | | | | | |
| Nebraska | 7 | 4 | 10 | 15 | 13 | 14 | 18 | 10 | 14 | 6 | 16 | 14 |
| Kansas | 19 | 98 | 70 | 142 | 63 | 109 | 133 | 106 | 140 | 38 | 120 | 22 |
| N. C. W. Miss. R. | 213 | 170 | 285 | 549 | 362 | 490 | 551 | 343 | 501 | 188 | 474 | 428 |
| Kentucky | 252 | 180 | 160 | 336 | 160 | 308 | 264 | 160 | 204 | 140 | 128 | 308 |
| Tennessee | 84 | 126 | 32 | 196 | 79 | 152 | 195 | 59 | 75 | 112 | 72 | 146 |
| Alabama | 100 | 138 | 48 | 172 | 90 | 132 | 168 | 90 | 80 | 152 | 114 | 110 |
| Mississippi | 101 | 140 | 40 | 154 | 106 | 142 | 160 | 50 | 30 | 136 | 95 | 100 |
| Louisiana | 36 | 32 | 24 | 52 | 48 | 52 | 55 | 48 | 52 | 52 | 50 | 40 |
| Texas | 111 | 224 | 147 | 296 | 187 | 266 | 301 | 322 | 280 | 246 | 385 | 205 |
| Oklahoma | 7 | 28 | 33 | 54 | 23 | 28 | 68 | 11 | 45 | 38 | 70 | 12 |
| Arkansas | 38 | 46 | 47 | 113 | 55 | 98 | 135 | 68 | 102 | 64 | 98 | 38 |
| South Central | 729 | 914 | 531 | 1,373 | 748 | 1,178 | 1,346 | 808 | 868 | 940 | 1,012 | 959 |
| Montana | 8 | | 11 | 12 | 10 | 12 | 12 | 6 | 11 | 6 | 11 | 14 |
| Wyoming | | | | | | | | | | | | |
| Colorado | 133 | 121 | 160 | 193 | 130 | 206 | 99 | 99 | 320 | 194 | 290 | 338 |
| New Mexico | 29 | 30 | 43 | 52 | 46 | 60 | 64 | 36 | 46 | 56 | 67 | 32 |
| Arizona | 13 | 14 | 16 | 20 | 17 | 20 | 22 | 18 | 21 | 19 | 22 | 12 |
| Utah | 39 | 41 | 51 | 52 | 42 | 56 | 31 | 12 | 48 | 51 | 47 | 60 |
| Nevada | 1 | 7 | 2 | 8 | 6 | 7 | 4 | 2 | 6 | 6 | 5 | 7 |
| Idaho | 43 | 62 | 65 | 81 | 71 | 66 | 75 | 50 | 70 | 60 | 70 | 83 |
| Washington | 311 | 396 | 372 | 477 | 464 | 536 | 564 | 551 | 595 | 1,300 | 1,700 | 2,246 |
| Oregon | 375 | 540 | 441 | 554 | 559 | 540 | 525 | 555 | 600 | 672 | 553 | 560 |
| California | 1,928 | 1,887 | 1,848 | 2,015 | 1,634 | 1,958 | 1,650 | 3,124 | 3,523 | 4,240 | 4,500 | 3,600 |
| Far Western | 2,883 | 3,098 | 3,009 | 3,461 | 2,979 | 3,461 | 3,046 | 4,453 | 5,240 | 6,604 | 7,265 | 6,952 |
| United States | 8,841 | 10,431 | 11,450 | 11,843 | 10,108 | 12,086 | 11,216 | 11,874 | 13,281 | 13,362 | 13,902 | 17,279 |

## ORANGES

### Oranges: Production and prices, 1915-1920

| Year. | United States. | | | Florida. | | | California. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Production (000 omitted). | Average price per box Dec. 1. | Farm value Dec. 1 (000 omitted). | Production (000 omitted). | Average price per box Dec. 1. | Farm value Dec. 1 (000 omitted). | Production (000 omitted). | Average price per box Dec. 1. | Farm value Dec. 1 (000 omitted). |
| | *Boxes.* | | | *Boxes.* | | | *Boxes.* | | |
| 1915 | 21,200 | $2 39 | $50,692 | 6,150 | $1 88 | $11,562 | 15,050 | $2 60 | $39,130 |
| 1916 | 24,433 | 2 52 | 61,463 | 6,933 | 2 05 | 14,213 | 17,500 | 2 70 | 47,250 |
| 1917 | 10,593 | 2 60 | 27,556 | 3,500 | 2 30 | 8,050 | 7,093 | 2 75 | 19,506 |
| 1918 | 24,200 | 3 49 | 84,480 | 5,700 | 2 65 | 15,105 | 18,500 | 3 75 | 69,375 |
| 1919 | 22,075 | 2 68 | 58,956 | 7,000 | 2 50 | 17,500 | 15,075 | 2 75 | 41,456 |
| 1920 | 27,200 | 2 58 | 70,125 | 8,500 | 2 20 | 18,700 | 18,700 | 2 75 | 51,425 |

### Oranges: Farm price per box on 1st of month, 1908-1919

FLORIDA.

| | 1919 | 1918 | 1917 | 1916 | 1915 | 1914 | 1913 | 1912 | 1911 | 1910 | 1909 | 1908 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan. 1. | $2 75 | $2 55 | $1 82 | $1 59 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Feb. 1. | 2 45 | 2 00 | 1 74 | 1 65 | $1 36 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Mar. 1. | 2 83 | 2 54 | 1 81 | 1 78 | 1 37 | $1 55 | $1 87 | $1 78 | $1 64 | $1 50 | $1 23 | $1 57 |
| Apr. 1. | 3 00 | 3 38 | 2 45 | 1 74 | 1 35 | 1 83 | 1 96 | 2 08 | 2 18 | 1 69 | 1 77 | 1 46 |
| May 1. | 3 00 | 5 00 | 2 85 | 2 15 | 1 40 | 2 02 | 2 41 | 2 20 | 1 94 | 2 07 | 1 93 | 1 53 |
| June 1. | 4 00 | ..... | ..... | 1 71 | 2 00 | 1 86 | 2 54 | 2 62 | 1 91 | 2 16 | 1 97 | 1 78 |
| July 1. | 4 50 | 4 44 | ..... | 2 50 | 1 80 | 2 25 | 2 95 | 2 08 | 2 28 | 2 62 | 1 84 | 1 53 |
| Aug. 1. | 5 00 | 4 17 | 2 83 | 2 30 | 2 58 | 1 75 | 3 19 | 2 79 | 1 79 | 2 10 | ..... | 1 30 |
| Sept. 1. | 3 25 | 3 16 | 1 75 | 2 04 | 2 25 | 2 55 | 2 00 | 3 25 | 2 08 | 2 20 | 1 53 | 1 72 |
| Oct. 1. | 2 32 | ..... | 2 62 | 1 39 | 1 70 | ..... | 1 69 | 1 76 | 1 70 | 1 88 | 1 22 | 1 43 |
| Nov. 1. | 2 50 | 3 43 | 2 16 | 1 81 | 1 70 | ..... | 2 02 | 1 75 | 1 49 | 1 80 | 1 78 | 1 39 |
| Dec. 1. | 2 40 | 2 65 | 2 30 | 2 05 | 1 88 | 1 21 | 1 50 | ..... | 1 60 | 1 50 | 1 23 | 1 20 |

CALIFORNIA.

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan. 1. | $3 65 | $2 23 | $1 63 | $1 42 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Feb. 1. | 3 50 | 3 00 | 1 79 | 1 68 | $1 26 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Mar. 1. | 2 75 | 4 00 | 1 90 | 1 80 | 1 43 | $1 97 | $1 86 | $1 72 | ..... | ..... | ..... | ..... |
| Apr. 1. | 3 20 | 2 99 | 2 21 | 1 30 | 1 53 | 1 50 | 2 56 | 1 92 | ..... | ..... | ..... | ..... |
| May 1. | 2 75 | 3 84 | 1 84 | 1 68 | 1 42 | 1 67 | 2 78 | 2 16 | ..... | ..... | ..... | ..... |
| June 1. | 3 00 | 2 63 | 2 02 | 1 88 | 1 97 | 1 55 | 2 50 | 1 83 | ..... | ..... | ..... | ..... |
| July 1. | 2 60 | 2 86 | 1 97 | 2 20 | 1 50 | 1 40 | 2 61 | 1 84 | ..... | ..... | ..... | ..... |
| Aug. 1. | 3 00 | 5 00 | 2 25 | 3 30 | 1 55 | 1 94 | 4 71 | 1 68 | ..... | ..... | ..... | ..... |
| Sept. 1. | 3 00 | 4 44 | 2 40 | 3 06 | 1 75 | 2 15 | 3 75 | 1 89 | $2 00 | ..... | ..... | ..... |
| Oct. 1. | 3 00 | 3 75 | 2 60 | 3 43 | 2 00 | 2 30 | 3 25 | 1 62 | 2 21 | ..... | ..... | ..... |
| Nov. 1. | 3 00 | 8 54 | 1 97 | 3 30 | 2 50 | 2 08 | 3 08 | 2 05 | 2 19 | ..... | ..... | ..... |
| Dec. 1. | 2 50 | 5 50 | 2 75 | 2 70 | 2 60 | 2 00 | 3 30 | ..... | ..... | ..... | ..... | ..... |

## APPLE CROPS IN FOREIGN COUNTRIES

(Compiled by the U. S. Bureau of Crop Estimates from the official reports of the respective foreign countries.)

| Country. | Year. | Number of trees. | | Production in bushels. *a* |
|---|---|---|---|---|
| | | Total. | Bearing trees. | |
| Argentina | 1908 | 1,185,000 | ..... | ..... |
| Australia | 1912–1913 | ..... | ..... | 4,693,000 |
| Austria | 1913 | ..... | ..... | *b* 549,909 Tons |
| Bulgaria | 1912 | ..... | ..... | 2,500 |
| Canada | 1910 | 16,217,176 | 10,617,372 | 10,618,666 |
| Chile | 1913–1914 | ..... | ..... | 447,580 |
| France | 1915 | ..... | ..... | *c* 9,478,000 |
| Germany | 1913 | 74,375,929 | 49,744,082 | ..... |
| Italy | 1916 | ..... | ..... | *d* 210,098 Tons |
| Japan | 1914 | 3,257,934 | ..... | 1,642,654 |
| Spain | 1910 | ..... | ..... | 7,043,000 |
| United States | 1910 | 217,114,688 | 151,322,840 | *e* 146,122,318 |
| Uruguay | 1908 | 118,391 | ..... | 7,310 |

*a* In converting foreign weights, a bushel was assumed to average 48 pounds.
*b* Stated as "Apples, pears, etc."
*c* Stated as "Apples for table use."
*d* Stated as "Apples, pears, quinces, and pomegranates."
*e* Production of 1909, from reports of the Thirteenth Census.

## AVERAGE EXPORT VALUES OF APPLES, EXPORTED FROM THE UNITED STATES TO FOREIGN COUNTRIES, 1851-1920

(The original currency values as reported for 1862–1879 are here expressed in gold.)

| Year ending June 30. | Fresh apples, per barrel. | Dried apples, per pound. | Year ending June 30. | Fresh apples, per barrel. | Dried apples, per pound. | Year ending June 30. | Fresh apples, per barrel. | Dried apples, per pound. |
|---|---|---|---|---|---|---|---|---|
| 1851 | $2.47 | ..... | 1875 | 2.33 | .072 | 1898 | 2.78 | .061 |
| 1852 | 2.37 | ..... | | | | 1899 | 3.18 | .065 |
| 1853 | 2.38 | ..... | 1876 | 3.05 | 0.084 | 1900 | 2.74 | .064 |
| 1854 | 3.38 | ..... | 1877 | 2.19 | .060 | | | |
| 1855 | 3.17 | ..... | 1878 | 3.71 | .061 | 1901 | 2.33 | .053 |
| | | | 1879 | 1.94 | .040 | 1902 | 3.54 | .076 |
| 1856 | 1.94 | ..... | 1880 | 2.92 | .061 | 1903 | 2.65 | .060 |
| 1857 | 4.07 | ..... | | | | 1904 | 2.70 | .058 |
| 1858 | 2.68 | ..... | 1881 | 2.06 | .055 | 1905 | 2.57 | .056 |
| 1859 | 3.03 | ..... | 1882 | 3.05 | .079 | | | |
| 1860 | 2.61 | ..... | 1883 | 3.46 | .077 | 1906 | 3.10 | .073 |
| | | | 1884 | 4.01 | .071 | 1907 | 3.02 | .069 |
| 1861 | 2.39 | ..... | 1885 | 2.35 | .058 | 1908 | 3.49 | .080 |
| 1862 | 3.53 | ..... | | | | 1909 | 3.10 | .070 |
| 1863 | 1.56 | ..... | 1886 | 2.43 | .052 | 1910 | 3.44 | .082 |
| 1864 | 1.74 | $0.056 | 1887 | 2.34 | .051 | | | |
| 1865 | 2.06 | .060 | 1888 | 2.82 | .069 | 1911 | 3.36 | .089 |
| | | | 1889 | 2.39 | .054 | 1912 | 3.71 | .085 |
| 1866 | 3.40 | .071 | 1890 | 2.72 | .050 | 1913 | 3.67 | .070 |
| 1867 | 3.45 | .113 | | | | 1914 | 4.04 | .078 |
| 1868 | 3.45 | .113 | 1891 | 3.53 | .059 | 1915 | 3.44 | .077 |
| 1869 | ..... | ..... | 1892 | 2.57 | .049 | | | |
| 1870 | 4.94 | .078 | 1893 | 2.69 | .061 | 1916 | 3.76 | .080 |
| | | | 1894 | 3.09 | .059 | 1917 | 4.59 | .077 |
| 1871 | 2.48 | .061 | 1895 | 2.39 | .065 | 1918 | 4.43 | .127 |
| 1872 | 4.90 | .065 | | | | 1919 | 7.67 | .154 |
| 1873 | 2.96 | .053 | 1896 | 2.58 | .050 | 1920 | 9.09 | .202 |
| 1874 | 4.09 | .062 | 1897 | 1.58 | .044 | | | |

## QUANTITY AND VALUE OF EXPORTS OF DOMESTIC FRUIT, 1851-1920

| Year ending June 30— | Apples. | | | |
|---|---|---|---|---|
| | Dried. | | Fresh. | |
| | *Pounds.* | *Dollars.* | *Barrels.d* | *Dollars.* |
| 1851 | ..... | ..... | 28,842 | 71,367 |
| 1852 | ..... | ..... | 18,411 | 43,635 |
| 1853 | ..... | ..... | 45,075 | 107,283 |
| 1854 | ..... | ..... | 15,326 | 51,766 |
| 1855 | ..... | ..... | 33,959 | 107,643 |
| 1856 | ..... | ..... | 74,287 | 143,884 |
| 1857 | ..... | ..... | 33,201 | 135,280 |
| 1858 | ..... | ..... | 27,711 | 74,363 |
| 1859 | ..... | ..... | 32,979 | 99,803 |
| 1860 | ..... | ..... | 78,809 | 206,055 |
| 1861 | ..... | ..... | 112,523 | 269,363 |
| 1862 | ..... | ..... | 66,767 | 238,923 |
| 1863 | ..... | ..... | 174,502 | 364,628 |
| 1864 | 2,841,532 | 246,051 | 183,969 | 487,140 |
| 1865 | 892,075 | 105,548 | 120,317 | 481,334 |
| 1866 | *e* 551,350 | 55,265 | 51,612 | 246,118 |
| 1867 | *e* 510,750 | 79,922 | 29,577 | 142,023 |
| 1868 | *e* 775,700 | 121,910 | 19,874 | 94,748 |
| 1869 | (*f*) | (*g*) | (*f*) | (*g*) |
| 1870 | 836,110 | 79,387 | 38,157 | 230,013 |
| 1871 | 1,150,122 | 79,026 | 49,688 | 136,693 |
| 1872 | 2,644,592 | 190,560 | 36,508 | 198,948 |
| 1873 | 4,483,186 | 272,028 | 241,663 | 819,061 |
| 1874 | 4,234,736 | 294,893 | 44,928 | 204,312 |
| 1875 | 4,053,696 | 326,193 | 276,209 | 722,247 |
| 1876 | 713,840 | 67,915 | 64,472 | 221,764 |
| 1877 | 14,318,052 | 920,292 | 417,065 | 986,112 |
| 1878 | 4,188,173 | 260,085 | 101,617 | 386,261 |
| 1879 | 7,379,836 | 296,794 | 505,018 | 980,455 |
| 1880 | 3,158,367 | 192,069 | 407,911 | 1,190,599 |
| 1881 | 22,623,652 | 1,247,891 | 1,117,065 | 2,301,334 |
| 1882 | 2,893,270 | 228,945 | 176,704 | 539,513 |
| 1883 | 10,187,957 | 786,800 | 313,921 | 1,085,230 |
| 1884 | 5,558,746 | 394,350 | 105,400 | 422,447 |
| 1885 | 18,416,573 | 1,062,859 | 668,867 | 1,572,126 |
| 1886 | 10,473,183 | 548,434 | 744,539 | 1,810,606 |
| 1887 | 8,130,396 | 413,363 | 591,868 | 1,382,872 |
| 1888 | 11,803,161 | 812,682 | 489,570 | 1,378,801 |
| 1889 | 22,102,579 | 1,201,070 | 942,406 | 2,249,375 |
| 1890 | 20,861,462 | 1,038,682 | 453,506 | 1,231,436 |
| 1891 | 6,973,168 | 409,605 | 135,207 | 476,897 |
| 1892 | 26,042,063 | 1,288,102 | 938,743 | 2,407,956 |
| 1893 | 7,966,819 | 482,085 | 408,014 | 1,097,967 |
| 1894 | 2,846,645 | 168,054 | 78,580 | 242,617 |
| 1895 | 7,085,946 | 461,214 | 818,711 | 1,954,318 |
| 1896 | 26,691,963 | 1,340,507 | 360,002 | 939,289 |
| 1897 | 30,775,401 | 1,340,159 | 1,503,981 | 2,371,143 |
| 1898 | 31,031,254 | 1,897,725 | 605,390 | 1,684,717 |
| 1899 | 19,305,739 | 1,245,733 | 380,292 | 1,210,459 |
| 1900 | 34,964,010 | 2,247,851 | 526,636 | 1,444,655 |
| 1901 | 28,309,023 | 1,510,581 | 883,673 | 2,058,964 |
| 1902 | 15,664,468 | 1,190,593 | 459,719 | 1,628,886 |
| 1903 | 39,646,297 | 2,378,635 | 1,656,129 | 4,381,801 |
| 1904 | 48,301,665 | 2,791,421 | 2,018,262 | 5,446,473 |
| 1905 | 39,272,890 | 2,208,414 | 1,499,942 | 3,859,375 |
| 1906 | 27,852,831 | 2,044,820 | 1,208,989 | 3,751,375 |
| 1907 | 45,697,948 | 3,166,946 | 1,539,267 | 4,652,966 |
| 1908 | 24,237,873 | 1,946,810 | 1,049,545 | 3,660,854 |
| 1909 | 33,474,634 | 2,339,936 | 896,279 | 2,782,007 |
| 1910 | 25,076,618 | 2,056,692 | 922,078 | 3,175,433 |
| 1911 | 21,804,086 | 1,944,209 | 1,721,106 | 5,777,458 |
| 1912 | 53,664,639 | 4,545,971 | 1,456,381 | 5,409,946 |
| 1913 | 41,574,562 | 2,898,211 | 2,150,132 | 7,898,634 |
| 1914 | 33,566,160 | 2,628,445 | 1,506,569 | 6,089,701 |
| 1915 | 42,589,169 | 3,270,658 | 2,351,501 | 8,087,466 |
| 1916 | 16,219,174 | 1,304,224 | 1,466,321 | 5,518,772 |
| 1917 | 10,357,791 | 797,487 | 1,739,997 | 7,979,236 |
| 1918 | 2,602,590 | 330,170 | 635,409 | 2,813,091 |
| 1919 | 18,908,589 | 2,920,780 | 1,576,348 | 12,084,302 |
| 1920 | 11,818,829 | 2,385,584 | 1,051,698 | 9,557,353 |

*d* For 1866-1868 and 1870-1883, computed by converting bushels into barrels at the rate of 2¾ bushels to 1 barrel.

*e* Originally stated in bushels (25 pounds).

*f* Not stated.

*g* Not separately stated. Included in "Total fruits."

## QUANTITY AND VALUE OF EXPORTS OF DOMESTIC FRUIT, 1851-1920 —Continued

| Year ending June 30— | Apricots, dried. | | Berries. | Lemons. | | Oranges. | | Peaches, dried. | |
|---|---|---|---|---|---|---|---|---|---|
| | *Pounds.* | *Dollars.* | *Dollars.* | *Boxes* | *Dollars.* | *Boxes.* | *Dollars.* | *Pounds.* | *Dollars.* |
| 1851-1897 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1898 .... | ..... | ..... | ..... | ..... | ..... | ..... | 339,396 | ..... | ..... |
| 1899 .... | ..... | ..... | ..... | ..... | ..... | ..... | 282,313 | ..... | ..... |
| 1900 .... | ..... | ..... | ..... | ..... | ..... | ..... | 271,468 | ..... | ..... |
| 1901 .... | ..... | ..... | ..... | ..... | ..... | ..... | 436,560 | ..... | ..... |
| 1902 .... | 1,928,367 | 178,113 | ..... | ..... | ..... | ..... | 420,835 | ..... | ..... |
| 1903 .... | 9,190,681 | 733,887 | ..... | ..... | ..... | ..... | 465,397 | ..... | ..... |
| 1904 .... | 7,205,686 | 608,511 | ..... | ..... | ..... | ..... | 739,593 | ..... | ..... |
| 1905 .... | 6,854,154 | 606,777 | ..... | ..... | ..... | ..... | 929,151 | ..... | ..... |
| 1906 .... | 13,760,281 | 1,325,422 | ..... | ..... | ..... | ..... | 1,110,993 | 1,181,619 | 110,407 |
| 1907 .... | 2,760,432 | 336,812 | ..... | ..... | ..... | ..... | 1,255,104 | 1,757,650 | 186,043 |
| 1908 .... | 1,224,602 | 229,467 | ..... | ..... | ..... | 654,251 | 1,577,661 | 1,148,598 | 144,318 |
| 1909 .... | 16,597,871 | 1,542,417 | ..... | ..... | ..... | 866,753 | 2,131,724 | 2,403,430 | 151,334 |
| 1910 .... | 12,028,834 | 1,218,423 | ..... | ..... | ..... | 932,148 | 2,213,905 | 2,617,069 | 151,520 |
| 1911 .... | 19,329,358 | 2,085,437 | ..... | ..... | ..... | 1,179,273 | 2,983,322 | 7,125,014 | 499,530 |
| 1912 .... | 13,413,431 | 1,885,855 | ..... | ..... | ..... | 1,197,363 | 3,022,859 | 4,425,803 | 422,766 |
| 1913 .... | 35,016,730 | 3,543,473 | 574,449 | 84,949 | 399,409 | 1,063,233 | 2,976,520 | 6,529,633 | 444,879 |
| 1914 .... | 17,401,692 | 1,937,771 | 717,059 | 70,075 | 308,707 | 1,558,921 | 3,824,889 | 6,712,296 | 449,549 |
| 1915 .... | 23,764,342 | 2,241,064 | 535,479 | 122,944 | 372,781 | 1,759,405 | 3,851,013 | 14,461,655 | 834,813 |
| 1916 .... | 23,939,790 | 2,168,808 | 639,476 | 175,070 | 493,919 | 1,575,042 | 3,690,080 | 13,739,312 | 893,587 |
| 1917 .... | 9,841,119 | 1,298,176 | 822,977 | 174,038 | 626,270 | 1,850,372 | 4,397,067 | 8,187,788 | 645,620 |
| 1918 .... | 5,229,618 | 767,780 | 858,813 | 138,063 | 728,791 | 1,240,477 | 4,608,048 | 5,862,605 | 627,841 |
| 1919 .... | 20,975,264 | 3,775,218 | 1,029,426 | 304,351 | 1,404,446 | 1,402,180 | 6,347,264 | 4,834,738 | 662,080 |
| 1920 .... | 26,767,944 | 7,082,573 | 953,747 | 276,549 | 1,299,869 | 1,619,393 | 7,564,787 | 12,755,907 | 2,329,897 |

## QUANTITY AND VALUE OF EXPORTS OF DOMESTIC FRUIT, 1851-1920 —Continued

| Year ending June 30— | Pears, fresh. | Prunes. | | Raisins. | | Waste, cannery (pulp, cores, etc.) | |
|---|---|---|---|---|---|---|---|
| | *Dollars.* | *Pounds.* | *Dollars.* | *Pounds.* | *Dollars.* | *Pounds.* | *Dollars.* |
| 1851-97 ... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1898 .... | ..... | 15,940,791 | 1,021,888 | 3,109,639 | 167,062 | ..... | ..... |
| 1899 .... | ..... | 5,615,565 | 380,847 | 4,659,807 | 242,620 | ..... | ..... |
| 1900 .... | ..... | 25,922,371 | 1,646,332 | 2,415,456 | 139,689 | ..... | ..... |
| 1901 .... | ..... | 10,021,564 | 589,113 | 3,512,164 | 218,715 | ..... | ..... |
| 1902 .... | ..... | 23,358,849 | 1,404,422 | 2,323,274 | 149,216 | ..... | ..... |
| 1903 .... | ..... | 66,385,215 | 3,512,507 | 4,280,028 | 284,530 | ..... | ..... |
| 1904 .... | ..... | 73,146,214 | 3,410,497 | 4,020,418 | 281,402 | ..... | ..... |
| 1905 .... | ..... | 54,993,819 | 2,455,056 | 7,054,824 | 372,687 | ..... | ..... |
| 1906 .... | 631,972 | 24,869,744 | 1,410,636 | 4,528,502 | 305,768 | ..... | ..... |
| 1907 .... | 675,944 | 44,400,104 | 2,400,960 | 9,128,827 | 599,398 | ..... | ..... |
| 1908 .... | 288,918 | 28,148,450 | 1,642,114 | 5,684,541 | 427,583 | ..... | ..... |
| 1909 .... | 546,198 | 22,602,288 | 1,078,210 | 7,880,161 | 455,657 | ..... | ..... |
| 1910 .... | 302,958 | 89,014,880 | 4,046,554 | 8,526,114 | 417,403 | ..... | ..... |
| 1911 .... | 578,067 | 51,030,711 | 3,271,974 | 18,659,992 | 1,069,300 | ..... | ..... |
| 1912 .... | 784,627 | 74,328,074 | 4,969,053 | 19,949,046 | 1,351,986 | ..... | ..... |
| 1913 .... | 796,913 | 117,950,875 | 6,655,870 | 28,120,507 | 1,542,642 | ..... | ..... |
| 1914 .... | 1,402,924 | 69,813,711 | 4,662,546 | 14,766,416 | 997,575 | ..... | ..... |
| 1915 .... | 992,497 | 43,478,892 | 3,274,197 | 24,845,414 | 1,718,547 | ..... | ..... |
| 1916 .... | 691,732 | 57,422,827 | 3,975,396 | 75,014,753 | 5,407,219 | ..... | ..... |
| 1917 .... | 1,356,259 | 59,645,141 | 4,934,329 | 51,992,514 | 4,409,639 | ..... | ..... |
| 1918 .... | 978,298 | 32,926,546 | 3,060,691 | 54,987,793 | 4,981,270 | ..... | ..... |
| 1919 .... | 1,105,181 | 59,072,436 | 7,946,241 | 84,150,060 | 8,066,001 | ..... | ..... |
| 1920 .... | 1,857,809 | 114,066,496 | 17,648,711 | 86,857,496 | 12,625,076 | 379,465 | 33,366 |

## QUANTITY AND VALUE OF EXPORTS OF DOMESTIC FRUIT, 1851-1920 —Continued

| Year ending June 30— | Other fresh or dried fruits, *a* | Canned, *b* | Preserved, other than canned. | Total fruits, *c* |
|---|---|---|---|---|
| | *Dollars* | *Dollars* | *Dollars* | *Dollars* |
| 1851 | | | | 71,367 |
| 1852 | | | | 43,635 |
| 1853 | | | | 107,283 |
| 1854 | | | | 51,766 |
| 1855 | | | | 107,643 |
| 1856 | | | | 143,884 |
| 1857 | | | | 135,280 |
| 1858 | | | | 74,363 |
| 1859 | | | | 99,803 |
| 1860 | | | | 206,055 |
| 1861 | | | | 269,363 |
| 1862 | | | | 238,923 |
| 1863 | | | | 364,628 |
| 1864 | 132,676 | | | 865,867 |
| 1865 | 414,920 | | | 1,001,802 |
| 1866 | 191,342 | | | 492,725 |
| 1867 | 158,993 | | | 380,938 |
| 1868 | 189,854 | | | 406,512 |
| 1869 | | | | 306,142 |
| 1870 | 151,367 | 81,735 | | 542,502 |
| 1871 | 138,355 | 195,283 | | 549,357 |
| 1872 | 161,541 | 250,420 | | 804,469 |
| 1873 | 292,935 | 318,678 | | 1,703,305 |
| 1874 | 211,308 | 283,649 | | 994,162 |
| 1875 | 269,632 | 315,931 | | 1,634,003 |
| 1876 | 210,177 | 327,422 | | 827,278 |
| 1877 | 268,282 | 762,341 | | 2,937,030 |
| 1878 | 296,310 | 435,450 | | 1,378,106 |
| 1879 | 252,415 | 386,718 | | 1,916,382 |
| 1880 | 272,715 | 435,290 | | 2,090,634 |
| 1881 | 361,217 | 529,277 | | 4,439,719 |
| 1882 | 322,229 | 659,681 | | 1,750,398 |
| 1883 | 447,395 | 686,517 | | 3,005,942 |
| 1884 | 381,417 | 495,143 | 53,361 | 1,746,418 |
| 1885 | 369,540 | 473,941 | 37,239 | 3,515,708 |
| 1886 | 340,507 | 580,422 | 28,339 | 3,308,308 |
| 1887 | 337,447 | 506,791 | 29,489 | 2,669,965 |
| 1888 | 397,643 | 834,668 | 58,630 | 3,482,424 |
| 1889 | 621,390 | 915,341 | 52,048 | 5,039,224 |
| 1890 | 1,003,846 | 698,321 | 59,401 | 4,031,686 |
| 1891 | 699,798 | 703,880 | 93,996 | 2,384,176 |
| 1892 | 1,095,845 | 1,558,820 | 214,738 | 6,565,461 |
| 1893 | 881,804 | 1,137,660 | 224,381 | 3,823,897 |
| 1894 | 1,016,397 | 660,723 | 211,215 | 2,299,006 |
| 1895 | 1,522,100 | 871,465 | 47,420 | 4,856,517 |
| 1896 | 1,868,353 | 1,376,281 | 70,353 | 5,585,783 |
| 1897 | 2,172,199 | 1,686,723 | 43,276 | 7,613,500 |
| 1898 | 2,033,845 | 1,624,741 | 82,504 | 8,851,878 |
| 1899 | 1,997,649 | 2,330,715 | 66,899 | 7,757,235 |

## QUANTITY AND VALUE OF EXPORTS OF DOMESTIC FRUIT, 1851-1920 — Continued

| Year ending June 30— | Other fresh or dried fruits. *a* | Canned. *b* | Preserved, other than canned. | Total fruits. *c* |
|---|---|---|---|---|
| | *Dollars* | *Dollars* | *Dollars* | *Dollars* |
| 1900 | 2,545,451 | 3,127,278 | 63,448 | 11,486,172 |
| 1901 | 2,716,269 | 3,006,109 | 71,597 | 10,607,908 |
| 1902 | 2,153,050 | 1,195,635 | 94,323 | 8,415,103 |
| 1903 | 4,215,034 | 1,739,571 | 66,757 | 17,758,119 |
| 1904 | 4,317,910 | 2,637,002 | 115,490 | 20,348,299 |
| 1905 | 2,253,638 | 2,541,025 | 71,868 | 15,297,391 |
| 1906 | 1,727,943 | 2,348,064 | 89,872 | 14,857,272 |
| 1907 | 2,246,384 | 1,581,047 | 104,663 | 17,206,267 |
| 1908 | 2,360,360 | 1,549,826 | 137,929 | 13,965,840 |

| Year ending June 30— | All other— | | Canned. | Preserved, other than canned. | Total fruit. |
|---|---|---|---|---|---|
| | Dried. | Fresh. | | | |
| | *Dollars* | *Dollars* | *Dollars* | *Dollars* | *Dollars* |
| 1909 | 2,104,624 | | 2,899,374 | 77,746 | 16,079,227 |
| 1910 | 2,119,210 | | 2,656,019 | 176,474 | 18,504,591 |
| 1911 | 2,792,281 | | 2,686,445 | 205,643 | 23,893,663 |
| 1912 | 3,812,304 | | 4,012,463 | 136,870 | 30,354,700 |
| 1913 | 2,893,395 | | 5,599,373 | 181,749 | 36,345,517 |
| 1914 | 2,922,740 | | 4,863,946 | 224,841 | 31,030,713 |
| 1915 | 2,717,449 | | 6,064,765 | 269,180 | 34,229,906 |
| 1916 | 3,261,109 | | 7,050,061 | 978,568 | 36,072,951 |
| 1917 | 3,619,266 | | 6,138,692 | 413,291 | 37,398,309 |
| 1918 | 880,691 | 3,312,223 | 7,024,466 | 1,255,191 | 32,207,364 |
| 1919 | 1,375,410 | 3,743,133 | 14,595,703 | 4,089,002 | 69,144,187 |
| 1920 | 3,049,164 | 4,525,108 | 41,232,970 | 2,918,367 | 115,064,381 |

*a* In the original returns for 1864, stated as "Fruits, dried or preserved, not specified;" and in those for 1865, as follows: "Fruits, green, other than apples," $94,427, and "Fruits, dried and preserved," $420,493. Prior to 1901, including dried apricots, and prior to 1898, also oranges, prunes, and raisins.

*b* For 1870–1883, including "Fruits, preserved, other than canned."

*c* Prior to 1864, comprising fresh apples only.

## QUANTITY AND VALUE OF IMPORTS OF FRUIT INTO THE UNITED STATES, 1851-1920

| Year ending June 30— | Bananas. *a* | | Currants. *a* | | Dates. *a* | | Figs. *a* | |
|---|---|---|---|---|---|---|---|---|
| | *Bunches.* | *Dollars.* | *Pounds.* | *Dollars.* | *Pounds.* | *Dollars.* | *Pounds.* | *Dollars.* |
| 1851 | | | 3,249,418 | 138,870 | 458,178 | 4,393 | 3,448,799 | 135,559 |
| 1852 | | | 4,758,008 | 143,343 | 1,101,766 | 13,974 | 2,909,077 | 94,043 |
| 1853 | | | 1,039,435 | 40,893 | 1,128,753 | 14,792 | 3,931,640 | 124,713 |
| 1854 | | | 174,513 | 15,325 | 717,935 | 9,301 | 2,389,126 | 118,823 |
| 1855 | | | 1,626,070 | 94,389 | 1,124,257 | 17,671 | 2,850,529 | 111,638 |
| 1856 | | | 1,468,261 | 127,089 | 1,271,249 | 21,399 | 4,692,793 | 233,181 |
| 1857 | | | 2,488,912 | 151,418 | 1,493,251 | 17,048 | 4,932,791 | 212,207 |
| 1858 | | | 3,965,721 | 342,869 | 1,914,572 | 31,567 | 4,989,603 | 308,472 |
| 1859 | | | 7,149,363 | 319,326 | 3,233,081 | 91,660 | 4,158,627 | 140,282 |
| 1860 | | | 5,844,947 | 284,642 | 3,093,753 | 67,605 | 7,410,288 | 362,369 |
| 1861 | | *b* 63,452 | 5,108,113 | 186,904 | 3,231,985 | 61,891 | 6,032,516 | 245,740 |
| 1862 | | 43,759 | 1,453,429 | 65,410 | 585,530 | 11,853 | 1,097,272 | 75,174 |
| 1863 | | 45,889 | 3,513,264 | 119,752 | 925,737 | 15,614 | 3,273,673 | 146,871 |
| 1864 | | *c* 96,050 | 5,529,508 | 196,742 | 594,619 | 17,372 | 1,969,487 | 113,506 |
| 1865 | | *d* 116,556 | 3,015,664 | 92,506 | 1,765,619 | 42,150 | 1,250,148 | 72,980 |
| 1866 | | *d* 170,636 | 8,507,320 | 251,040 | 483,307 | 16,295 | 4,289,348 | 163,048 |
| 1867 | | *d* 214,343 | 9,115,737 | 294,289 | 2,547,256 | 80,434 | 4,217,785 | 242,970 |
| 1868 | | 125,496 | 7,036,486 | 205,082 | 1,932,442 | 48,952 | 5,549,909 | 310,495 |
| 1869 | | | | | | | | |
| 1870 | | | | | | | | |
| 1871 | | | | | | | | |
| 1872 | | | | | | | | |
| 1873 | | | | | | | | |
| 1874 | | | | | | | | |
| 1875 | | | | | | | | |
| 1876 | | | | | | | | |
| 1877 | | *c* 10,074 | | | | | | |
| 1878 | | *c* 13,277 | | | | | | |
| 1879 | | | | | | | | |
| 1880 | | | | | | | | |
| 1881 | | | | | | | | |
| 1882 | | | | | | | | |
| 1883 | | | | | | | | |
| 1884 | | 1,820,178 | | | | | 7,945,977 | 512,063 |
| 1885 | | 2,095,228 | | | | | 7,770,178 | 510,732 |
| 1886 | | 2,356,843 | | | | | 7,223,070 | 505,876 |
| 1887 | | 2,682,143 | | | | | 8,724,583 | 487,602 |
| 1888 | | 3,153,654 | | | | | 10,058,053 | 496,755 |
| 1889 | | 3,571,024 | | | | | 10,649,049 | 482,759 |
| 1890 | | 4,653,779 | | | | | 10,284,998 | 456,567 |
| 1891 | | 5,854,752 | 33,128,140 | 1,246,074 | 18,239,057 | 613,845 | 9,201,565 | 697,562 |
| 1892 | | 5,000,632 | 36,665,828 | 1,209,119 | 17,084,557 | 551,629 | 8,338,759 | 511,142 |
| 1893 | | 5,361,187 | 33,166,546 | 1,185,537 | 16,211,906 | 493,910 | 10,503,928 | 548,995 |
| 1894 | | 5,122,503 | 52,664,843 | 774,802 | 12,408,192 | 387,586 | 7,985,959 | 392,040 |
| 1895 | | 4,674,861 | 16,450,706 | 258,659 | 15,186,789 | 316,592 | 11,855,890 | 587,420 |
| 1896 | | 4,502,746 | 33,040,846 | 551,072 | 13,680,302 | 273,456 | 11,900,710 | 639,512 |
| 1897 | | 4,086,320 | 29,265,761 | 596,084 | 11,847,279 | 284,056 | 8,940,762 | 535,380 |
| 1898 | | 4,236,418 | 25,186,219 | 837,987 | 13,561,134 | 371,992 | 9,628,426 | 509,002 |
| 1899 | | 5,665,588 | 30,849,253 | 798,357 | 12,943,305 | 324,087 | 7,284,058 | 356,762 |
| 1900 | | 5,877,835 | 36,251,779 | 916,908 | 19,902,512 | 410,349 | 8,812,487 | 513,895 |
| 1901 | | 6,550,186 | 16,049,198 | 916,994 | 18,434,917 | 372,400 | 9,933,871 | 458,513 |
| 1902 | | 7,307,437 | 36,238,976 | 1,238,756 | 20,013,681 | 344,833 | 11,087,131 | 487,733 |
| 1903 | | 8,541,156 | 33,878,209 | 743,644 | 21,681,159 | 486,151 | 16,482,142 | 775,917 |
| 1904 | | 7,709,976 | 38,347,649 | 997,430 | 21,058,164 | 463,459 | 13,178,061 | 660,360 |
| 1905 | | 9,897,821 | 31,742,919 | 764,289 | 19,257,250 | 360,483 | 13,364,107 | 617,027 |
| 1906 | | 10,330,302 | 37,078,311 | 1,119,146 | 22,435,672 | 479,142 | 17,562,358 | 722,967 |
| 1907 | | 11,883,168 | 38,392,779 | 1,746,941 | 31,270,899 | 850,588 | 24,346,173 | 1,136,924 |
| 1908 | 37,003,388 | 11,391,211 | 38,652,656 | 1,592,018 | 24,958,343 | 689,190 | 18,836,574 | 867,523 |

## QUANTITY AND VALUE OF IMPORTS OF FRUIT INTO THE UNITED STATES, 1851-1920 — Continued

| Year ending June 30— | Bananas.*a* | | Currants.*a* | | Dates.*a* | | Figs.*a* | |
|---|---|---|---|---|---|---|---|---|
| | *Bunches.* | *Dollars.* | *Pounds.* | *Dollars.* | *Pounds.* | *Dollars.* | *Pounds.* | *Dollars.* |
| 1909.. | 36,973,584 | 11,012,100 | 32,482,111 | 1,185,106 | 21,869,218 | 526,747 | 15,235,513 | 691,981 |
| 1910.. | 38,156,659 | 11,642,693 | 33,326,030 | 1,190,020 | 22,693,713 | 516,704 | 17,362,197 | 775,319 |
| 1911.. | 44,699,222 | 14,375,075 | 33,439,565 | 1,486,263 | 29,504,592 | 621,319 | 23,459,728 | 1,059,340 |
| 1912.. | 44,520,539 | 14,368,330 | 33,151,396 | 1,561,350 | 25,208,248 | 536,983 | 18,765,408 | 934,768 |
| 1913.. | 42,357,109 | 14,484,258 | 30,843,735 | 1,306,410 | 34,304,951 | 660,311 | 16,837,819 | 944,317 |
| 1914.. | 48,683,592 | 16,397,884 | 32,033,177 | 1,233,228 | 34,073,608 | 679,527 | 19,284,868 | 941,207 |
| 1915.. | 41,091,585 | 13,512,960 | 30,350,527 | 1,209,273 | 24,949,374 | 420,203 | 20,779,730 | 1,024,495 |
| 1916.. | 36,754,704 | 12,106,158 | 25,373,029 | 1,382,839 | 31,075,424 | 547,433 | 7,153,250 | 315,831 |
| 1917.. | 34,661,179 | 12,724,198 | 10,476,534 | 1,056,525 | 25,485,361 | 622,934 | 16,479,733 | 704,164 |
| 1918.. | 34,549,913 | 15,147,643 | 5,168,070 | 561,904 | 5,572,908 | 249,621 | 10,473,239 | 715,423 |
| 1919.. | 35,382,306 | 15,772,277 | 841,721 | 114,624 | 20,192,160 | 891,068 | 9,239,070 | 868,289 |
| 1920.. | 36,848,475 | 17,346,068 | 38,225,271 | 4,657,502 | 36,893,263 | 2,224,836 | 28,552,351 | 5,102,464 |

*a* 1869-1872, 1874, 1875 contained only in "Total fruits;" in other years for which no figures are given since 1851, included in "Other fresh or dried fruits."
*b* Incomplete.
*c* Including plantains.
*d* Including pineapples and plantains.
*e* From Hawaii only.
*f* Quantity for 1908, 37,003,388 bunches. Quantity not stated prior to 1908.

## QUANTITY AND VALUE OF IMPORTS OF FRUIT INTO THE UNITED STATES, 1851-1920 — Continued

| Year ending June 30— | Oranges.*a* | | Grapefruit. | Lemons.*b* | | Olives.*c* | | Grapes.*a* | |
|---|---|---|---|---|---|---|---|---|---|
| | *Cubic ft.* | *Dollars.* | *Dollars.* | *Pounds.* | *Dollars.* | *Gallons.* | *Dollars.* | *Pounds.* | *Dollars.* |
| 1851 .... | | | | | | | | | |
| 1852 .... | | | | | | | | | |
| 1853 .... | | | | | | | | | |
| 1854 .... | | | | | | | | | |
| 1855 .... | | | | | | | | | 818,576 |
| 1856 .... | | | | | | | | | 640,670 |
| 1857 .... | | | | | | | | | 640,544 |
| 1858 .... | | | | | 301,492 | | | | 476,694 |
| 1859 .... | | | | | 313,160 | | | | 644,683 |
| 1860 .... | | | | | 423,220 | | 18,012 | | 753,695 |
| 1861 .... | | | | | 287,499 | | 10,268 | | 623,559 |
| 1862 .... | | 9,850 | | | 299,488 | | 6,612 | | 622,831 |
| 1863 .... | | 9,316 | | | | | 12,344 | | *d* 998,113 |
| 1864 .... | | | | | | | | | *d* 983,652 |
| 1865 .... | | 17,645 | | | | | 11,409 | | *d* 708,071 |
| 1866 .... | | | | | | | | | *d*1,316,496 |
| 1867 .... | | | | | | | | | *d*1,890,361 |
| 1868 .... | | | | | | | | | *d*1,546,019 |
| 1869 .... | | | | | | | | | |
| 1870 .... | | | | | | | | | |
| 1871 .... | | | | | | | | | |
| 1872 .... | | | | | | | | | |
| 1873 .... | | | | | | | 61,654 | | |
| 1874 .... | | | | | | | | | |
| 1875 .... | | | | | | | | | |
| 1876 .... | | | | | | | | | |
| 1877 .... | | | | | | | | | |

## QUANTITY AND VALUE OF IMPORTS OF FRUIT INTO THE UNITED STATES, 1851-1920 — Continued

| Year ending June 30— | Oranges.*a* | | Grapefruit. | Lemons.*b* | | Olives.*c* | | Grapes.*a* | |
|---|---|---|---|---|---|---|---|---|---|
| | *Cubic ft.* | *Dollars.* | *Dollars.* | *Pounds.* | *Dollars.* | *Gallons.* | *Dollars.* | *Pounds.* | *Dollars.* |
| 1878 | | | | | | | 74,971 | | |
| 1879 | | | | | | | *e* 48,549 | | |
| 1880 | | | | | | | 79,032 | | |
| 1881 | | | | | | | 112,456 | | |
| 1882 | | | | | | | 84,473 | | |
| 1883 | | | | | | | 108,329 | | |
| 1884 | | | | | 2,686,747 | | | | 2,901,228 |
| 1885 | | | | | 2,510,126 | | | | 2,088,204 |
| 1886 | | | | | 2,608,819 | | | | 1,871,839 |
| 1887 | | | | | 3,835,147 | | | | 2,408,140 |
| 1888 | | | | | 3,395,983 | | | | 2,268,872 |
| 1889 | | | | | 3,189,534 | | | | 1,961,889 |
| 1890 | | | | | 3,374,032 | | | | 1,916,652 |
| 1891 | | | | | 4,351,970 | | | | 2,339,987 |
| 1892 | | | | | 4,548,263 | | | | 1,210,338 |
| 1893 | | | | | 4,994,328 | | | | 1,695,469 |
| 1894 | | | | | 4,285,278 | | | | 1,127,005 |
| 1895 | | | | | 3,917,326 | | | | 1,997,266 |
| 1896 | | | | | 5,040,344 | | | | 2,694,131 |
| 1897 | | | | | 4,043,822 | | | | 2,324,907 |
| 1898 | | | | | 2,848,130 | | | | 886,722 |
| 1899 | | | | | 4,398,004 | | | | 1,097,596 |
| 1900 | | | | 160,198,056 | 3,666,881 | | | 68,618,938 | 1,087,041 |
| 1901 | | | | 148,514,614 | 3,516,856 | | | 50,332,914 | 716,457 |
| 1902 | | | | 164,075,309 | 3,320,359 | | | 52,742,476 | 784,640 |
| 1903 | | | | 152,004,213 | 3,079,221 | | | 56,872,070 | 818,780 |
| 1904 | | | | 171,923,221 | 3,659,598 | | | 35,893,260 | 525,468 |
| 1905 | | | | 139,084,321 | 2,905,082 | | | 28,880,575 | 374,088 |
| 1906 | | | | 138,717,252 | 2,933,990 | | | 31,134,341 | 456,726 |
| 1907 | 1,298,469 | 1,575,521 | | 157,859,906 | 4,253,296 | 2,298,480 | 1,277,973 | 21,267,316 | 354,495 |
| 1908 | 2,234,508 | 2,743,356 | | 178,490,003 | 4,388,530 | 3,121,788 | 1,358,897 | 18,397,429 | 275,060 |
| 1909 | 1,203,419 | 1,575,620 | | 135,183,550 | 2,623,399 | 2,969,329 | 1,349,023 | 8,435,873 | 137,390 |
| 1910 | 1,395,310 | 1,682,994 | | 160,214,785 | 3,136,933 | 4,555,075 | 1,659,801 | 4,676,118 | 82,457 |
| 1911 | 1,485,159 | 1,723,022 | | 134,968,924 | 2,985,561 | 3,044,947 | 1,567,546 | 7,672,186 | 116,658 |
| 1912 | 2,009,841 | 2,331,504 | | 145,639,396 | 3,368,803 | 5,076,857 | 2,303,277 | 7,628,662 | 108,880 |
| 1913 | 1,135,942 | 1,359,415 | | 151,416,412 | 4,300,266 | 3,946,076 | 1,896,982 | 12,252,960 | 233,760 |
| 1914 | 1,334,163 | 1,599,969 | | | 5,981,635 | 5,316,364 | 2,292,837 | | 93,472 |
| 1915 | 1,323,928 | 1,523,547 | | | 3,730,075 | 3,622,275 | 1,607,973 | | 50,022 |
| 1916 | 623,856 | 703,274 | | | 2,062,030 | 5,938,446 | 2,433,304 | | 89,464 |
| 1917 | 1,402,416 | 1,656,609 | | | 2,163,583 | 5,641,759 | 2,338,615 | | 160,710 |
| 1918 | 556,558 | 648,093 | | | 2,179,211 | 2,385,059 | 1,062,187 | | 62,906 |
| 1919 | 695,883 | 1,037,587 | 447,257 | | 1,438,884 | 3,501,371 | 1,786,609 | | 85,859 |
| 1920 | 531,476 | 853,803 | 466,368 | | 3,423,398 | 5,206,458 | 4,729,978 | | 71,922 |

*a* 1869-1872, 1874, 1875 contained only in "Total fruits;" in other years since 1851 for which no figures given, included in "Other fresh or dried fruits."

*b* 1863-1868 included in "Oranges;" 1869-1872, 1874, 1875 contained only in "Total fruits" in other years since 1851, for which no figures are given, included in "Other fresh or dried fruits."

*c* 1869-1872 contained only in "Total fruits;" 1875-1877 included in "Cocoanuts (p. 47);" in other years for which no figures are given, except 1851-1854 and 1874, included in "Other fresh or dried fruits."

*d* Including lemons and limes.

*e* Including tamarinds.

## QUANTITY AND VALUE OF IMPORTS OF FRUIT INTO THE UNITED STATES, 1851-1920 — Continued

| Year ending June 30— | Pineapples. | Plums and prunes.a | | Raisins.a | | Other fresh or dried fruits.b | Prepared or preserved fruits.c | Total fruits.b |
|---|---|---|---|---|---|---|---|---|
| | *Dollars.* | *Pounds.* | *Dollars.* | *Pounds.* | *Dollars.* | *Dollars.* | *Dollars.* | *Dollars.* |
| 1851 | | 1,424,659 | 81,773 | 18,286,712 | 879,591 | | | 1,240,186 |
| 1852 | | 1,593,448 | 95,181 | 17,973,558 | 923,628 | | | 1,270,169 |
| 1853 | | 2,576,755 | 113,769 | 14,603,753 | 896,034 | | | 1,190,201 |
| 1854 | | 1,891,103 | 82,056 | 16,839,512 | 958,877 | | | 1,184,382 |
| 1855 | | 2,139,061 | 115,525 | 21,183,339 | 1,064,243 | e 144,610 | 138,794 | 2,505,446 |
| 1856 | | 3,048,835 | 141,367 | 14,306,407 | 864,219 | e 124,333 | 124,480 | 2,276,738 |
| 1857 | | 4,171,770 | 227,053 | 15,699,624 | 937,460 | e 162,908 | 102,557 | 2,451,195 |
| 1858 | | 5,157,422 | 292,104 | 23,047,443 | 1,441,471 | e 243,795 | 121,058 | 3,559,622 |
| 1859 | | 7,246,937 | 362,494 | 24,448,630 | 1,420,980 | e 235,179 | 120,977 | 3,648,141 |
| 1860 | | 9,086,368 | 497,223 | 23,693,573 | 1,475,879 | 252,512 | 257,565 | 4,392,722 |
| 1861 | | 3,153,952 | 200,864 | 32,111,492 | 1,923,746 | 221,172 | 154,172 | 3,979,267 |
| 1862 | | 788,406 | 44,198 | 7,672,703 | 548,681 | 181,753 | 90,224 | 1,999,833 |
| 1863 | | 2,876,201 | 117,548 | 10,348,156 | 663,714 | 145,168 | 175,308 | 2,449,637 |
| 1864 | | 3,329,576 | 139,364 | 17,599,053 | 1,030,018 | 171,600 | 157,244 | 2,904,948 |
| 1865 | | 2,592,739 | 137,086 | 9,438,083 | 519,107 | 34,218 | 92,082 | 1,843,810 |
| 1866 | | 11,084,477 | 507,730 | 48,165,930 | 1,450,736 | 228,870 | 187,553 | 4,292,404 |
| 1867 | | 5,082,869 | 313,551 | 21,378,482 | 1,543,545 | 52,110 | 243,479 | 4,875,082 |
| 1868 | | 12,980,466 | 600,000 | 22,257,403 | 1,672,286 | 201,455 | 324,341 | 5,034,226 |
| 1869 | | | | | | | | 7,954,278 |
| 1870 | | | | | | | | 7,416,592 |
| 1871 | | | | | | | | 9,602,630 |
| 1872 | | | | | | | | 10,383,466 |
| 1873 | | | | | | 9,673,462 | | 9,735,116 |
| 1874 | | | | | | | | 8,281,418 |
| 1875 | | | | | | | | 12,536,420 |
| 1876 | | | | | | 12,380,678 | 4,472 | 12,385,150 |
| 1877 | | | | | | 9,832,391 | 7,903 | 9,850,368 |
| 1878 | | | | | | 9,739,440 | 9,690 | 9,837,378 |
| 1879 | | | | | | 10,346,579 | 16,421 | 10,411,549 |
| 1880 | | | | | | 13,284,062 | 17,858 | 13,380,952 |
| 1881 | | | | | | 12,365,727 | 16,034 | 12,494,217 |
| 1882 | | | | | | 18,518,606 | 14,316 | 18,617,425 |
| 1883 | | | | | | 19,314,434 | 15,427 | 19,438,190 |
| 1884 | | 60,600,228 | 2,632,838 | 53,702,220 | 3,290,150 | 3,401,770 | 585,048 | 17,830,622 |
| 1885 | | 57,631,820 | 2,147,505 | 38,319,787 | 2,661,699 | 2,144,436 | 770,895 | 14,929,125 |
| 1886 | | 64,995,545 | 2,026,595 | 40,387,946 | 2,885,123 | 2,332,812 | 833,557 | 15,421,464 |
| 1887 | | 92,032,625 | 2,999,648 | 40,673,288 | 2,281,981 | 3,065,707 | 748,493 | 18,508,861 |
| 1888 | | 70,626,027 | 2,197,150 | 40,476,763 | 2,070,120 | 3,778,209 | 941,3 2 | 18,302,045 |
| 1889 | | 46,154,825 | 1,423,304 | 35,091,139 | 1,736,786 | 3,362,025 | 1,042,8'6 | 16,770,167 |
| 1890 | | 58,093,410 | 1,789,176 | 36,914,330 | 1,997,103 | 3,168,367 | 954,331 | 18,310,007 |
| 1891 | | 34,281,322 | 2,054,486 | 39,572,655 | 2,018,879 | 2,552,245 | 1,289,137 | 23,018,937 |
| 1892 | | 10,869,797 | 437,271 | 20,687,640 | 964,309 | 2,508,940 | 1,234,828 | 18,176,471 |
| 1893 | | 26,414,112 | 1,162,318 | 27,543,563 | 1,266,342 | 3,372,666 | 864,166 | 20,941,918 |
| 1894 | | 9,908,122 | 416,342 | 13,751,050 | 554,081 | 2,980,584 | 526,561 | 16,566,782 |
| 1895 | | 14,352,057 | 527,625 | 15,921,278 | 651,120 | 1,725,342 | 570,568 | 15,227,079 |
| 1896 | | 483,658 | 68,862 | 10,826,094 | 460,200 | 2,128,056 | 598,928 | 16,957,307 |
| 1897 | | 710,028 | 73,303 | 12,650,598 | 567,039 | 1,810,807 | 605,053 | 14,926,771 |
| 1898 | | 303,992 | 39,660 | 6,593,833 | 381,889 | 1,294,855 | 922,357 | 12,329,012 |
| 1899 | | 600,360 | 63,574 | 4,933,201 | 282,400 | 1,579,652 | 1,020,644 | 15,586,664 |
| 1900 | | 443,457 | 47,700 | 10,309,498 | 531,124 | 1,989,546 | 1,243,479 | 16,284,758 |
| 1901 | | 745,974 | 62,880 | 3,860,836 | 297,631 | 2,059,130 | 1,368,801 | 16,317,848 |
| 1902 | | 522,478 | 44,077 | 6,683,545 | 399,973 | 2,053,588 | 1,454,788 | 17,436,184 |
| 1903 | | 633,819 | 63,218 | 6,715,675 | 476,844 | 2,373,864 | 1,521,443 | 18,560,238 |
| 1904 | | 494,105 | 46,976 | 6,867,617 | 355,542 | 2,749,670 | 1,796,209 | 18,964,688 |
| 1905 | | 671,604 | 63,617 | 4,041,689 | 273,031 | 2,924,187 | 1,599,488 | 19,779,113 |
| 1906 | | 497,494 | 53,348 | 12,414,855 | 524,590 | 2,484,345 | 2,437,766 | 21,542,322 |
| 1907 | | 323,377 | 45,386 | 3,967,151 | 364,403 | 1,363,167 | 1,272,445 | 26,124,277 |
| 1908 | | 335,089 | 49,322 | 9,132,353 | 554,633 | 2,250,813 | 1,550,246 | 27,710,799 |

## QUANTITY AND VALUE OF IMPORTS OF FRUIT INTO THE UNITED STATES, 1851-1920 — Concluded

| Year ending June 30— | Pineapples. | Plums and prunes.a | | Raisins.a | | Other fresh or dried fruits.b | Prepared or preserved fruits.c | Total fruits.b |
|---|---|---|---|---|---|---|---|---|
| | *Dollars.* | *Pounds.* | *Dollars.* | *Pounds.* | *Dollars.* | *Dollars.* | *Dollars.* | *Dollars.* |
| 1909 | ..... | 296,123 | 41,696 | 5,794,320 | 327,644 | 1,912,949 | 1,062,775 | 22,446,430 |
| 1910 | 1,317,462 | ..... | ..... | 5,042,683 | 296,047 | 920,362 | 956,368 | 24,177,160 |
| 1911 | 979,721 | ..... | ..... | 2,479,220 | 237,422 | 971,572 | 893,633 | 27,017,632 |
| 1912 | 1,110,341 | ..... | ..... | 3,255,861 | 295,466 | 1,693,516 | 936,008 | 29,549,281 |
| 1913 | 1,319,006 | ..... | ..... | 2,579,705 | 241,630 | 1,115,330 | 795,399 | 28,657,084 |
| 1914 | 1,287,862 | ..... | ..... | 4,554,549 | 309,511 | 1,710,009 | 1,111,193 | 23,638,334 |
| 1915 | 1,309,750 | ..... | ..... | 2,808,806 | 238,958 | 1,431,242 | 1,022,971 | 27,081,399 |
| 1916 | 964,623 | ..... | ..... | 1,024,296 | 143,750 | 1,582,600 | 954,523 | 23,285,829 |
| 1917 | 935,906 | ..... | ..... | 1,850,219 | 234,560 | 1,936,561 | 781,586 | 25,315,951 |
| 1918 | 801,298 | ..... | ..... | 843,533 | 153,319 | 2,114,444 | 712,428 | 24,408,777 |
| 1919 | 1,011,099 | ..... | ..... | 119,969 | 34,827 | 1,657,070 | 578,946 | 25,724,396 |
| 1920 | 1,474,965 | ..... | ..... | 13,897,417 | 2,653,458 | 5,473,406 | 1,860,528 | 50,338,696 |

*a* 1869-1872, 1874, 1875 contained only in "Total fruits" in other years since 1854, for which no figures are given, included in "Other fresh or dried fruits."

*b* 1876, 1877, exclusive of olives 1869-1901 including nuts not specified under "Nuts" (after 1863 only those free of duty).

*c* 1860-1863, 1865-1868 including fruit juice; 1870 jelly only; 1877-1883 comprising only jelly, orange and lemon peel.

*e* Including all fresh or dried fruits imported from Canada and Newfoundland under the reciprocity treaty.

## IMPORTS OF FRUIT INTO THE UNITED STATES* FROM JANUARY 1 TO SEPTEMBER 30, 1920

| | |
|---|---|
| Currants | 43,247,005 lbs. |
| Figs | 9,942,112 lbs. |
| Grapefruit | $293,897 |
| Grapes | 31,629 cu. ft. |
| Lemons | $2,491,707 |
| Olives | 4,131,574 gal. |
| Oranges | $32,457 |
| Raisins and other dried grapes | 20,395,425 lbs. |

## EXPORTS OF FRUITS FROM THE UNITED STATES* FROM JANUARY 1 TO SEPTEMBER 30, 1920

| | |
|---|---|
| Apples | 585,555 bbls. |
| Dried apples | 5,437,194 lbs. |
| Apricots, dried | 8,421,221 lbs. |
| Lemons | 232,580 boxes |
| Oranges | 1,224,530 boxes |
| Pears | $1,063,843 |
| Dried Peaches | 6,825,976 lbs. |
| Prunes, dried | 60,754,789 lbs. |
| Raisins and other dried grapes | 33,562,936 lbs. |
| Canned fruits | $16,736,519 |
| All other green or ripe fruit | $3,062,980 |
| All other dried fruit | $1,723,793 |

* Figures prepared by Foreign Markets Service, Bureau of Markets.

## IMPORTS OF FRUIT INTO THE UNITED STATES FROM JANUARY 1 TO SEPTEMBER 30, 1920

Statement prepared by Foreign Markets Service, Bureau of Markets.

| *Countries* | **Currants** | *Quantity Pounds* |
|---|---|---|
| Denmark | | 42,624 |
| Greece | | 41,989,819 |
| Italy | | 381,362 |
| United Kingdom | | 436,793 |
| Canada | | 120,198 |
| British India | | 110,020 |
| Turkey in Asia | | 125,000 |
| All other countries | | 34,189 |
| Total | | 43,247,005 |

| *Countries* | **Figs** | *Quantity Pounds* |
|---|---|---|
| Belgium | | 669,020 |
| France | | 408,670 |
| Greece | | 531,346 |
| Italy | | 459,007 |
| Netherlands | | 494,597 |
| Portugal | | 2,177,604 |
| Spain | | 2,374,991 |
| Turkey in Asia | | 2,678,089 |
| All other countries | | 148,788 |
| Total | | 9,942,112 |

| *Countries* | **Grapefruit** | *Value Dollars* |
|---|---|---|
| Italy | | 1,385 |
| Costa Rica | | 440 |
| Honduras | | 571 |
| Jamaica | | 5,071 |
| Trinidad and Tobago | | 373 |
| Other British West Indies | | 2,136 |
| Cuba | | 283,584 |
| All other countries | | 337 |
| Total | | 293,897 |

| *Countries* | **Grapes** | *Quantity Cubic Feet* |
|---|---|---|
| Belgium | | 13,696 |
| Spain | | 16,968 |
| All other countries | | 965 |
| Total | | 31,629 |

| *Countries* | **Lemons** | *Value Dollars* |
|---|---|---|
| Austria | | 1,974 |
| Italy | | 2,486,630 |
| United Kingdom | | 723 |
| Canada | | 2,172 |
| West Indies | | 208 |
| Total | | 2,491,707 |

## IMPORTS OF FRUIT INTO THE UNITED STATES FROM JANUARY 1 TO SEPTEMBER 30, 1920 — Concluded

| *Countries* | **Olives** | *Quantity Gallons* |
|---|---|---|
| France | | 2,215 |
| Greece | | 406,234 |
| Italy | | 99,061 |
| Spain | | 3,509,585 |
| Chile | | 73,429 |
| Peru | | 21,426 |
| Hongkong | | 13,777 |
| Turkey in Asia | | 5,197 |
| All other countries | | 650 |
| Total | | 4,131,574 |

| *Countries* | **Oranges** | *Value Dollars* |
|---|---|---|
| Italy | | 13,552 |
| Costa Rica | | 4,265 |
| Honduras | | 1,332 |
| Jamaica | | 3,328 |
| Cuba | | 4,125 |
| Japan | | 3,226 |
| All other countries | | 2,629 |
| Total | | 32,457 |

| *Countries* | **Raisins and Other Dried Grapes** | *Quantity Pounds* |
|---|---|---|
| Belgium | | 67,278 |
| Denmark | | 379,876 |
| France | | 240,433 |
| Greece | | 830,524 |
| Netherlands | | 80,380 |
| Norway | | 349,274 |
| Spain | | 9,528,134 |
| United Kingdom | | 4,301,056 |
| Argentina | | 52,918 |
| Chile | | 204,999 |
| China | | 50,000 |
| Turkey in Asia | | 3,865,411 |
| Australia | | 212,065 |
| All other countries | | 233,077 |
| Total | | 20,395,425 |

| Total Imports of: — | |
|---|---|
| Bananas (Bunches) | 31,241,624 |
| Dates (Pounds) | 10,201,954 |
| Pineapples (Dollars) | 1,389,139 |
| Preserved fruits (Dollars) | 1,375,324 |
| *All other fruits (Dollars) | 3,676,128 |

* Not elsewhere specified.

## EXPORTS OF FRUITS FROM THE UNITED STATES FROM JANUARY 1 TO SEPTEMBER 30, 1920

### Apples, Green or Ripe

| *Countries to which exported.* | *Barrels.* |
|---|---|
| Denmark | 11,079 |
| Norway | 45,287 |
| Sweden | 12,055 |
| United Kingdom | 303,530 |
| Canada | 124,855 |
| Mexico | 16,252 |
| Cuba | 7,757 |
| Argentina | 20,773 |
| Brazil | 19,498 |
| Other countries | 24,469 |
| Total | 585,555 |

### Apricots, Dried

| *Countries to which exported.* | *Pounds* |
|---|---|
| Belgium | 344,828 |
| Denmark | 950,687 |
| France | 1,821,002 |
| Netherlands | 104,010 |
| Norway | 104,385 |
| Sweden | 317,482 |
| United Kingdom | 3,687,571 |
| Canada | 453,251 |
| Australia | 1,585 |
| Other countries | 636,420 |
| Total | 8,421,221 |

| Total Exports of:— | *Value* |
|---|---|
| Berries | $671,094 |
| Canned Peaches | 4,847,118 |
| Canned Pears | 3,779,126 |
| Canned Pineapples | 2,246,934 |
| All other canned fruit | 5,863,341 |
| All other preserved fruit | 1,527,120 |

### Dried Apples

| *Countries* | *Quantity Pounds* |
|---|---|
| Belgium | 91,000 |
| Denmark | 686,514 |
| Finland | 252,150 |
| France | 544,651 |
| Netherlands | 788,960 |
| Norway | 116,150 |
| Sweden | 1,283,892 |
| Turkey in Europe | 51,700 |
| United Kingdom | 781,868 |
| Canada | 168,583 |
| Panama | 23,849 |
| Mexico | 32,034 |
| Newfoundland and Labrador | 50,560 |
| Argentina | 129,998 |

## EXPORTS OF FRUITS FROM THE UNITED STATES FROM JANUARY 1 TO SEPTEMBER 30, 1920 — Continued

| | |
|---|---|
| Brazil | 45,188 |
| Chile | 24,029 |
| British India | 36,258 |
| Dutch East Indies | 64,212 |
| Japan | 31,655 |
| New Zealand | 61,545 |
| Philippine Islands | 17,787 |
| All other countries | 154,611 |
| Total | 5,437,194 |

| *Countries* | **Lemons** | *Quantity Boxes* |
|---|---|---|
| Canada | | 202,625 |
| China | | 8,683 |
| New Zealand | | 8,686 |
| Philippine Islands | | 3,661 |
| All other countries | | 8,925 |
| Total | | 232,580 |

| *Countries* | **Oranges** | *Quantity Boxes* |
|---|---|---|
| United Kingdom | | 9,611 |
| Canada | | 1,139,383 |
| All other countries | | 75,536 |
| Total | | 1,224,530 |

| *Countries* | **Pears, Green or Ripe** | *Value Dollars* |
|---|---|---|
| United Kingdom | | 118,438 |
| Canada | | 683,407 |
| Mexico | | 12,576 |
| Cuba | | 72,639 |
| Argentina | | 17,369 |
| Brazil | | 130,787 |
| All other countries | | 28,627 |
| Total | | 1,063,843 |

| *Countries* | **Dried Peaches** | *Quantity Pounds* |
|---|---|---|
| Netherlands | | 293,100 |
| Belgium | | 51,188 |
| Denmark | | 712,627 |
| France | | 540,235 |
| Italy | | 10,000 |
| Sweden | | 35,614 |
| Switzerland | | 44,000 |
| Turkey in Europe | | 50,150 |
| United Kingdom | | 3,787,922 |
| Canada | | 823,331 |
| Mexico | | 39,201 |
| Cuba | | 10,700 |
| Argentina | | 211,114 |

## EXPORTS OF FRUITS FROM THE UNITED STATES FROM JANUARY 1 TO SEPTEMBER 30, 1920 — Continued

| | |
|---|---|
| Brazil | 10,598 |
| Peru | 13,429 |
| Uruguay | 20,500 |
| Japan | 25,759 |
| New Zealand | 37,020 |
| British South Africa | 12,140 |
| All other countries | 97,348 |
| Total | 6,825,976 |

### Prunes, Dried

| *Countries to which exported.* | *Pounds* |
|---|---|
| Belgium | 1,854,743 |
| Denmark | 1,134,639 |
| Finland | 932,828 |
| France | 16,184,922 |
| Italy | 353,275 |
| Netherlands | 1,855,312 |
| Norway | 560,005 |
| Sweden | 855,480 |
| United Kingdom | 23,677,784 |
| Canada | 8,115,843 |
| British Oceania | 973,512 |
| Other countries | 4,256,446 |
| Total | 60,754,789 |

### Raisins and Other Dried Grapes

| *Countries to which exported.* | *Pounds* |
|---|---|
| Denmark | 99,880 |
| Norway | 138,862 |
| Sweden | 35,585 |
| United Kingdom | 14,379,573 |
| Canada | 14,058,992 |
| Japan | 208,062 |
| New Zealand | 1,176,167 |
| Other countries | 3,465,815 |
| Total | 33,562,936 |

### Canned Fruits

| *Countries* | *Value Dollars* |
|---|---|
| Belgium | 439,673 |
| France | 926,132 |
| Norway | 195,503 |
| United Kingdom | 9,247,754 |
| Canada | 1,587,184 |
| Cuba | 1,610,416 |
| British India | 290,706 |
| Dutch East Indies | 208,352 |
| All other countries | 2,230,799 |
| Total | 16,736,519 |

## EXPORTS OF FRUITS FROM THE UNITED STATES FROM JANUARY 1 TO SEPTEMBER 30, 1920 — Concluded

### All Other Green or Ripe Fruit*

(In value only)

| *Countries to which exported.* | *Dollars* |
|---|---|
| United Kingdom | 78,011 |
| Canada | 2,583,239 |
| Panama | 19,562 |
| Mexico | 122,880 |
| Newfoundland and Labrador | 11,259 |
| Cuba | 177,294 |
| Dominican Republic | 11,842 |
| Other countries | 58,893 |
| Total | 3,062,980 |

### All Other Dried Fruits*

(In value only)

| *Countries to which exported.* | *Dollars* |
|---|---|
| Finland | 28,460 |
| France | 191,000 |
| Germany | 16,917 |
| Netherlands | 10,543 |
| Sweden | 15,326 |
| United Kingdom | 940,173 |
| Canada | 230,708 |
| Panama | 10,486 |
| Mexico | 31,240 |
| Cuba | 20,882 |
| Argentina | 30,667 |
| Brazil | 15,955 |
| Australia | 10,927 |
| New Zealand | 32,788 |
| British South Africa | 10,178 |
| Other countries | 127,543 |
| Total | 1,723,793 |

* Not elsewhere specified.

# AMERICAN POMOLOGICAL SOCIETY

**Organized 1848**
**Incorporated 1887**

## ACT OF INCORPORATION

COMMONWEALTH OF MASSACHUSETTS, 1887

SECTION 1. Patrick Barry of Rochester, New York; Charles W. Garfield, of Grand Rapids, Michigan; Benjamin G. Smith of Cambridge, Massachusetts; J. J. Thomas of Union Springs, New York; Prosper J. Berckmans of Augusta, Georgia; Robert Manning of Salem, Massachusetts, their associates, the Officers and Members of the Association known as the American Pomological Society, and their successors, are hereby made a corporation under the name of "American Pomological Society," for the purpose of promoting and encouraging the culture of fruit, with all the powers and privileges and subject to all the duties and liabilities set forth in the general laws which are now or may hereafter be in force applicable to such corporations.

SECTION 2. Said corporation may, for the purposes aforesaid, have and hold by purchase, grant, gift, or otherwise, real and personal property to an amount not exceeding one hundred thousand dollars.

SECTION 3. Said corporation may hold its annual meeting, or any special meeting in any place, state or county it may determine, provided that due notice shall be given to the members thereof of the time and place of said meeting.

SECTION 4. Any two of the corporators above named are hereby authorized to call the first meeting of said corporation in the month of September next ensuing, by due notice thereof to each member of said Association.

6 year old Baldwin tree in bearing. No pruning.

# AMERICAN POMOLOGICAL SOCIETY

## CONSTITUTION

### Article I — Name

The name of this Association shall be the American Pomological Society.

### Article II — Object

Its object shall be the advancement of the science and art of Pomology.

### Article III — Membership

The regular membership of this Society shall consist of Collegiate, Annual, Society, Life, and Institutional members.

The special membership shall consist of Honorary members, Subscribers, Contributors, Junior and Senior Patrons.

### Article IV — Meetings

The regular meetings of this Society shall be held annually at such time and place as the Executive Committee may decide.

Special meetings may be convened upon the call of the President or by the Executive Committee on petition signed by a majority of its members.

### Article V — Election of Members

Students shall be eligible for Collegiate membership on recommendation of the professor of pomology in the faculty of the institution whence the applicant registers.

Any person shall be eligible for Annual membership on payment of membership fee.

Any society of established standing shall be eligible for Society membership and may become such member on its own election.

Libraries and educational institutions may become members on their own election; such memberships shall be limited to thirty years.

Any person shall be eligible to Life membership on recommendation of a special committee appointed by the president to determine the applicant's qualiifications; and may be elected to such membership on approval by two-thirds of the Executive Committee.

Honorary membership, in recognition of eminent or distinguished services to pomology, may be conferred upon any person nominated by not less than a two-thirds vote of the Executive Committee, and who receives not less than a two-thirds vote of the membership present at a regular annual meeting.

The designation of Subscriber may be conferred by vote of the Executive Committee upon any person, firm or corporation that may have contributed valuable services toward the accomplishment of a definite periodical purpose.

The designation of Contributor may be conferred, as above, upon any person, firm or corporation that may have contributed means, material or special services of notable permanent value for the advancement of the work being carried on by the Society.

The title of Junior Patron may be conferred in similar manner upon any person — otherwise eligible to regular membership, who may contribute at any one time to any of the permanent funds of the Society the sum of $500.

The title of Senior Patron may likewise be conferred upon any person similarly eligible, who has contributed, for a like purpose, the sum of $1,000.

### Article VI — Dues and Fees

The dues for Collegiate membership shall be one dollar for the calendar year; for Annual membership shall be two dollars for the calendar year; for Society membership shall be ten dollars, the calendar year; the fee for Institutional membership shall be fifty dollars; the fee for Life membership shall be fifty dollars.

### Article VII — Officers and Executive Committee

The officers of this organization shall consist of a President, first and second Vice-Presidents, one of which shall be from Canada; Secretary-Treasurer and Executive Committee consisting of the President, first and second Vice-Presidents and seven additional members, six of whom shall constitute a quorum.

The foregoing officers shall be elected by ballot at the regular annual meeting, and shall hold office one year thereafter and until their respective successors are elected.

The Executive Committee shall have full charge of the ad interim business of the organization.

It shall make full and complete reports of its ad interim action together with such suggestions and recommendations as it deems for the best interests of the Society to the Society in session.

The Secretary-Treasurer shall be ex officio Secretary of the Executive Committee.

## BY-LAWS

1. The President shall preside at all meetings of the Society; he shall exercise a general supervision and control of the business and affairs of the Society, and appoint all committees unless otherwise directed.

2. In case of death, sickness or inability of the President, his official duties shall devolve on the Vice-President.

3. The Secretary-Treasurer shall receive all moneys belonging to the Society, and pay over the same on the written orders of the President; he shall, with the assistance of a reporter appointed by him, keep a record of the transactions of the Society for publication; he shall furnish such bond as may be required by the Executive Committee.

4. There shall be an Auditing Commitee of three members appointed by the President at each annual meeting.

5. A Chairman of Fruit Committees, for each State, Territory and Province and a General Chairman over all, shall be appointed annually. It shall be the duty of such Chairman to appoint four additional members of his committee, and with their aid and such information as he can procure, to forward to the General Chairman one month before each annual meeting, State Pomological Reports, to be condensed by him for publication.

6. A Standing Committee on New Fruits of American Origin consisting of eleven members, shall be appointed by the President, immediately after his election. It shall be the duty of this Committee to report annually on new fruits of American origin, and also to examine, and before the close of the session report on, all new seedling varieties that may be exhibited and to make an ad interim report on those that were exhibited in an unripe condition at the meeting of the Society, but had subsequently attained a state of maturity; and on such other seedlings as may have been submitted to their inspection during the Society's vacation.

7. A Standing Committee on Foreign Fruits, consisting of eleven members, shall be appointed, whose duties shall be similar to those of the committee in By-Law Six.

8. A Standing Committee on Tropical and Sub-Tropical Fruits, consisting of eleven members, shall be appointed, whose duties shall be similar to those of the committee in By-Law Six.

9. A Standing Committee on Nomenclature, consisting of seven members, shall be appointed annually.

10. Vacancies occurring in committees shall be filled by the chairman of each, and in case of his death or inability to serve, his place shall be supplied by the President of the Society.

11. The order of business for each meeting shall be arranged by the Executive Committee.

12. The Constitution or By-Laws may be altered or amended, at any regular annual meeting, by a vote of two-thirds of the members present.

13. That there be hereby established a membership in this body to be known as Society Membership, which shall be open to state, provincial and district organizations. The fee for such membership shall be, for a State or Provincial Society, ten dollars, and for a district society five dollars, the year. This membership carries with it the right and duty to appoint delegates, one for each hundred members, or major fraction thereof, and one delegate-at-large, of the delegating body, to attend and participate in the meetings of this Society.

Delegates from the above Society Members shall be entitled to all the privileges of other members of this Society; but in the case of the appointment of alternates, no alternate shall have a right to vote except in the absence of his principal, or in the event his principal elects to divide his privilege, thereby casting a one-half vote for principal and alternate.

14. There is hereby established a membership in this Society known as the Collegiate Membership which shall be open to students in Pomology in any agricultural school, college or university.

15. The voting privilege of this organization shall be exercised by these annual, society and life members in good standing, and whose dues are paid for the current year.

# AMERICAN POMOLOGICAL SOCIETY

**1920**

## LIFE MEMBERS

Allan, Alex M., 169 Mutual St., Toronto, Ontario, Can.
Alwood, Wm. B., Charlottesville, Va.
Ash, John, Pomfret Center, Conn.
Atkins, Charles G., Bucksport, Maine.
Austin, Mrs. Helen V., 625 S. W. A. St., Richmond, Ind.
Austin, C. F., Herradura, Cuba.
Babcock, J. Lyman, Norfolk, Va.
Bailey, L. H., Ithaca, N. Y.
Berryhill, J. G., 304 New Call Bldg., San Francisco, Cal.
Black, Charles, Heightstown, N. J.
Blackmore, John C., Christ Church, Canterbury, New Zealand.
Blair, J. C., Urbana, Ill.
Briggs, G. R., Plymouth, Mass.
Bunyard, E. A., Allington, Maidstone, England.
Chase, Howard A., Commonwealth Bldg., Mount Pocono, Pa.
Cone, Mrs. Moses H., Blowing Rock, N. C.
Cook, David C., Elgin, Ill.
Crandall, C. S., Urbana, Ill.
Darrow, George M., U. S. D. A., Washington, D. C.
Dean, M. L., Olympia, Wash.
Dearing, Charles, U. S. D. A., Washington, D. C.
Devitt, Wm., Georgetown, Del.
Devol, Wm. Stowe, 420 Palisade Beach, Santa Monica, Cal.
Dewey, George W., Jerome, Idaho.
Dreer, W. F., 714 Chestnut St., Philadelphia, Pa.
Dumas, J. L., Pomona Ranch, Dayton, Wash.
Durell, E. H., Woodbury, N. J.
Durfee, George B., 550 June St., Fall River, Mass.
De Cou, Howard F., Moorestown, N. J.
Egbert, Knott C., Fremont, Ohio.
Fay, Jesse B., 1021 Society Bldg., Cleveland, Ohio.
Fletcher, W. F., Woodward, Okla.
Fraser, Samuel, Geneseo, N. Y.
Fugazzi, John F., Cincinnati, Ohio.
Gammon, C. W., Metropolitan Bldg., N. Y.
Gardiner, Robert H., Gardiner, Maine.
Garfield, Charles W., Grand Rapids, Mich.
Gay, Leslie F., Sta. A., Los Angeles, Calif.
Gerrish, O. K., Lakeville, Mass.
Gillett, M. E., Tampa, Fla.
Goodman, L. A., 4000 Warwick Blvd., Kansas City, Mo.
Greening, Charles E., Monroe, Mich.
Green, E. C., 923 W. Green St., Urbana, Illinois.
Guilford, W. S., Orland, Cal.
Hansen, N. E., Brookings, S. Dak.
Harrison, Orlando, Berlin, Md.
Hart, W. S., Hawks Park, Fla.
Hartevelt, A., Rijswijk bij den Haag, Holland.
Herff, B. von, 1901 McCormick Bldg., Chicago, Ill.
Hodge, C. F., Clark University, Worcester, Mass.
Hume, H. Harold, Glen St., Mary, Fla.
Hunnewell, Walter, 87 Milk St., Boston, Mass.
Husmann, Fred L., 2nd and Seminary Sts., Napa, Calif.
Husmann, George C., U. S. D. A., Washington, D. C.
Hardie, H. H., Hudson, Mich.
Idescalchi, Prince E. L., Tuzser Szaboles, Mezye, Hungary.
Ilgenfritz, Charles A., Monroe, Mich.
Irish, H. C., Missouri Botanical Garden, St. Louis, Mo.
Kains, M. G., Pomona, N. Y.
Kidder, N. T., Milton, Mass.
Kirkpatrick, T. J., 1603 E. High St., Springfield, Ohio.
Lake, E. R., 2033 Park Road, N. W., Washington, D. C.
Lauman, G. N., Ithaca, N. Y.
Lehenbauer, Professor P. A., University of Illinois, Urbana, Ill.
Leslie, W. R., Ontario, Canada, Vineland.
Lewis, K. B., Red Hook, N. Y.
Lovett, J. T., Little Silver, N. J.
Lysle, Addison, Fillmore, Calif.
Magid, Louis B., Tallulah Park, Ga.
Mann, Charles W., U. S. D. A., Washington, D. C.

Marshall, George A., Arlington, Neb.
Mayer, Dr. I. H., Willow Street, Penna.
Meneray, F. W., 715 First Ave., Council Bluffs, Iowa.
Miller, H. W., Paw Paw, W. Va.
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### Ohio State University

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Gordon, E. W., Columbus, Ohio.
Ink, James, Canton, Ohio.
Laisy, A. L., Cleveland, Ohio.
Richardson, H. C., Cleveland, Ohio.
Rofkar, W. F., Port Clinton, Ohio.
Scott, H. H., Cumberland, Ohio.
Wells, H. M., Alice, Ohio.
Stacy, D. D., Marietta, Ohio.

## THIRTY-YEAR INSTITUTIONAL MEMBERSHIPS

Alabama Polytechnic Institute, 1904-1934, Auburn, Alabama.
Arkansas Agricultural Experiment Station Library, 1889-1919, Fayetteville, Ark.
Burbank Press, Luther, 1912-1942, Santa Rosa, Calif.
California State University Library, 1913-1943, Berkeley, Calif.
Central Experiment Farms, 1889-1929, Ottawa, Canada.
Citrus Experiment Station, 1912-1942, Riverside, Calif.
Colorado State Agricultural College, 1902-1932, Fort Collins, Colo.
Cornell University Library, 1889-1919, Ithaca, New York.
Crerar Library, The John, 1909-1939, Chicago, Ill.
Detroit Public Library, 1890-1920, Detroit, Mich.
Georgia State College of Agriculture, Library, 1915-1945, Athens, Georgia.
Georgia State University Horticultural Dept., 1908-1938, Urbana, Ill.
Iowa State College Library, 1902-1932, Ames, Iowa.

Iowa State Horticultural Library, 1892-1922, Des Moines, Iowa.
Kansas State Horticultural Society, 1897-1927, Topeka, Kansas.
Maine State Experiment Station Library, 1906-1936, Orono, Maine.
Maine State University Library, 1909-1939, Orono, Maine.
Maryland Agricultural Experiment Station Library, 1905-35, College Park, Md.
Massachusetts Agricultural College Library, 1910-1940, Amherst, Mass.
Massachusetts Fruit Growers' Ass'n, 1911-1941, Marlboro, Mass.
Michigan Agricultural College Library, 1872, East Lansing, Mich.
Minnesota Agricultural Experiment Station Library, 1899-29, St. Anthony Park.
Mississippi State Agricultural College Library, 1900-1930, Agri. College. Miss.
Missouri Fruit Experiment Station, 1901-1931, Mountain Grove, Mo.
Missouri State University Library, 1898-1928, Columbia, Mo.
Missouri State Horticultural Society, 1897-1927, Columbia, Mo.
Montana State Board of Horticulture, 1911-1941, Missoula, Mont.
Montana Experiment Station Library, 1901-1931, Bozeman, Montana.
Nebraska State University Library, 1914-1944, Lincoln, Neb.
New Hampshire Agricultural Experiment Sta., 1910-1940, Durham, N. H.
New Hampshire State Library, 1901-1931, Concord, N. H.
New Mexico A. & M., College Library, 1901-1931, Mesilla Park, N. M.
New York State Experiment Station, 1900-1930, Geneva, N. Y.
New York State Library, 1900-1930, Albany, N. Y.
North Carolina College of Agriculture, 1908-1938, W. Raleigh, N. C.
North Carolina Dept. of Agriculture, 1907-1937, Raleigh, N. C.
Ohio State University Library, 1912-1942, Columbus, Ohio.
Ohio Agricultural Experiment Station, 1889-1919, Wooster, Ohio.
Ontario Agricultural College Library, 1902-1932, Guelph, Ontario, Canada.
Oregon Agricultural Experiment Station, 1907-1937, Corvallis, Oregon.
Oregon State Agricultural Experiment Station, 1912-1942, Talent, Oregon.
Purdue University Experiment Station, 1912-1942, Lafayette, Ind.
Purdue University Library, 1912-1942, Lafayette, Ind.
Rhode Island Experiment Station Library, Kingston, R. I.
Riverside Public Library, 1915-1945, Riverside, Cal.
Sapporo Agricultural College, 1904-1934, Sapporo, Hokkaido, Y. Hoshino, Japan.
Texas Agricultural College Library, 1906-1936, College Station, Texas.
Vermont Agricultural Experiment Station, 1906-1936, Burlington, Vermont.
Vermont Horticultural Society, Burlington, Vermont.
Virginia Polytechnic Institute, 1907-1937, Blackburg, Virginia.
Washington Agricultural College Library, 1907-1937, Pullman, Washington.
West Virginia Agricultural Experiment Station, 1913-1943, Morgantown, W. Va.
West Virginia University Library, 1913-1943, Morgantown, W. Va.
Wild & Brothers, James B., 1904-1934, Sarcoxie, Mo.
Wisconsin State University Library, 1904-1934, Madison, Wis.
Worcester County Horticultural Society, 1911-1941, Worcester, Mass.
Wyoming State University Library, 1898-1928, Laramie, Wyoming.

## SOCIETY MEMBERSHIPS

American Association of Nurserymen.
Georgia State Horticultural Society.
Montana State Horticultural Society.
Wisconsin State Horticultural Society.
Western Washington Horticultural Association.
Indiana State Horticultural Society.
Pomological and Fruit Growing Society of Quebec.
Maryland State Horticultural Society.
Ohio State Horticultural Society.
New York State Horticultural Society.

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