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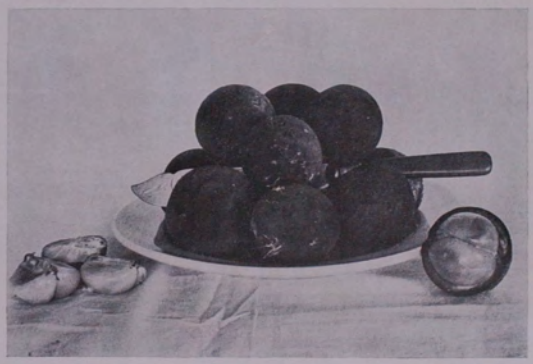
Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

THE IDEAL SCRAP BOOK

LANSIUM DOMESTICUM. Variety known as the langsat. From photograph by Mr. F. W. Popenoe, Penang, 1912. For description see text of this bulletin.



LANSIUM DOMESTICUM. Variety known as the duku or doekoe. From photograph by Mr. F. W. Popenoe, Singapore, Straits Settlements, 1912. For description see text of this bulletin.

March 12, 1911.

Los Angeles Sunday Times
MAGAZINE.

The Avocado.

THE avocado (Persia gratissima) is a native of tropical America, from Mexico to Peru and Brazil. It was cultivated and highly esteemed by the Indians when this continent was discovered by Columbus. Since the time of Columbus, the avocado has spread from its home in America entirely around the world, within the tropics. Not until recently, however, has it been cultivated to any extent within the United States. Being strictly a tropical fruit, its culture in this country is limited to the so-called frostless areas in Florida and Southern California. While as yet not grown on a commercial scale here, the number of trees being set out every year is increasing rapidly, and it is probable that within the next few years small plantations of them will be set out for commercial purposes in the warmest portions of this part of the State.

There is a rapidly-growing demand for the fruit in all the large cities and such high prices are realized, that the avocado should be one of, if not the most profitable fruits to grow for market.

In this country, the avocado is often, and in fact, generally, called the "alligator pear." This designation is not only misleading, but incorrect, as the avocado in no way, except in form, resembles the common pear. The term "aHigator" is probably a corruption of "avocado" and is incorrect. "Alligator pear" is much easier to remember than "avocado," and this probably accounts for the use of that name in this country. It is to be hoped that the use of the misnomer will be done away with before the fruit comes into extended use, as its general use would lead to much confusion. "Aguacate," the Spanish name of the avocado, is used to some extent in the United States, especially in those States which border on Mexico.

Apart from being a very valuable fruit, the avocado is of great value as an ornamental tree, and as such is worthy a place in every garden. The tree grows to an ultimate height of forty or fifty feet, and is generally spreading in habit. The branches are so densely clothed with leaves that the sun's rays rarely penetrate the foliage. Its glossy green leaves, symmetrical shape, and dense foliage, combine to make it the equal of many ornamental trees grown in Southern California gardens.

Avocados are usually divided into two classes or types, the Mexican and the South American. The principal difference between the two is in the character of the fruit, but they can also be distinguished by the taste of the leaves. The leaves of the Mexican type have a distinct flavor of sassafras or anise, which the leaves of the South American type do not possess. In mature trees, the foliage is generally broader and smoother in the South American, but the foliage of each is so variable that it is hard to distinguish between them by foliage alone. Unless in fruit the only sure way to distinguish between them is by the taste of the leaves. The size of the leaves of both types varies greatly. On the average the leaf of the Mexican type is shorter and not so broad as that of the South American.

The leaves of both types [illegible] varying from acute to [illegible]

gins are always smooth. The upper surface of the leaf is glossy green, with the veins depressed, and the lower is glacious, with the veins raised. In the young trees the bark is green, tinged with red or brown, and sometimes there are numerous brown dots on it. As the tree grows older, the bark becomes a grayish brown, and remains that color. The bark is smooth on the young wood, but as the wood becomes older the bark becomes somewhat rough.

The flowers, which are inconspicuous and about three-eighths of an inch in diameter, are perfect and are borne in auxiliary racemes near the ends of the branches. The corolla is wanting and the calyx are all of equal length and greenish-white in color. The stamens are nine, and the ovary one-celled. The flowers are produced in early spring and usually remain on the tree for several weeks. If a heavy frost occurs at the time of blooming it is liable to ruin the crop for that year, by freezing the blossoms. The Mexican type is less liable to injury by frost than the South American, and it is only occasionally that a crop is ruined in Southern California.

In their natural state no two avocado trees produce fruits exactly alike. The avocado does not come true from seed, and this fact has resulted in there being about as many different kinds of avocados as there are trees. The fruits vary in form from globular to long and slender, in diameter from one to six inches, and in weight from two ounces to three pounds. In color they range from green through various shades of brown and dull red to purplish-black.

All avocados can be classified as belonging to one of two forms, the South American or the Mexican. The former is large, and is usually globular or pear-shaped. The outer covering of the fruit is thick, tough and granular. The seed is large, often an inch and a half or two inches in diameter. The Mexican type is usually smaller than the South American and varies greatly in form. Some are egg-shaped, some pear-shaped, some bottle-necked, and some exceedingly long and slender. The outer covering of the fruit is usually thin and membranous, this being the main point of difference between the two types. The seed is smaller than in the South American type and is long and slender in some forms, and nearly spherical in others.—[F. W. P., in Pacific Garden.

The Avocado in Southern California

BY F. W. POPENOE
PASADENA, CALIFORNIA

That the avocado will succeed in Southern California has been proved conclusively by the seedlings planted fifteen to twenty-five years ago which are now bearing, and by more recent experiments with budded trees; and the establishment of an avocado industry in the immediate future is assured. As to whether we shall proceed at once to the production of the best fruits or whether the loss of much money and time with the incident disappointment to all concerned shall be caused by the planting of inferior varieties is the vital question at this moment. It is to the solution of this problem that the earnest endeavor and careful efforts of all our nurserymen should be directed, and it is in the hope that some help may be given in eliminating wasteful efforts that this article is written.

For centuries the avocado has been grown in Mexico and other tropical countries, propagated only by seed. Like other fruit trees grown from seed, it comes true in but a very small percentage of cases. This has led to the existence of a wide range of varieties. All avocados so far fruited in California are these mere chance seedlings, most of them of indifferent value and not worth propagation on an extensive scale. There are many varieties of good size and flavor, fruiting in Mexico and other parts of the tropics, which will doubtless succeed here as well as the smaller and inferior ones. Some of these Mexican varieties are of such superior quality as to leave nothing to be desired.

It is therefore manifestly the part of wisdom for California planters of this fruit to proceed with intelligence and accept nothing but the best. Attracted by prospective large returns some investments of a doubtful character are already being made. There is really no excuse for this.

Investigation and care will lead anyone in the right path. There will be no demand for seedling or inferior fruits once a superior avocado is to be found plentifully in our markets. Nor need there be delay or groping in the dark for these superior varieties. At our very door lies a boundless experimental garden in which for centuries the avocado has been grown, where countless varieties have originated, and where now are growing hundreds of thousands of trees from among which we have only to select the best.

By taking advantage of this opportunity California can obtain in a comparatively short time the choicest varieties, which it would take years of time and a large expenditure of money to produce by the ordinary methods of plant breeding, carried on here.

The results presented in this preliminary paper on this subject have been worked up in the Biological Laboratory of Pomona College, and acknowledgments are here made for the facilities placed at my disposal there and the constant and kindly assistance extended to me.

TYPES GROWN IN CALIFORNIA

Broadly speaking, the avocados which have fruited here so far may be divided into two classes; those of Mexican origin, which include all the smooth and thin skinned varieties, and those of Guatemalan origin, which are easily distinguished by their very thick skins and rough exterior. This is not saying, of course, that all avocados can be divided into these two classes.

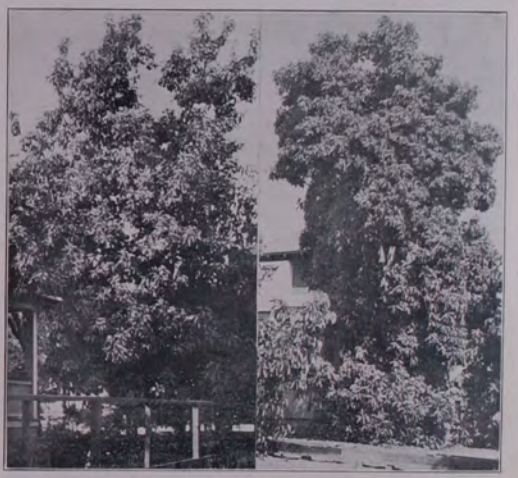


Figure 1. At left the parent tree of the Blake Avocado, growing at Pasadena, age eight years; this tree would be of good form if topped. At right, parent tree of the Walker Avocado growing at Hollywood, age fourteen years, the tree showing a very bad form for a cultivated Avocado.

Of the Mexican type many trees may be found scattered all over the southern end of the state, most of which have been grown from seed obtained from Monterey and other points in northern Mexico. The famous Chappelow tree is the oldest and best known of the lot.

Most of these Mexican varieties produce fruits of small size, dark purple in color, but of good quality, and are preferred by many to the large green

fruits, it being the belief that they are richer and of better flavor than the larger varieties.

They are also somewhat hardier than the larger varieties and would probably be valuable in locations where the latter would not thrive.

For home use these varieties will always be desirable, but as a commercial fruit they are out of the question altogether. They are too thin skinned to stand shipment, and would probably not take at all in American markets in competition with the larger, thick skinned fruits.

A few varieties of Mexican origin and green in color are now grown here which are larger than the purple varieties, but these also are thin skinned and of little more value commercially than the purple ones, although the quality is all that could be desired in some cases. To be profitable commercially, the fruit will have to be thick and tough skinned, so as to stand shipment, and as yet no Mexican variety which has fruited here has this quality.

Outside of the Mexican varieties the only other type known to have successfully fruited here is the Guatemalan. The trees of this type are probably all descendants of the old Miller tree, the seed of which was brought from Guatemala and planted at Hollywood over twenty-five years ago. Numerous seedlings have been grown from this tree, several of which are now bearing. The Walker tree is the best known of these, and is the most prolific tree known here, its crop every year running into the thousands. From the behavior of these trees it seems certain that this type is admirably adapted to this climate, a fact of the greatest importance to the future of the industry here.

In his bulletin on the avocado, Collins speaks of the avocados of Guatemala as forming a very distinct group, the most peculiar characteristic of which is the unusual thickness and toughness of the skin, and he considers them the most promising of all types from a commercial standpoint. It is particularly fortunate, then, that this type has been tested here and its adaptability proved, for the way has been paved for the introduction of numerous forms of the type with practical assurance of success. Another noteworthy point in regard to this type is the fact that all of the local trees are spring bearers, this point alone making them of great value. Being spring bearers their blooming season is considerably later than the fall bearing Mexican sorts, so that danger of the crop being destroyed by late frosts is almost eliminated. Already we have several varieties of this type that are well worth growing, of which the Lyon is the most promising, it being the finest avocado yet produced in California, of good size and excellent quality. This variety has just come into bearing, and therefore is little known as yet, but its prolificacy and good qualities promise to place it in the lead of the local varieties. The trees of the Guatemalan type are easily distinguished from those of the Mexican type because more spreading, particularly when young, and the leaves are more lanceolate.

It has been the general impression that the South American type which is grown in Florida would not succeed here, but this remains to be proved.

Budded trees of many Florida varieties are being tested in Southern California, and the Bureau of Plant Industry expects to send out a large number this spring for trial. One large tree at Sherman which was worked over to the Trapp variety flowered this year for the first time, and numerous other trees are becoming old enough to bear and will be watched with interest for the next few years. This type is certainly more tender than the Mexican, but the past few winters have shown that some varieties at least will stand our average winter temperature without injury. Future experience will likely confirm the present belief that this type will succeed in many locations here.

Numerous seedlings of Hawaiian, Cuban, and West Indian varieties have been grown, but as yet these have not come into bearing. Budded trees will have to be tested before anything definite can be said of their adaptability.

It has been stated that the avocado would not succeed in the hot and dry

Figure 2. At left the parent tree of the Ganter Avocado growing at Whittier, Cal., age eight years; at right the parent tree of the White Avocado, growing at Santa Barbara, age twelve years.

interior parts of California. Trees are known to have grown without injury as far into the interior as Redlands and Riverside, and have fruited heavily at Pomona and San Fernando, and should be tried at Imperial.

PROPAGATION

BY SEED. This is the simplest method, and the one most practiced in California up to the present time. The seeds of most varieties are obtainable during late summer and autumn, and should be planted as soon after removal from the fruit as possible. It has been found to hasten germination greatly if the seeds are buried in moist sand or sawdust for a period of two to four

weeks before planting. During this time they should be occasionally examined, and when they show signs of germinating they can be taken out and planted in pots. After this treatment they will start to grow very promptly and it has the added advantage that only seeds that are sure to grow are planted, and no labor is wasted. For most seeds a four inch pot is large enough. The seeds should be placed in the pot pointed end up, or in the case of the round seeded varieties, the end toward the stem of the fruit, and about one-fourth of the seed left exposed above the surface of the soil. A good rich soil is essential to the best development of the young plant, and should be kept thoroughly moist, but care should be exercised to avoid standing water in the pots, as this is fatal to either the seed or the young tree. While the young trees should be grown in a warm situation, the direct rays of the sun should be avoided. If the seeds have not been buried in moist sand before planting they will often be slow in germinating, especially if not grown under glass. Many of the seeds planted in the fall in a lath house do not come up until the following spring. After the young trees have made a growth of eight to twelve inches they should be shifted into larger pots or cans, if it is desired to carry them on in this way, or set out in the nursery to be grown until of suitable size to bud.

BY BUDDING.—It is only during the past season or two that much attention has been given to budding the avocado in California, although previously a few nursery-men most interested in this fruit had tried it. Having no experience of their own in the budding of this particular tree, most of those who have budded during the past year or two have simply applied the methods they would use for citrus fruits, while a few others have followed the instruction given in various publications by those who have experimented in Florida. In all cases the results have proved the budding of this fruit to be no more difficult than that of the citrus fruits, and when a little more experience has been acquired the operation will be performed with as much assurance of success as with the orange.

For commercial purposes plants are grown in pots until about twelve inches high, when they are set out in nursery rows three and one-half to four feet apart, and fourteen inches apart in the rows. Here they are grown and budded and allowed to remain until of saleable size, when the trees are balled, or transplanted into pots, and allowed to become established before being sold.

The method of budding is practically the same as used for the orange. In regard to such points as the best size of stock and buds, and season for carrying on the work, there has, however, been some uncertainty.

Experiments have been carried out locally on stocks ranging in diameter from about one-fourth of an inch to over one inch, with budwood of all sizes, from the young and tender tops to well matured wood of the previous season's growth. Results lead to the conclusion that for small stocks, such as will be obtained during the first summer's growth of the seedling tree, buds from young wood of the current season's growth are the only ones which will give good results. On older trees, mainly two-year-olds, the

buds from older wood seem to take better, but are liable to drop after taking, leaving a blind bud.

The experience of P. J. Wester, in charge of the avocado investigations of the Bureau of Plant Industry, is unquestionably the most valuable to be had on this subject. Under date of January 4, 1911, he writes me as follows: "In 1906 I published an article in the Florida Agriculturist that has been reproduced in many papers, but which does not now wholly represent my views on the subject. The stock should be the size of a lead pencil, in vigorous growing condition with sap flowing freely, and young budwood,

Figure 3. Parent tree of the Harmon Avocado, growing at Sherman, Cal. This tree is thirteen years old, and shows a fine orchard form for an Avocado.

i. e., that from the current year's growth, with well developed buds, used. Do not use old and hard budwood, as such buds after taking frequently drop. Cut the buds large, and cover entirely with waxed tape. The last point may not be so important in California's dry climate. Continued experimentation since I wrote the above mentioned paper shows that budding may be practiced any month of the year, provided the stock is in condition, though for nursery practice I would not bud in August, September, October or November."

Regarding the best season to bud, it seems to be the concensus of opinion here that October and November, which are mentioned by Mr. Wester as undesirable months, are as good a season as any, if not the best of the whole year. This is probably owing to the climatic conditions of Southern California being different from those of Florida.

Three weeks after insertion the buds will have taken and the trees should be lopped back to several inches above the bud. The buds will then start into growth, and when a growth of eight to twelve inches has been made the stock may be trimmed back to the bud.

Edgar Harman, of Sherman, has done considerable experimental budding and what he says will be of value to those contemplating doing this work. The seeds are started under glass and as soon as the plants are two inches high they are set in pots and placed in a protected place in the open. When they have grown to the diameter of three-eighths to one-half of an inch, they are budded. Mr. Harman considers that this operation can be performed successfully any month of the year except July and August. Young and tender budwood is used and the buds cut from three-fourths to one inch long. Waxed cloth is used for wrapping, and the buds are not wrapped very tightly. As soon as the buds swell, which should be in about three weeks, the top of the stock is lopped over at about the fourth leaf above the bud, and a little later on it is cut clear off. When the bud has started into growth the top is cut back to a level with the bud. The sap must be flowing freely at the time of budding to insure success.

C. P. Taft of Orange has probably had more experience in growing and budding the avocado than any other person in California. He says: "I am inclined to regard the months of October and November as the best for budding, though I think there is a short period in the spring when considerable success can be had. The buds I put in my three-year-old orchard last fall have done well and are making a fine growth. About 25% of the buds on stock in cans succeeded. Those put in during the warm summer months were an almost total failure."

In April, 1909, D. W. Coolidge of Pasadena budded about 150 two-year-old seedlings growing in the open ground at Hollywood. The buds were taken from well matured wood of the previous year's growth, and waxed cloth was used for wrapping. Fully 90% of these buds took, but quite a number dropped their buds after having taken. However, fully 75% of the buds inserted developed into trees. Mr. Coolidge has made several attempts to bud stock grown in cans, but with no success, probably because trees thus grown are not sufficiently vigorous.

William Chappelow of Monrovia, owner of the original Chappelow tree, states that he proceeds exactly as in budding citrus fruits, and has budded at all seasons of the year with about equal success.

Large avocado trees which are unproductive should be cut back and budded over to some good variety. The method is simple, and as described has been practiced very successfully by Mr. Harman. The large limbs are all cut back close to the trunk, and the cut ends covered with white lead to

prevent bleeding. In a short time numerous sprouts will make their appearance; all of these should be kept cut off but three or four of the most promising, selected on different sides of the tree so as to form a good head. In a short time they will be large enough to bud, and should be budded in the same way as small seedlings. The wraps must be loosened every four or five days, as the sprouts make a very rapid growth. After the buds have made a growth of several inches the stocks may be cut back and the buds allowed to develop into the new tree. In two years time a good sized head will be obtained.

Figure 4. Avocado tree of the Mexican type growing at Redlands, Cal., showing what the Avocado may become when not pruned or cut back.

The best material for budding tape is cheap cotton cloth which will tear easily. The method of preparing it is described by Mr. Wester as follows: "Rip up the cloth in strips of desired widths, say six inches, and roll these tightly on stout iron wire as long as the width of the strips. Several strips may be rolled on until the roll is one inch in diameter; tie a string around the roll at each end to prevent unrolling while being boiled in the wax. A

good wax is made by boiling together two pounds beeswax, two pounds rosin, and half a pound of good lard; when in boiling state put in the rolls of cloth and let them remain for fifteen minutes, when they are taken out and cooled before being stored away. The iron wire is more desirable than sticks of wood, as the weight of the wire will keep the roll below the surface of the boiling mass. Another advantage in using the wire is that if the sticks are not quite dry the water, as it is converted into steam, will cause the contents to boil over."

INARCHING has never been practiced in California, but J. L. Hickson, of Miami, Florida, a large and successful grower of the avocado, states that he propagates entirely by this method, as he considers it produces a stronger and better growth than budding. However this may be, the method is slow and laborious, and trees cannot be produced in sufficient quantities to make it commercially practicable here.

GRAFTING has been performed successfully in a few instances, but has not been attempted to any great extent as yet.

CUTTINGS have been very successfully rooted by being placed in clear sand in a lath house, but it is doubtful if this method of propagation produces as strong a plant as the others.

ORCHARD PLANTINGS

It is only within the last year or two that orchard plantings of the avocado have been made in Southern California, and then only in very small acreages, but the next few years will see the territory devoted to the culture of this fruit on a commercial scale greatly increased.

The trees may be planted at the same distance apart as orange trees, or if space is available at a somewhat greater distance. Budding seems to dwarf the tree, and budded trees will require much less room than seedlings. In either event the trees should not be allowed to grow to an unlimited size, but should be pruned like deciduous fruits, allowing only the strongest branches to develop and form the head of the tree, and all weak and undesirable growths cut out each year. The top should be kept cut back to facilitate picking the fruit, and not allowed to grow to an unlimited height as has been done with all the seedlings grown here.

Transplanting should be done in early spring, before the trees have started into new growth.

During the first year or two of its growth, the tree is more tender than when larger, and in locations subject to heavy frosts should be protected during the winter by some covering. Palm leaves are used for this purpose if they can be obtained in sufficient quantities, or a frame can be constructed of lath and covered with burlap or cheesecloth. The danger from frost, however, lies not so much in the possibility of injury to the trees themselves, as in the destruction of the crop through freezing of blossoms of early flowering varieties. To avoid this, late blooming varieties may be planted, such as those of the Guatemalan type, which bloom so late in the spring as practically to eliminate all danger from this source. It is only occasionally

that the Mexican varieties are caught, but as the crop is practically certain to be lost, if a very heavy frost occurs during the blooming season, the only safe way will be to plant late blooming varieties.

The tree requires about the same irrigation as the orange. Insufficient irrigation will result in small fruit.

In selecting varieties for planting on a commercial scale, there are a number of points which should be kept in mind. Fruits which ripen during midwinter will command the highest prices in the markets, and there will probably be the greatest demand for avocados at this season of the year. As

Figure 5. At left a Mexican seedling Avocado, eighteen months from seed; at right a budded tree of the South American type, three years from the bud and grown in California.

to size of fruit, there is no advantage in having the very largest. While a two pound avocado is a regal fruit, for practical purposes one of half that size is better. Quality should be one of the most important factors in choosing a commercial fruit, and other desirable points are prolificness, a smooth, thick and leathery skin which will stand shipment, good keeping qualities, and a small seed, completely filling the cavity, as a loose seed pounds the walls in transit, causing early decay. We must, however, have still smaller varieties for cheaper trade, and summer varieties for local consumption, and we already have a good assortment of varieties to choose from for these purposes.

THE FUTURE OF THE AVOCADO IN SOUTHERN CALIFORNIA

It may seem a strong statement to say that within the next quarter of a century the avocado will rank with the orange as a commercial fruit in Southern California. But there is a strong foundation of fact underlying this statement and the reasons seem sufficient, indeed, to warrant the belief that it may become even more important.

First, the adaptability of the avocado to this climate has been proved beyond the possibility of a doubt. There are one hundred or more trees now in bearing, ranging in age from three to twenty-five years, scattered over the southern end of the state from the cool sea coast to the hot and dry interior. These trees embrace a number of widely different types, sizes and characters of fruits. This test of adaptability ought to be sufficient to satisfy the most skeptical.

Second, the food value of the fruit is the main basis for the above statement. It presents in a most easily digested and assimilated form as high as 12 to 18% of fat, which places the fruit in a class with the staple food products, instead of being a mere luxury as is the case with many fruits. The taste for the avocado is not always acquired upon first trial, but a few repetitions are usually sufficient to make any one extremely fond of it. The price is now prohibitive to most, and only a few have had opportunity to acquire the taste, but as the production becomes greater and the price lower, an almost unlimited demand will be created throughout the whole country. It is, of course, universally known as one of the most important staple fruits throughout the tropics and subtropics of the world.

Culture of the fruit in this country will be restricted to limited areas in Florida and Southern California, and consequently the danger of overproduction will be practically eliminated. As rapidly as price and production permit, the avocado will become an important and indispensable part of the daily food of the majority of the people of the United States.

LIST OF VARIETIES

known in California, arranged according to general characters and possible usage:

For winter fruiting: Lyon.

For late fall fruiting: White, Ganter.

For late summer and early fall fruiting: Harman, Fowler, Chappelow, Blake.

For spring fruiting: Walker, Miller.

Large varieties: Lyon, Miller.

Small to medium varieties: White, Walker, Harman, Ganter, Fowler, Chappelow, Blake.

Best varieties for shipping: Lyon, Walker, Miller.

Best varieties for local use only: Ganter, Chappelow, Fowler, Blake, Harman.

Most prolific varieties: Walker, Ganter, Lyon.

DESCRIPTION OF VARIETIES

The following list contains not only those varieties of local origin which have been named up to the present time but is a complete list of all the named varieties in cultivation of which it has been possible to obtain descriptions.

With the increasing number of varieties being propagated every year, it will be absolutely essential to any exact knowledge of this subject that the introducer of any variety shows sufficient differences between the new variety and all previously known ones to warrant giving it a name.

Better Known Varieties

PROVISIONAL KEY TO THE VARIETIES

This key is not to be considered as anything definite for the determination of varieties. It is merely intended to point out the distinguishing characters of the varieties described and supplement the descriptions.

A. Skin smooth.
  B. Towards base broadly rounded; general shape round to oblong.
    C. Skin thick.
      D. Roundish oblate to oblate pyriform; seed more or less loose in cavity ..... TRAPP
      DD. Round to oval; seed tight in cavity ..... SINALOA
    CC. Skin thin; shape oval to oblong.
      D. Averaging more oblong; flesh very rich and buttery; skin glossy; seed not compressed ..... FOWLER
      DD. Averaging more oval; flesh more watery, and not buttery; skin not glossy; seed compressed ..... GANTER
  BB. Towards base more or less tapering, pear shaped, or bottlenecked.
    C. Black, or dark or reddish purple when ripe.
      D. Slender pear shaped, or even banana-shaped.
        E. Skin thin; seed tight; becoming almost black when ripe ..... CHAPPELOW
        EE. Skin medium thick, seed loose; purple with scarlet streaks ..... FAMILY
      DD. Stout pear-shaped; reddish purple; skin medium thick ..... WESTER
    CC. Red mottled with yellow; skin thick; seed tight in cavity ..... CARDINAL
    CCC. Green principally when ripe, in ground color at least.
      D. Without distinct neck; seed loose in cavity; skin thin ..... HARMAN
      DD. With a more or less distinct neck.
        E. Skin thick and tough.
          F. Weight up to 3.5 pounds ..... POLLOCK
          FF. Weight up to 1.5 pounds ..... LANDON
        EE. Skin thin.
          F. Color clear green.
            G. Size small ..... BLAKE
            GG. Size large ..... QUALITY
          FF. Color green, washed with purple; size small ..... WHITE
AA. Skin rough, usually thick.

B. Towards base broadly rounded; pedicel inserted on one side; color dark green ..... MILLER
BB. Towards base more or less tapering, pear-shaped, or bottlenecked.
C. Color deep, dark green; weight up to 1.3 pounds.
D. Length about 4 ins.; pedicel inserted at center; flesh thin ..... WALKER
DD. Length about 6 ins.; pedicel inserted on one side; flesh thick ..... LYON
CC. Color pale greenish yellow; weight up to 2 pounds ..... RICO

Trapp

(Figure 6 A)

Form roundish oblate to oblate pyriform; size medium to large; cavity regular, small, shallow, with gradual slope, somewhat furrowed; stem stout;

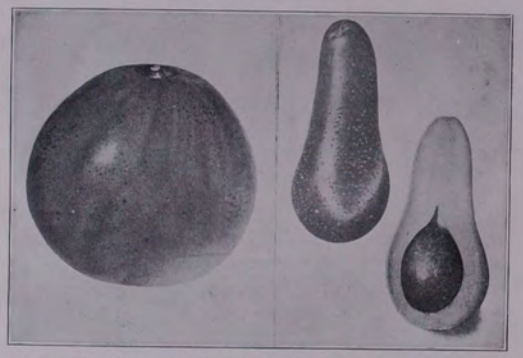


Figure 6. At left the Trapp Avocado and at right the Chappelow, as originally figured in Year Book U. S. Dept. Agriculture.

apex slightly depressed; surface smooth and undulating, with numerous brownish dots, some of which are indented; color pale green, with faint and indistinct pale yellow stripes; skin very thick and tough, separating readily from the flesh; flesh fairly thick, firm, but smooth and rather oily in texture, ranging from pale green near the skin to greenish yellow next the seed cavity; flavor mild, pleasant; seed large, oblate, with loose seed coats, and loose in the cavity, sometimes germinating in the fruit when allowed to remain late on the tree, though, so far as observed, without injury to either texture or flavor of flesh; quality very good; season from October 1 to January in South Florida, occasional specimens having remained on the tree in good condition until March.

The tree is reported to be a fairly vigorous grower and very productive.—1906 Yearbook U. S. Dept. of Agriculture.

Sinaloa

(Figures 7 and 8)

Form oval; size medium to large; stem stout; surface smooth, undulating; color light green with numerous large, irregular, brownish dots; skin thick

Figure 7. The Sinaloa Avocado, natural size.

and very tough; flesh rich yellow in color, shading to light green near the skin; texture smooth and very buttery; flavor very rich and nutty; quality very good; seed large, oblate, tight in cavity; season September to October. Originating in Mexico and now in our own plantations.

Fowler

Form oblong to oval; dimensions, length four and one-fourth inches, diameter three and one-fourth inches; apex a dot; base flattened slightly; cavity

regular, small and shallow, flaring; pedicel stout; surface smooth; color light green, with numerous small, rounded, yellowish dots; skin very thin, glossy, adhering closely to flesh; flesh yellow, changing to yellowish green near skin; texture smooth and buttery; flavor very rich and nutty; fibre slight; quality very good; seed medium large, oblong-conical, tight in cavity; season July to October at Pasadena, California.

Tree is of vigorous growth, upright, round topped, with abundant healthy foliage. Rather shy bearer. This is originally described here. A seedling of the Blake, and very similar to the Ganter.

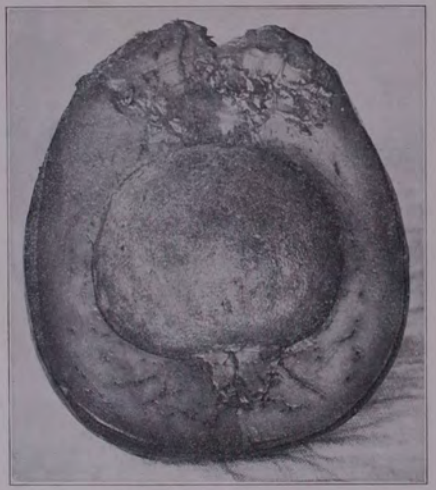


Figure 8. The Sinaloa Avocado.

Ganter

(Figure 9 A)

Form oval to oblong; dimensions, length two and one-half to four inches, diameter one and three-fourths to two and three-fourths inches; apex slightly depressed; base flattened; cavity regular, small, rounded or flaring, slightly furrowed; pedicel very stout; surface smooth, undulating; color

light green, with numerous small, irregular yellowish green dots; skin thin and tender, adhering closely to the flesh; flesh yellowish cream color, changing to pale green near the skin; texture smooth but not very buttery; fibre very slight; flavor rich, nutty; quality very good; seed large, oblong-conical, somewhat compressed, about 25% loose in the cavity; seed cavity medium large; season November to December at Whittier, California.

Tree is a vigorous grower and rather spreading in habit, with abundant healthy light green foliage. A very prolific bearer. Here first described. Very similar to the Fowler.

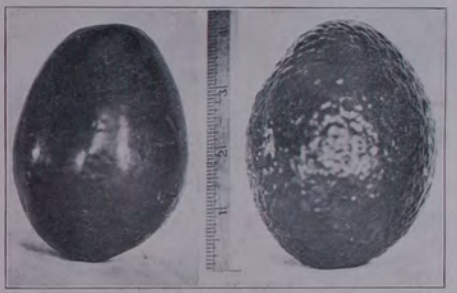


Figure 9. At left the Ganter Avocado, grown at Whittier; at right the Miller, grown at Hollywood.

Chappelow

(Figure 6 B)

Form oblong, slender pyriform or "bottlenecked"; size medium to large for the Mexican type; cavity small, shallow and wrinkled; stem stout; surface undulating, smooth, glossy; color dull purple, with reddish brown dots; apex a mere dot, skin very thin, tender, adhering closely; flesh pale greenish yellow, buttery; seed large in proportion to size of fruit, roundish conical, filling internal cavity; flavor pleasant, though less rich than the best varieties of the West Indian type. Season July to October at Monrovia, California.

The tree is a vigorous, rather diffuse grower, with slender wood. It is productive, although being an early bloomer it is sometimes caught by frost.—1905 Yearbook, U. S. Dept. of Agriculture.

The fruits produced by the original tree show considerable variation in form, and Mr. Chappelow states that they are becoming larger as the tree grows older.

Family

A strong growing tree of spreading habits, being an abundant bloomer and moderate cropper. Blooms in late February and during March. Ripens fruit during July, August and September, and into October.

Shape of fruit variable, from pear-shaped to long-oblong, nearly banana-shaped; size, variable from 6 by 3½ to 3½ by 1½ inches; color purple, with scarlet streaks, very attractive; skin medium thick, smooth; stem large; meat yellow, free from fibre; flavor good, seed small, loose in cavity.—*Rolfs.*

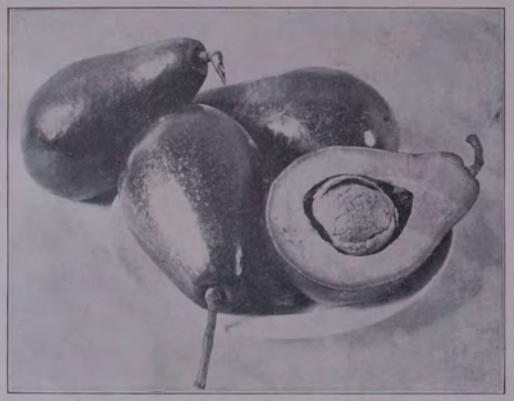


Figure 10. A common Cuban type of large purple Avocados, apparently the same as the Wester.

Wester

(Figure 10)

Form roundish or obliquely pyriform with short neck; average weight 650 grams; skin medium thick, smooth and glossy, adhering to meat; color reddish purple; meat greenish next to skin, rich yellow toward center of fruit; flavor good, rich and buttery; seed medium large, usually loose in cavity; season October.

This variety is of vigorous growth and very prolific.—Bureau of Plant Industry.

Cardinal

Form bottlenecked; skin thick, red, mottled with yellow; flavor very good, a trifle watery; seed small, filling cavity; season October in South Florida.—*Wester.*

Harman

(Figure 11 A)

Form irregularly oval, slightly compressed, and flattened obliquely at the apex; dimensions, length three to four and one-half inches, diameter two to three and one-half inches; apex a dot; base tapering somewhat and slightly flattened; cavity regular, small, shallow, flaring, and somewhat furrowed, calyx persistent in the form of 6 divisions surrounding the stem base of fruit; pedicel stout, insertion usually one sided; surface smooth, glossy;

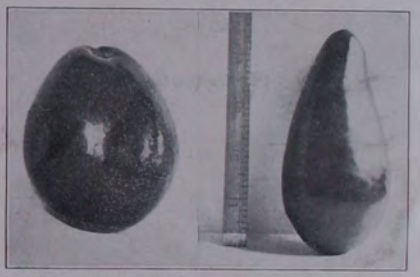


Figure 11. At left the Harman Avocado grown at Sherman, Cal.; at right the White Avocado grown at Santa Barbara.

color light green, washed with reddish purple, with numerous large, irregular greenish yellow dots; skin thin, adhering closely to the flesh; flesh greenish yellow, changing to yellowish green near the skin; texture smooth and very buttery; fibre practically none; flavor very rich and nutty; quality very good; seed very large, roundish conical, often loose in cavity; seed cavity very large; season October to November at Sherman, California.

Tree is upright, round-topped, and of fairly vigorous growth. Foliage rather scant, but healthy. Moderately prolific. This is the first description of this variety.

Pollock

Tree moderate grower, heavy bearer, profuse bloom, limbs rigid; blooms in February and March; ripens in September and October. Upright grower with strong central stem.

Fruit pear-shaped, being about six and one-half by four and one-half inches; weight up to three and one-half pounds; color greenish; rind medium; meat yellowish; flavor good; seed medium.—*Rolfs.*

Landon

Form broad pyriform or bottlenecked; size medium to large, average weight one and one-fourth pounds; surface smooth, undulating; color light green; skin thick and tough, separating readily from the flesh; flesh rich yellow, changing to yellowish green near the skin; texture very smooth and buttery; flavor rich and melting; quality very good; seed medium large, broadly conical, tight in the cavity; season September to October in South Florida.

Quality

Form bottlenecked; size large; color green; skin thin, smooth; quality very good; seed medium large, loose in cavity; prolific bearer; season September in South Florida.—*Wester.*

Blake

Form slender pyriform, bottlenecked; dimensions, length three and one-half to four and one-half inches, diameter one and three-quarters to two and one-fourth inches; apex slightly protruding to form a point; base very slightly flattened; cavity regular, small, very shallow and flaring; pedicel stout; surface smooth, slightly undulating; color light green with numerous small, round, greenish yellow dots; skin very thin, adhering closely to the flesh; flesh creamy yellow, changing to yellowish green near the skin; texture smooth and buttery; fibre very slight; flavor very rich and oily; quality very good; seed medium, conical, often loose in the cavity; seed cavity medium large to large; season September to October at Pasadena, California.

Tree upright, of fairly vigorous growth, with abundant, healthy, light green foliage. Moderately prolific. Here first described.

White

(Figure 11 B)

Form slender pyriform; dimensions, length four and three-quarters, diameter two and one-fourth inches; apex slightly protruding to form a point; base somewhat flattened; cavity regular, small, shallow, rounded, pedicel stout; surface smooth; glossy; color bright green, washed with purple, with numerous small, round, yellowish dots; skin thin and leathery, adhering closely to the flesh; flesh cream color, changing to pale green near skin; texture smooth; fibre objectionable; flavor rather watery; quality fairly good; seed conical, large, tight in cavity; seed cavity long, pointed, and wrinkled; season November to December at Santa Barbara, California.

Tree is upright, moderately vigorous, and a rather shy bearer. First described here.

Miller

(Figure 9 B)

Form oval; dimensions, length four and one-half inches, diameter three and one-half inches; apex a slight point; base rounded; cavity regular, small and shallow, flaring, furrowed; pedicel very stout, insertion usually one sided; surface very rough; color dark green, with numerous small, round, yellowish dots; skin very thick and tough, separating readily from the flesh; flesh yellowish cream color, changing to yellowish green near the skin; texture, smooth; fibre very slight; flavor fairly rich; quality good; seed large, roundish conical, tight in cavity; seed cavity large; season February to April at Hollywood, Los Angeles, Cal.

Tree is upright, vigorous, with abundant dark green foliage. Moderately prolific. Here described for the first time.

Walker

(Figure 12)

Form broad pyriform; dimensions, length four and one-fourth inches, diameter two and one-half inches; apex a dot; base rounded; cavity none; pedicel rather slender; surface very rough; color dark green, with numerous medium sized, round, yellowish green dots; skin very thick and tough, separating readily from the flesh; flesh cream color, tinged with green near the skin; texture smooth, but not buttery; flavor fair, rather watery; fibre objectionable; quality fair; seed large, broadly conical, tight in cavity; seed cavity large; season March to May at Hollywood, Los Angeles, Cal.

Figure 12. The Walker Avocado, one of the Guatemalan type, one-half natural size.

Tree is a vigorous grower, spreading in habit, with abundant, healthy, dark green foliage. Extremely prolific. A seedling of the Miller. Here first described.

Lyon

(Figure 13)

Form broad pyriform; dimensions, length five and one-half inches; diameter three and one-half inches; apex slightly depressed; cavity almost none; pedicel very stout, insertion usually one sided; surface rough, color dark green, with numerous small, irregular, yellowish or russet dots; skin very thick and tough.

separating readily from the flesh; flesh yellowish cream color, tinged with green near the skin; texture smooth and fairly buttery; flavor rich and nutty; fibre none; quality very good; seed large, broadly conical, tight in cavity; seed cavity medium large; season February to April at Hollywood, Los Angeles, Cal.

Tree is a vigorous grower, upright, with abundant, healthy foliage. Very prolific. This is the first description of this variety.

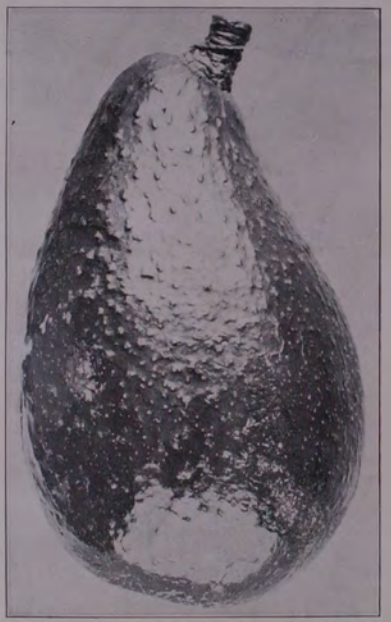


Figure 13. The Lyon Avocado, a fine example of the Guatemalan type. This specimen grown at Hollywood. Natural size.

Rico

Form rather oblong, thick necked, with oblique depressed flattening on opposite sides of both ends; average weight two pounds; skin rough; color pale greenish yellow; flesh pale yellow, with very little green near the skin; texture fine grained, firm; flavor very rich, nutty and buttery; season August to November in South Florida.—*Cellon.*

Insufficiently Known Varieties

Largo

Budwood from Mr. C. H. Matthews, who described the fruit as follows: "Egg shaped, very large, three and one-half to four pounds in weight; skin green, very thin; flavor very good; seed small; ripens in August and September."—*Wester.*

Johnstone

Budwood from Judge R. S. Johnstone, who gave the following description of the fruit: "Pear-shaped, but rather broad at basal end; skin smooth, thin; flesh yellow, almond flavored; seed large; famous as the best avocado in the Bahamas. Ripens in August and September."—*Wester.*

Blackman

Form oblong; size medium large to large; color greenish red to chocolate; skin thick and leathery; flesh delicate yellow, soft and melting; seed tight in cavity, medium large; quality good; season September in South Florida.—*Wester.*

Cyrus

Form pear-shaped to round; skin smooth, yellowish, thin, quality good; seed loose in cavity; very prolific; season September to October in South Florida. (Analysis gave 17% fat.)—*Wester.*

Sterling

Skin thick; color dark bronze red; quality good; seed filling cavity, medium large; season October in South Florida.—*Wester.*

Baldwin

Tree a vigorous grower, with strong central stem; branches rather rigid; light bloomer, but heavy cropper. Blooms in February and March. Fruit at best in August; drops in September. Ripens uniformly. Shape of fruit approaching oblong, four by five and one-half inches, not regular; color green, with a few yellowish streaks; rind smooth, thin, stem small; meat deep cream, one-fourth green, firm, flavor excellent. Seeds are rather large, firm in cavity.—*Rolfs.*

PACIFIC RURAL PRESS.

September 23, 1911

Little Known Semi-Tropicals.

Mr. F. W. Popenoe of Pasadena, as our readers already know from our publication of his writings, is making a most commendable study of semi-tropical fruits in California, and his monographs as appearing in the Journal of Economic Botany of Pomona College will not only help California growers, but give our State new standing in the advanced circles of semi-tropical pomology. He gives close attention not only to culture but to commercial outlook. His latest contribution consists of notes in the Western Empire concerning three plants which are worth better knowing:

An Avocado Experiment.—The United States Department of Agriculture has recently sent to southern California a large number of budded avocados which are to be planted by co-operators in different localities. The shipment consisted of four sets of about eighty trees each, one set going to each of the following localities: San Bernardino, Pasadena, Whittier and Altadena. These trees were propagated at the Department's Subtropical Laboratory at Miami, Florida, and contain the cream of all the Florida varieties, named and unnamed, and also desirable varieties from other parts of the world, including Guatamela, Mexico, Cuba, Hawaii, Bahama islands and Canary islands. All of the standard Florida varieties, Pollock, Trapp, Mitchell, Baldwin, Family, Webster, Blackman and Peacock are included in each set. The purpose of the department in sending out this material is to assist in the development of the avocado industry here by giving a thorough trial to the Florida varieties to determine whether they are suitable for commercial culture in southern California and also to try out types from other localities mentioned.

The Litchi.—The cultivation of the Litchi (Chinese nut) forms an important industry in China. The dried product is familiar to almost every one in California, but it is well to note that the fruit when fresh is quite a different article from the dried "nuts" so common here around the Chinese New Year. All past experiments indicate that the Litchi would be a success in the warmer portions of southern California, and grafted plants have recently been introduced with the idea of making a definite test of the proposition. A few seedlings in different localities have made a very satisfactory growth and a tree of the closely allied Longan at Hollywood has been producing regularly for a number of years. The Litchi cannot be depended upon when grown from seed, and although a number of grafted plants were introduced from China quite a few years ago none of them lived, and the only test of the tree has been supplied by the seedlings. Since the Department of Agriculture has taken the matter up and is propagating grafted trees of the choicest varieties, it is probable that the tree will become established here and a limited but remunerative industry may be developed.

The Feijoa.—For the past few years the Feijoa Sellowiana has been attracting increasing interest as a commercial possibility for all parts of California, and it has now reached the point where small plantations are being made. It is only ten years since this plant was first introduced to California, but the time has been sufficient to prove it admirably adapted to the climatic conditions of nearly all parts of the State, and to demonstrate that the fruit is of such superior quality and value as to warrant its cultivation on an extensive scale.

The feijoa is allied to the gauvas and closely resembles the latter in growth and character. The shrub grows to a six or eight-foot height, or under the most favorable circumstances, to ten or twelve feet, and is so ornamental that it would be well worthy of cultivation if it produced no fruit. The leaves are small and leathery, glossy green above and white beneath. The flowers are very attractive, the long tuft of crimson stamens contrasting brilliantly with the silvery white petals, and forming a very striking combination.

But as closely as the feijoa resembles the guavas in foliage and flowers, it far surpasses any of them in the value of its fruit. There is no doubt that an almost unlimited market could be developed for the fruit, and as it stands shipping perfectly there is no reason why feijoa culture should not play an important part in California horticulture. The fruits ripen in December, another point in their favor, as at this season the markets of the country are shy of almost all other fruits and the demand for feijoas would be great.

Hitherto the feijoa has had no "common" name, but it has now been christened "pineapple guava," and it is expected it will be popularly known under this name in the future. In the land of its nativity the name "guayaba" is applied to it by the inhabitants, this being the same name applied to the guavas. Being so closely allied to the guava it can correctly be called a guava, and the distinctly pineapple flavor of the fruit has suggested that appellation.

CALIFORNIA CULTIVATOR

March 16, 1911.

JOURNAL OF ECONOMIC BOTANY.

The Pomona College located at Claremont has for the past few years been issuing a valuable publication in the Journal of Entomology which has been largely quoted in scientific publications. Beginning with the first of February another valuable publication in the Pomona College Journal of Economic Botany as applied to sub-tropical horticulture, is to be issued quarterly. It is to be of a less technical nature than the Journal of Entomology. The first issue contains: Avocado in Southern California, Withertip in Ventura County, Biological Expedition to Southern Mexico, and The Botanical Garden of Para. It is well printed and beautifully illustrated, this first issue containing 72 pages. Professor C. F. Baker of Pomona College is the editor.

THE PACIFIC GARDEN

February Number of Pomona College Journal of Economic Botany contains an exhaustive article on the Feijoa Sellowiaroa, by F. W. Popenoe. The probability is that it contains more information concerning this ornamental and economic shrub than can be found anywhere else in print. That one article alone is worth the price—one dollar—of the Journal for a whole year. We shall at some future time give to our readers our experience and observations with this remarkable plant, which, when thoroughly understood, is destined to be a valuable addition to our list of plants grown for beauty and utility.

THE RURAL CALIFORNIAN

JUNE, 1911

NEXT MONTH.

Cotton has the center of the stage in the Rural this month, but in the next issue it will step aside for sugar beets. California now stands practically first in sugar beet culture. Colorado still claims slightly greater tonnage and number of factories, but California's production per acre is greater. But we will not anticipate too much and will ask our readers to observe the next issue; we believe those who are not conversant with California's standing in sugar beet production will be surprised at the magniture of the industry.

In addition to sugar beets, an excellent article already in hand, written by Mr. F. W. Popenoe of Pasadena, will give information as to the avocado or alligator pear, and its adaptability to California. The article will be illustrated and is a most excellent one by a man who has investigated this fruit very fully.

Los Angeles Times

Jan. 27, 1912.]

Ornamental Fruit Trees.

AMONG trees for garden planting that are of unusual value for both ornament and fruit crop, the avocado easily heads the list. It is a fast-growing, finely-shaped tree well-furnished with a heavy growth of dark-green, glossy leaves. We have no fruit that surpasses it as an ornamental. Another promising tree for like purposes is the mango. The few seedling and grafted mangoes grown in Southern California present ample warrant for the statement that some day we shall have these fruits, home-grown, of high quality. It is necessary only that a great many varieties be tried in order to demonstrate which are worthy and which should be discarded. Two splendid monographs on these fruits have been written by F. W. Popenoe of Altadena, first appearing in the Pomona College Journal of Economic Botany; afterward as separates. Everyone interested in these two fine tropical fruits should secure these two treatises, for the author has left nothing unsaid that should be known about the two trees of great economic and ornamental value.

* * *

A VALUABLE PUBLICATION.

A valuable publication regarding which the question has been asked, "Will it continue another year?" is a quarterly called the Pomona College Journal of Economic Botany, edited by Prof. C. F. Baker of Pomona College. The question as to its continuance was made necessary because of the fact that it is not self-supporting; it carries no advertising and is only for the presentation of original scientific matter. The December issue has an article by Mr. F. W. Popenoe on the mango in California. It is fully illustrated and gives the best collection of information regarding the mango we have seen brought together. Dr. F. Franceschi has an excellent article on trees for Southern California avenues. Whenever Dr. Franceschi writes, it has value. R. D. Cornell gives plans and plants for small places. Not only plans, but photographic views of places laid out accordingly, are given. Prof. Baker, the editor, makes comparison of Southern California and Java.

We are glad to announce that another year of the journal's existence is now assured.

The White Sapote

BY F. W. POPENOE, PASADENA, CALIFORNIA

Among the fruits brought to California by the Franciscan fathers when they established their missions along this coast more than one hundred years ago were some, like the olive and the grape, whose cultivation is today an important factor in our horticulture. But there is one at least, which although introduced early in the nineteenth century, is at present cultivated only a little more extensively than it was at that remote day. This is the White Sapote, or Zapote Blanco of the Mexicans, botanically known as *Casimiroa edulis*. In the city of Santa Barbara there is still to be seen (Fig. 31) an aged tree which has survived all vicissitudes from the early mission planting, being without doubt over one hundred years old. This tree is one of the most interesting horticultural landmarks of California, as it has the honor of having been the first tropical fruit tree planted in this state. Several other trees much more recently planted are now in bearing and have helped to demonstrate that this fruit is well adapted to our climate, and with the increasing interest now being taken in the subtropical fruits it seems likely that this one will soon receive the attention which it deserves.

The White Sapote is a member of the order *Rutaceae*, and is found growing both wild and cultivated in the states of Sinaloa and Durango, and other parts of northern and central Mexico. The tree is handsome, having large, palmate leaves, glossy green on the upper surface, and with age forms a dense, dome-shaped head of foliage. As an ornamental alone it is of value, and possesses good possibilities as a street and avenue tree. The fruits greatly resemble in appearance an apple or a quince, and the better varieties are as large as a good-sized apple. When fully ripe the pulp becomes quite soft, and has been described as of a delicious, melting, peach-like flavor. The normal season of ripening is October and November, but as soon as the fruit is fully developed it may be picked and ripened in the house, and is then quite as good as though ripened on the tree.

It should be remembered that the results obtained from this tree in Southern California, both in growth and fruiting, have been produced under the most adverse conditions in practically all cases, and much more can be expected when it is put under proper cultivation.

Of the local trees there are a number which produce small and inferior fruits, worthless or of little value. This is the case with the old tree in Santa Barbara, referred to above, but there are a few which have produced fruits equaling many of the best grown in Mexico, and although it would probably be possible to obtain better varieties by going to Mexico for them, those described are well worth propagating.

Propagation and Culture

Probably the principal reason for this fruit never having been brought into general cultivation in California lies in the fact that its propagation has been but imperfectly understood, and as it does not come true from seed it has been impos-

THE WESTERN EMPIRE

LOS ANGELES, CALIFORNIA, MARCH, 1911.

THE AVOCADO.

A Salad Fruit of the Tropics.

By F. W. Popenoe, Pasadena, California.

There is no more delicious fruit than the Avocado (Persea gratissima) or Alligator Pear, as it is commonly, but incorrectly called. It is a tropical fruit, pear shaped or round, weighing from half a pound to a pound and a half or even more, green or purple in color, with a thick, edible flesh surrounding a hard seed the size and shape of a small peach. The flesh, in color a rich golden yellow, is eaten in a number of ways, its rich, nutty, buttery flavor being very agreeable.

The Avocado offers great possibilities for culture in Southern California. It always brings a good price, single fruits selling as high as seventy-five cents each. It stands shipment well. The demand, especially in the large cities, has always been in excess of the supply.

The seedling trees grow to an immense size and are shapely and beautiful. They are very prolific bearers, the natural season of fruiting being from September to November in this climate, but the fine budded varieties extend the season from July to April. The budded trees do not grow so large, being about the size of large, vigorous orange trees. The trees are propagated from seeds, and can be budded to whatever variety desired, although the seedlings themselves are in general use. From a seedling tree at Hollywood thirteen years old, the fruits in a single year, about 2000 in number, sold for as much as $415. However, budded trees are recommended for general planting, as the size and quality of the fruit they can produce can be definitely foretold beforehand, a thing which is not possible with the seedlings.

Planting and Cultivation: It is only within the last year or two that orchard plantings of the Avocado have been made in Southern California, and them on a small scale only, but the next few years will see the territory devoted to the culture of this fruit on a commercial scale greatly increased.

The trees may be planted the same distance apart as orange trees, although it is better to give them more room if it is available. Budding seems to dwarf the tree, and budded trees require much less room than seedlings. In either event the trees should not be allowed to grow to an unlimited size, but should be pruned like deciduous fruits, allowing only the strongest branches to develop and form the head of the tree, and all weak and undesirable growths cut out each year. The top should be kept cut back to facilitate picking the fruit, and not allowed to grow to an unlimited size as is often done with seedlings.

Transplanting should be done in early spring, before the trees have started into new growth.

During the first year or two of its growth, the tree should be protected during the winter months with a covering made of burlap, or palm leaves. After the trees have become well established and attained some size, they will stand as much cold as the orange without injury, and the hardier Mexican varieties will stand considerably more. In fact, the danger from cold lies not so much in possibility of injury to the trees as in the freezing of the blossoms and consequent loss of the crop of fruit for that year. To avoid this, late blooming varieties must be planted, so that the blooming season will occur when danger from frosts is practically over.

The tree will require about the same irrigation as the orange. Insufficient irrigating during the dry season will result in small fruit. A judicious application of fertilizer is also of great benefit.

The Future of the Avocado: It may seem to be making a strong statement to say that within the next quarter of a century the Avocado will rank with the orange as a commercial fruit in Southern California. But there is a strong foundation of fact underlying this statement, and the reasons seem sufficient, indeed, to warrant the belief that it may become even more important.

First, the adaptability of the Avocado to this climate has been proved beyond the possibility of a doubt. There are one hundred or more trees now in bearing, ranging in age from three to twenty-five years, scattered over Southern California, from the cool sea coast to the hot and dry interior. These trees embrace a number of widely different types, sizes and characters of fruits. This test of adaptability ought to be sufficient to satisfy the most skeptical.

Second, the food value of the fruit is the main basis for the above statement. It presents in a most easily digested and assimilated form as high as 12 to 18 per cent. of fat, which places the fruit in a class with the staple food products instead of being a mere luxury as is the case with many fruits. The taste for the Avocado is not always acquired upon first trial, but a few repetitions are usually sufficient to make anyone extremely fond of it. The price is now prohibitive to most, and only a few have had the opportunity to acquire the taste, but as the production becomes greater and the price lower, an almost unlimited demand is sure to be created throughout the whole country. It is, of course, universally known as one of the most important staple fruits throughout the tropics and subtropics of the world.

Culture of the fruit in this country will be restricted to limited areas in Florida and California, and consequently the danger of overproduction will be practically eliminated. As rapidly as price and production permit, the Avocado will become an important and indispensable part of the daily food of the majority of the people of the United States.

FRUIT OF SOUTH AMERICAN TYPE OF AVOCADO, NATURAL SIZE.

AVOCADO INFORMATION.

F. W. Popenoe, nursery culturist, of Avocado Pears at Altadena, Cal., has contributed a fund of information and instruction about Avocado Pears in the Pomona College Journal of Economic Botony for February.

This is the work we have been looking for. A reprint booklet of twenty-eight pages may be had from Mr. Popenoe, at ten cents a copy, postpaid. If you have frostless location many of you will want this information at once.

Feijoa and White Sapote

Feijoa Sellowiana
Casimiroa Edulis.

By F. W. POPENOE,
Altadena, California.

[THE CUBA MAGAZINE is indebted to Dr. F. R. Ramsdell, Columbia, Isle of Pines, for these interesting contributions furnished us by Mr. Popenoe, at his request.—Ed.]

THE FEIJOA is a fruit which is attracting considerable attention in California. It is a Myrtaceous shrub, very similar in growth and character to its near relative, the Guava. It grows to an ultimate height of ten or twelve feet, and is of considerable value as an ornamental alone. The leaves are small, oval, dark green above and silvery white beneath, and the flowers, which are produced in spring, are very striking, the long tuft of scarlet stamens forming a brilliant contrast with the white petals.

The Feijoa is a native of Uruguay, Argentina, and Brazil, and was first introduced to horticulture in North America by Dr. Franceschi of Santa Barbara, California, in 1901.

The fruit is about the size of a hen's egg, ordinarily oval in form, and green in color, with sometimes a touch of crimson on the cheek. The flesh is white, translucent, and melting, and of the most delicious flavor imaginable, combining the flavors of pineapple, strawberry, and banana. The seeds are extremely small and can not be felt in the mouth, this being one of the many advantages the Feijoa has over the guava. The season of ripening varies with different varieties from September to January.

In the past this plant has been propagated principally by seed, but as seedlings do not come true to variety it is necessary to resort to some asexual means of propagation to perpetuate the best sorts. Layering is the most simple. Cuttings can be easily rooted if bottom heat is supplied, and they are kept covered with a bell-jar. Budding has not as yet been successfully practiced. Grafting and inarching are both successful, inarching being one of the simplest means of vegetative propagation. There is much difference in size and quality between the fruits produced by different trees, but as yet no named varieties have been introduced, although it is probable several will be placed on the market in the near future.

The plant is somewhat particular as to culture, if best results are to be obtained, and thrives in a light sandy loam, containing plenty of humus.

The fruit is useful in many ways. It is commonly eaten out of hand, but it can be cooked in almost any form, crystallized, or made into jams or jellies.

One of the first tropical fruits introduced into California was the White Sapote, or *Sapote Blanco*, a native of northern and central Mexico. This fruit, while not yet produced in any great quantity, bids fair to become quite popular in the near future.

The tree is a rapid grower and very hardy. It is an evergreen, with glossy dark green foliage, the leaves palmate and of good size. In addition to its economic value it is quite ornamental, and possesses the valuable characteristic of being extremely drought-resistant, thus making it valuable for planting in arid countries.

The fruits resemble in appearance an apple or a quince, and good specimens are from three to four inches in diameter. The flesh is whitish or creamy yellow, and contains three to five large seeds, very much like orange seeds on a larger scale. It is soft and melting when fully ripe, and of a flavor difficult to describe, but liked by almost everyone, and sometimes said to resemble that of the peach; it lacks, however, any trace of acidity or spiciness.

When grown from seed the White Sapote is liable to considerable variation, and to obtain best results from this fruit it will be necessary to resort to some means of asexual propagation, so that the choicest seedling forms can be perptuated. As yet grafting or budding have not been practiced, but there seems to be no reason why they should not be successfully accomplished.

Among the seedlings which have fruited in California are several which are above the average in quality, and have been named as distinct varieties. These are the Harvey, Gillespie and Paroquia, and it is expected that these will soon be put on the market in the form of budded or grafted trees.

The culture of the White Sapote presents no difficulties, it being one of the easiest fruits to grow that is now under cultivation in California. It flourishes in almost any soil, and requires but little irrigation during the dry months. When grown from seed it does not bear under an age of seven or eight years, but it stands to reason that budded trees would bear much younger.

Great Future for the Alligator Pear in Southern California

Avocado, or Alligator Pear, as It May Be Grown in So. California

THAT the avocado will succeed in Southern California has been proved conclusively by the seedlings planted fifteen to twenty years ago which are now bearing, and by more recent experiments with budded trees; and the establishment of an avocado industry in the immediate future is assured, says F. W. Popence of Pasadena in a recent article on the subject.

For centuries the avocado has been grown in Mexico and other tropical countries, propagated only by seed. Like other fruit trees grown from seed, it comes true in but a very small percentage of cases. This has led to the existence of a wide range of varieties. All avocados so far fruited in California are these mere chance seedlings, most of them of indifferent value and not worth propagation on an extensive scale. There are many varieties of good size and flavor, fruiting in Mexico and other parts of the tropics, which will doubtless succeed here as well as the smaller and inferior ones. Some of these Mexican varieties are of such superior quality as to leave nothing to be desired.

It is therefore manifestly the part of wisdom for California planters of this fruit to proceed with intelligence and accept nothing but the best. Attracted by prospective large returns some investments of a doubtful character are already being made. There is really no excuse for this.

Investigation and care will lead anyone in the right path. There will be no demand for seedling or inferior fruits once a superior avocado is to be found plentifully in our markets. Nor need there be delay or groping in the dark for these superior varieties. At our very door lies a boundless experimental garden in which for centuries the avocado has been grown, where countless varieties have originated, and where now are growing hundreds of thousands of trees from among which we have only to select the best.

By taking advantage of this opportunity California can obtain in a comparatively short time the choicest varieties, which it would take years of time and a large expenditure of money to produce by the ordinary methods of plant breeding, carried on here.

Broadly speaking, the avocados which have fruited here so far may be divided into two classes; those of Mexican origin, which include all the smooth and thin skinned varieties, and those of Guatemalan origin, which are easily distinguished by their very thick skins and rough exterior. This is not saying, of course, that all avocados can be divided into these two classes.

In his bulletin on the avocado, Collins speaks of the avocados of Guatemala as forming a very distinct group, the most peculiar characteristic of which is the unusual thickness and toughness of the skin, and he considers them the most promising of all types from a commercial standpoint.

Already we have several varieties of this type that are well worth growing, of which the Lyon is the most promising, it being the finest avocado yet produced in California, of good size and excellent quality. This variety has just come into bearing, and therefore is little known as yet, but its prolificacy and good qualities promise to place it in the lead of the local varieties. The trees of the Guatemalan type are easily distinguished from those of the Mexican type because more spreading, particularly when young, and the leaves are more lanceolate.

It has been stated that the avocado would not succeed in the hot and dry interior parts of California. Trees are known to have grown without injury as far into the interior as Redlands and Riverside, and have fruited heavily at Pomona and San Fernando, and should be tried at Imperial.

PROPAGATION

By Seed. This is the simplest method and the one most practiced in California up to the present time. The seeds of most varieties are obtainable during late summer and autumn, and should be planted as soon after removal from the fruit as possible. It has been found to hasten germination greatly if the seeds are buried in moist sand or sawdust for a period of two to four weeks before planting. During this time they should be occasionally examined, and when they show signs of germinating they can be taken out and planted in pots. After this treatment they will start to grow very promptly, and it has the added advantage that only seeds that are sure to grow are planted, and no labor is wasted. For most seeds a four-inch pot is large enough. The seeds should be placed in the pot pointed end up, or in the case of the round seeded varieties, the end toward the stem of the fruit, and about one-fourth of the seed left exposed above the surface of the soil. A good rich soil is essential to the best development of the young plant, and should be kept thoroughly moist, but care should be exercised to avoid standing water in the pots, as this is fatal to either the seed or the young tree.

While the young trees should be grown in a warm situation, the direct rays of the sun should be avoided. If the seeds have not been buried in moist soil before planting they will often be slow in germinating, especially if not grown under glass. Many of the seeds planted in the fall in a lath house do not come up until the following spring. After the young trees have made a growth of eight to twelve inches they should be shifted into larger pots or cans, if it is desired to carry them on in this way, or set out in the nursery to be grown until of suitable size to bud.

By budding. It is only during the past season or two that much attention has been given to budding the avocado in California, although previously a few nursery men most interested in this fruit had tried it. Having no experience of their own in the budding of this particular tree, most of those who have budded during the past year or two have simply applied the methods they would use for citrus fruits, while a few others have followed the instruction given in various publications by those who have experimented in Florida. In all cases the results have proved the budding of this fruit to be no more difficult than that of the citrus fruits, and when a little more experience has been acquired the operation will be performed with as much assurance of success as with the orange.

A Common Cuban Type of Large Purple Avocados

The Lyon Avocado, Grown at Hollywood. A Fine Example of the Guatemalan Type.

The method of budding is practically the same as used for the orange.

Regarding the best season to bud, it seems to be the consensus of opinion here that October and November are as good a season as any, if not the best of the whole year. This is probably owing to the climatic conditions of Southern California being different from that of Florida.

Three weeks after insertion the buds will have taken and the trees should be lopped back to several inches above the bud. The buds will then start into growth, and when a growth of eight to twelve inches has been made the stock may be trimmed back to the bud.

Edgar Harman of Sherman has done considerable experimental budding and what he says will be of value to those contemplating doing this work. The seeds have started under glass and as soon as the plants are two inches high they are set in pots and placed in a protected place in the open. When they have grown to the diameter of three-eighths to one-half of an inch they are budded. Mr. Harman considers that this operation can be performed successfully any month of the year except July and August.

C. P. Taft of Orange has probably had more experience in growing and budding the avocado than any other person in California. He says: "I am inclined to regard the months of October and November as the best for budding, though I think there is a short period in the spring when considerable success can be had. The buds I put in my three-year-old orchard last fall have done well and are making a fine growth. About 25 per cent of the buds in stock in cans succeeded. Those put in during the warm summer months were an almost total failure."

In April, 1908, D. W. Coolidge of Pasadena budded about 150 two-year-old seedlings growing in the open ground at Hollywood. The buds were taken from well matured wood of the previous year's growth and waxed cloth was used for wrapping. Fully 90 per cent of the buds took, but quite a number dropped their buds after having taken. However, fully 8 per cent of the buds inserted developed into trees.

William Chappelow of Monrovia, owner of the original Chappelow tree, states that he proceeds exactly as in budding citrus fruits and has budded at all seasons of the year with about equal success.

G. W. Davison has a twenty acre grove of the Chappelow variety at La Habra. The trees are doing well.

Large avocado trees which are unproductive should be cut back and budded over to some good variety.

During the first year or two of its growth the tree is more tender than when larger, and in locations subject to heavy frosts should be protected during the winter by some covering.

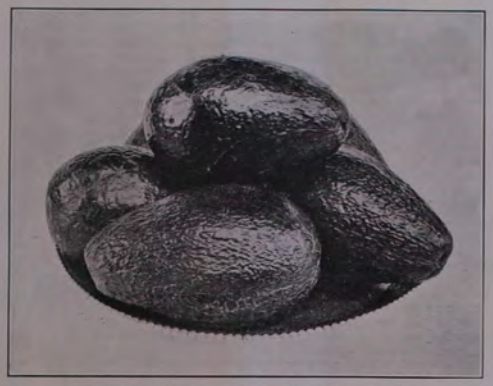
AVOCADOS FOR HOME GARDENS

By F. W. POPENO, Altadena

Whether he be city dweller or suburbanite, almost every resident of Southern California is interested in the subject of fruit trees for the home garden. Even though the ground at his command be limited to the confines of a city lot, there is usually room for a few trees to supply the table with home grown fruit.

In selecting fruits for the home garden there are several questions which arise. Space is usually limited, and the majority of those fruits which you have written down as you thumbed the nurseryman's catalog will have to be eliminated. Everyone has his favorites, and in deciding on the few which the ground will accommodate the matter of personal preference must of course be given first consideration. But a subject fully as important, even though it is usually ignored, is the matter of adaptability to the conditions under which fruit trees in back-yard gardens, particularly in cities, must exist. Here is where the avocado offers exceptional attractions, for experience in and around Los Angeles has not only shown that it will withstand more neglect than any fruit and still produce abundantly, but it will at the same time keep up a good appearance and be of great value as an ornamental tree. Few of our ornamental trees are of greater merit than the avocado, and if it produced no fruit whatever it would be valuable for this purpose alone.

Although remarkably tolerant of abuse, naturally the best results can only be obtained when good care is given. Many trees in Los Angeles gardens are producing abundantly, with the ground around them like asphalt, and never having seen any cultivation or fertilization since the tree was planted. But those who systematically irrigate and manure their avocados are amply repaid by a bountiful harvest and fruit of better size and quality.



A plate of fine Avocados, each fruit weighing about one pound.
Courtesy of West India Gardens, Altadena, Cal.

Those who are familiar with the avocado, practically without exception, are ardent devotees of this regal fruit. As with the olive and many other subtropical fruits to which the northern palate has not yet become accustomed, the taste for the avocado has sometimes to be acquired. Rarely is this a difficult operation, and if one chances to experiment on a perfectly ripened fruit he is likely to require little urging to partake of his second spoonful. After the third trial his gustatory apparatus becomes accustomed to the flavor and consistency of the fruit, and the unfortunate individual is well on his way towards that state where he will squander his hard-earned money on avocados at fifty cents apiece, without a murmur. Many immature avocados have been sold in the Los Angeles markets, and it is little wonder that those who have essayed to familiarize themselves with the avocado under such circumstances, have given up in disgust and remarked that they "could not see anything in that fruit." There is as much difference between a green avocado and a perfectly ripened one as there is between apples under the same conditions. What person who, when about to sample an apple for the first time, was given a half-grown specimen, would go into ecstacies over the new fruit?

Yet despite its delicious and incomparable flavor, the avocado is not a delicacy nor a dessert fruit. It is as a food product that it presents it strongest claim to our affections, and it is its high food value alone that justifies the predictions now being made as to the future commercial development of the avocado industry. The amount of vegetable oil, sometimes as great as 18 or 20 per cent. which is contained in the fruit, places the avocado in the same class with such food products as beefsteak or beans. And not only is the food value present, but it is present in a much more attractive and appetizing form than can be found in any other product. Under these conditions the desirability of having a few avocados in the back yard can be readily seen, and the effect they would have on ameliorating the present distressing problem of high cost of living is even greater than is generally realized. The ways in which the fruit can be served are numerous and as the fruit comes into general use they will rapidly increase. A surprising fact is that those who use the avocado as an important part of their daily food, never seem to tire of it.

An advantage held by the avocado and possessed by few other fruits is that by a proper selection of varieties, fruit may be had throughout the entire year. After maturity, avocados of most varieties can be left on the tree for two or three months, improving in quality up to the moment they are picked. Thus by planting a tree of a fall bearing variety fruit can be had from October, when it first commences to ripen, until January or February. And with a spring-bearing variety the crop will last from March until June or July. Thus two trees will supply fruit for a greater portion of the year, and by extending the number to four or five it will be easy to have avocados on one's table every day in the year. It is doubtful if this would be possible in tropical countries, but in California's favorable climate it has been proven to be a fact.

April, 1911

The Pacific Garden

Issued on the First Day of the Month

Address all Communications to
P. D. BARNHART, Editor
148 WEST COLORADO ST.
PASADENA, - - - CALIFORNIA

The article by Mr. F. W. Popenoe on the Mango, will, we are sure, be read with interest by all enthusiasts who never cease in their efforts to try out plants, new to the country in which they reside. The ambition is a worthy one. It has cost that class of horticulturists untold sums of money and an amount of thought and labor unknown to the other class, who are content to cultivate what has proven to be remunerative. We have traveled the road in which the experimenters walk—and know from experience about the subject of which we write. We shall watch the experiements of this young enthusiast and shall do what we can to make his labors a success. None of us, however, must ever forget the fact that the hygroscope must be as carefully studied as the thermometer. A plant may be a success in this peculiar climate, so far as the **temperature** of the atmosphere is concerned, yet be a failure because of deficient **humidity**, and in this class we believe the Mango belongs when the attempt is made to grow it in California.

JOURNAL OF ECONOMIC BOTANY, a quarterly publication of the **Department of Biology of Pomona College, Claremont, Cal.** If Volume 1, Number 1, is to be the standard of excellence of future numbers, the subscription price, one dollar is cheap indeed, and it will be a valuable addition to the short list of that class of publications on this coast. It contains seventy pages, not one of which contains an advertisement. Twenty-four pages, containing nineteen illustrations, are devoted to the Avocado. Thirty-two pages to the disease of citrus fruit trees, known as Wither-Tip. An interesting and instructive article entitled **"A Biological Expedition to Southern Mexico." The Botanic Garden of Para,** closes this, the initial number of a first-class quarterly magazine of economic and practical botany.

The **West India Gardens,** of Altadena, Cal., have issued a 24-page booklet, with the title, **The Avocado in Southern California.** It is profusely illustrated, and contains a vast amount of information about a tree and its fruit, which is destined to occupy a prominent place in the list of **ornamental** and **economic** trees of this southland. The tree for its grateful shade during our sunny summers, the fruit for its delicious taste, and high nutritive value.

Editor, The Pacific Garden,

Dear Sir—Your article inthe March issue regarding the Mango in Southern California interested me very much. But while I agree with you that this fruit has not been a success here up to the present time, I do not believe the trial it has been given has been by any means sufficient to prove that some varieties at least are not adapted to this climate and will prove a complete success. There have been but very few Mangos planted in California, and these have all been seedlings, mostly of Mexican and Central American origin, probably grown in the hot and humid seacoast country where conditions are so unlike those here. At Montecito, near Santa Barbara, there is a seedling or two of Phillipine origin, but these too have come from a climate utterly unlike our own.

There are over two hundred varieties of this fruit named and described, besides countless others that have never been given any attention, and of these many are suited to widely different climatic conditions. Having been under cultivation for centuries, and planted in all parts of the tropical world, the Mango has been subjected to many new conditions to which it has in time become acclimated. Thus it is found growing and thriving in high mountain valleys in Mexico where the winter temperature is often much lower than it is here, and in the northern provinces of India where the winters are cold and the summers hot and dry, and such conditions are certainly vastly different from those of its native home, Malaya. We have never given budded or grafted trees of varieties found in those localities a trial, but instead have grown a few seedlings of inferior forms found in humid tropical countries, and because they would not thrive under the conditions here it has been pronounced an impossibility to grow the Mango in California. Nothing definite can ever be ascertained by growing seedlings, as this fruit invariably deteriorates when grown in this way, reverting to the small and inferior jungle forms, but when budded or grafted varieties from some climate similar to our own are given a thorough trial here, there is scarcely a doubt but that a few at least will be found which will be a success.

At the Saharanpur Botanical Gardens, in the northern provinces of India, over fifty varieties are grown, all of which are a success in that climate. In a letter to David Fairchild of the U. S. Bureau of Plant Industry, the Superintendent of these gardens says: "As regards the condtions under which the Mango ripens its fruit, undoubtedly ahigh temperature is necessary and moreover a dry one is preferred. The fuits ripen here from May to July and thus have the hottest and dryest time of the year in which to ripen. Generally there is during May a hot dry wind that no doubt acts on the acids of the fruit." A number of varieties which have been successfully grown at Saharanpur are to be tested in California soon, as the Bureau of Plant Industry is sending out grafted trees for an experimental planting this spring.

Professor C. F. Baker of Pomona College, an economic botanist of wide experience in tropical countries, has the greatest confidence in the future of this fruit in California, and believes it is only a matter of a few years until varieties will be found which are adapted to this climate. To hasten the day when good mangos will be produced here in abundance, grafted trees of as many varieties as it is possible to obtain ought to be planted at once in several different locations, both near the seacoast and in the interior valleys, and in this way some varieties suited to both locations would doubtless be found.

Very truly yours,
F. W. POPENOE.
Altadena, Calif., March 7, 1911.

THE WESTERN EMPIRE

JUNE, 1911.

AVOCADO NOMENCLATURE.

PASADENA (Cal.) May 9.—[Editor Western Empire:] The article on the avocado by Mr. Martinez in the May issue is certainly very interesting and instructive, and I want to heartily indorse all he says as to the value and fine qualities of this fruit. Since he has brought up the question of the correct name, however, I would like to say a few words in that connection, as this is a matter that should be given our attention at once, before an incorrect name shall have an opportunity to become established.

Mr. Martinez seems to believe there is only one correct name, viz., Palta. Now this fruit is grown in many countries, and these countries speak different languages. In almost every country it has a different name, and even in parts of the same country it will be known under different local names, and different types are called by different names in the same locality. Thus in Mexico the small purple type is universally known as Ahuacate (sometimes spelled Aguacate,) while the large green type, although grown in the same locations as the purple ones, is known as Paihua. In Cuba the name Aguacate is used almost exclusively; and this is also true of some other Spanish-speaking countries. The name Palta is largely used in South America, as Mr. Martinez states. In English-speaking countries where the fruit is grown it is known principally as Avocado or Avocado pear; in French possessions as Avocatier. The English and French names are both doubtless corruptions of the Spanish name Ahuacate.

And these are by no means all of the names under which this fruit is known. C. F. Collins of the Bureau of Plant Industry, in his bulletin on the avocado, lists over forty. This multiplicity of names leads us to the question "Which is the correct one, and which are we going to adopt?" It would be impossible to say any one of the above-mentioned names is correct and the others are not, as every one is correct in the locality in which it is used. Like other fruits, the avocado has different names in different languages, and all we can do is to select the one that suits us best. This the Bureau of Plant Industry has already done for us, having chosen the name avocado, as this name was thought to be much better suited to an English speaking people than any of the Spanish or Indian names. As this name is euphonious, and in no way misleading, there is certainly no objection to its use, except that it was probably originally a corruption of the Spanish name Ahuacale. This latter name, however, has a great claim to priority, as it is probably more widely used than all others combined, and in a country where so many Spanish names are used as in California it would not be as impossibility to adopt this name. It is derived from the original Aztec, and although spelled in at least two different ways, Ahuacate and Aguacate, is pronounced the same, "Ah-wah-cah-te. But as the name avocado is already in use in other parts of our own country, and is the name selected by our government, it probably behooves us to adopt it even though there are many of us who would like to see one of the Spanish names retained. Whatever we do, let us do away with the misleading name Alligator pear, for which there is no excuse and which is only the work of some ignorant person who could not pronounce the name Avocado. In particular the term alligator is used to designate a fruit that is inferior or worthless, and adding the name pear to this leads the uninitiated to believe that the Ahuacate is only a variety of, or is related to, the common pear. Now that the culture of this fruit is about to become an important industry in California, this is the time to establish a correct name for it, and we should not allow it to become known and advertised under any such misnomer.

F. W. POPENOE.

January 1912

The Lemon Grass

By F. W. Popenoe

This plant, botanically known as **Andropogon citratus,** merits a more extensive planting in California, not industrially, but in gardens on account of its economic features and interesting character; and to that large class of people who are commendably interested in adding to the wealth of interesting plants which can be grown in their gardens, it is one of the most attractive to be found.

Lemon Grass has doubtless been grown in California for a number of years, yet to such a limited extent that few people have seen it or even heard of it. The genus Andropogon belongs to the Order Gramineae, or grass family, and contains among its members the well-known sorghum. In India and Ceylon, the cultivation of Lemon Grass forms quite an important industry, several thousand acres being given over to its cultivation, and many thousands of ounces of the essential oil yielded by the plant are exported annually. It is stated that an acre of the grass will yield about twenty pounds of oil per year.

In appearance the plant cannot be said to be striking, but it is as decorative as the majority of other grasses, and its interesting economic features place it above the ordinary. Its growth is very rapid, and a single shoot will develop in a year's time into a large clump. No frost experienced in Southern California seems to affect it. While said to attain a height of five feet in its native country, India, in California it does not seem to reach so great a development, two or three feet being the average height here.

When crushed, the leaves emit an odor similar to that of the Lemon Verbena (Lippia citriodora), but considerably more pleasant and refreshing. This fragrance is due to the presence of an essential oil known in the trade as Lemon Grass oil. It is used in perfumery and in the manufacture of scented soaps.

In addition to its cultivation for the expression of the oil, it is grown to a limited extent in Mexico and other countries for the preparation of a beverage. For this purpose the leaves are simply dried in the sun, and an infusion made of them. A gentleman traveling in Mexico, after having ridden on mule back all day under a broiling sun, was given a cup of this tea upon arriving at a hacienda in the evening, and stated that it was the most refreshing drink he had ever tasted.

According to Macmillan, the white, fleshy part of the leaf stalks are very generally used by the natives of Ceylon for the flavoring of curries, and in pickles.

It will thus be seen that the economic value of the plant is considerable, and being of the easiest culture and known to succeed in California, it will be surprising if it does not become more generally planted in the near future.

MARCH 1912

THE CUBA MAGAZINE

The Mango in Southern California, F. W. Popenoe, Pomona College Journal of Economic Botany, Dec., 1911, is an important paper for all interested in the mango. In fact, it is an admirable piece of horticultural research work, and it brings together in well digested form all of the available knowledge of this important fruit.

The paper opens with a full discussion of the present state of mango cultivation in Southern California, where, by the way, it is so far hardly more than a curiosity. Notwithstanding climatic difficulties the writer is of the opinion that a commercial industry may be developed in the future in certain of the more favorable localities.

Next is an instructive chapter on propagation with remarks on the influence of different stocks on fruitfulness and quality; then follows full description of the three of four best kinds that have been fruited successfully in California, with remarks on the classification of mango varieties. The paper ends with an alphabetical descriptive list of all of the better known varieties of mango compiled from various authorities in all parts of the world.

The Journal, in which this article appears, is worthy of more than a passing notice. It is a quarterly gotten out by Pomona College of Claremont, Cal., with the cooperation of several of the fruit companies and Exchanges of Southern California. It is edited by Prof. C. F. Baker, formerly the botanist of the Cuba Experiment Station and it is devoted to "Economic Botany, especially as applied to Tropical and Sub-tropical Horticulture." This issue completes its first year and it has already become one of the most important publications in its special field.

THE CUBA MAGAZINE wishes it the best [illegible]

RARE PLANTS ARE EXHIBITED AT MARYLAND

Spring Flower Show Brings Out Novelties of Great Value.

BULBOUS PLANTS ARE NOTEWORTHY

Tropical Importations Are Attracting Unusual Attention.

Large attendance and general admiration continue to be the rule at the flower show, on the tennis courts of Hotel Maryland. They will continue until Saturday night.

Chairs are arranged on the grounds for visitors in little cozy flowered nooks, where everyone has the privilege of listening to some delightful music by the Schneider orchestra. Excellent programs have been prepared by the orchestra and the strains of sweet music drifting through the wealth of natural beauty, add to the charms of the wonderland of flowers, ferns and palms.

From this afternoon, children will be admitted for ten cents each. The price of admission for adults has been reduced to twenty-five cents. A record breaking crowd is expected tomorrow afternoon and evening. The place is flooded with hundreds of electric lights and visitors at night will have the same view as those attending the show in the day time.

Of the many fine exhibits of professionals, that of Howard and Smith of Los Angeles is attracting much attention. As usual some particularly fine strains of bulbous plants are exhibited by this firm. Scarcely anything in the show is more admired than their magnificent display of hybrid Amaryllis, shown in a large variety of colors and every one of immense size. Their display of hybrid Gerberas, commonly known as Transvaal daisies, is also fine, there being a beautiful collection of these, many varieties of which never have been seen before in Pasadena. Polargoniums, Columbines and some beautiful orange-scarlet Watsonias are among the other interesting things exhibited by this firm.

The entire south end of the tent is given over to the exhibit of decorative plants belonging to H. E. Huntington. This collection has been arranged in an attractive way by Mr. Hertrich and won the Hogan cup for the finest scenic effect in the show. Here are to be seen many magnificent specimens of rare palms and ferns, some of them almost never seen in this country. One of the most interesting specimens is a large fern (Gonophlebium subauriculatum) suspended in a hanging basket from the framework of the tent. Although suspended fully ten feet above the floor, the graceful fronds almost touch the floor. Three large specimens of that most beautiful palm Phoenix Roebelenii are here exhibited, these plants being some of the finest specimens of this palm in America. Many other rare palms, ferns, dracaenas, crotons and other decorative plants are also shown in this display.

Edward H. Rust of South Pasadena shows as usual a fine collection of decorative plants. Here are to be seen interesting conifers, palms and ferns artistically staged. The Pasadena Nursery also exhibits a number of large palms and ornamentals.

Probably the most interesting exhibit in the show to all those interested in new and rare plants is that of the Montarioso Nursery of Santa Barbara. Here are many interesting plants and flowers, and also fruits of the Cherimoya, Zapote Blanco or White Sapote, Pepino and the evergreen grape, Vitis capensis. This exhibit is presided over by C. F. Franceschi, manager of the nursery, and here an opportunity is given to enthusiasts to talk to Dr. F. Franceschi, the eminent Pacific coast botanist, a treat sure to be appreciated. Dr. Franceschi's fund of information seems fairly inexhaustible, and he is kept busy answering the questions of those interested in the new horticultural and floricultural possibilities.

Other rare fruits and economic plants are shown in the exhibit of Coolidge's fernery and rare plant gardens. Some particularly fine avocados are to be seen here, and are attracting considerable attention, this being a fruit which is just now attracting attention as a commercial possibility.

Edmund D. Sturtevant of Hollywood, the water lily specialist, shows some interesting and beautiful rarities, Erythrina, Solandra guttata, and Rosa gigantea, a beautiful single rose from Burma, with flowers of large size and a delicate cream color.

Due to the very late season the display of roses is not up to the usual standard. Usually this class is one of the largest and most popular in the show, but this year only five vases are shown. These are quite up to the average in quality, however. Annuals are well represented, most of the east side of the tent being given over to them. Sweet peas are few and rather inferior, but the show always comes too early to permit of showing of the late flowering varieties, which are so much superior to the winter blooming strains.

The display of bulbous flowers is rather smaller than usual, but of high quality. Particularly interesting here is the collection of irises shown by A. J. Morris, which won the cup. Among them are some striking and beautiful Regelio-cyclus hybrids, probably the first ever seen in Southern California, as the bulbs were obtained last year direct from the originator in Holland. The table of late tulips is also very fine and attracts considerable attention.

RESULT OF PLANT WORK TO BE SHOWN

Students in Plant Propagation Will Keep Open House Thursday.

IS ORIGINAL LINE OF SCHOOL WORK

Progress Made in Instituting the New Course Has Been Remarkable.

Considerable interest has been taken this year in the plant propagation course which has been given at the high school, as this line of work is an innovation in high school curricula. Beginning at the first of the year badly handicapped by lack of facilities and equipment, the work progressed rapidly in spite of the difficulties and during the course of the year a lath house of ample size to accommodate the work for the next year or two, a cold frame, and other necessaries have been added to the equipment, until the material needed to carry on the work under the most favorable conditions is now at hand.

At the beginning of the year the entire attention of the students was given to the propagation of plants by seed, including a study of soils and the requirements of the growing plants, and a large number of very desirable plants have been grown in this way, many of the plants being those which are not found in the ordinary nursery, and which are of greater value than the majority of the plans generally propagated. Later on in the season the various methods of budding and grafting were studied and practiced with exceptional success, the students having regular "amateurs' luck" with this work and obtaining a greater percentage of buds to "stick" than is sometimes obtained by experienced budders. One of the most important additions to the work has been the acquisition of a valuable and interesting set of newly introduced economic and ornamental plants from the U. Department of Agriculture, most of the set being from Brazil or of the extensive collections made in China by Frank N. Meyer. These plants are being cultivated in pots for the present, and will form a very interesting collection when they are planted out in the open and allowed to develop.

The students have taken hold of the work in a manner which proves conclusively that there is a place for such a course in the high school, and a need for this kind of work. The course has been under the charge o. Miss Martha M. Winslow, head of the department of biology. Those who have finished the course this year are Ellen Chisholm, Ruth Schock, Clara Franz, Gladys Harris, Ernest Millsap, Joe Thornburg and Ernest Wiedenmueller. A feature of the work has been the preparation of observation papers by the students, covering their observations along a certain line during the course of the year. Those on "The Avocado," by Joe Thornburg, and "The Propagation of the Grape," by Ernest Wiedenmueller, are particularly interesting.

The students have decided to hold an "open house" on Thursday from 1 to 3, at which time the results of their work may be inspected, and all who are interested in this line of work are invited to drop around to the high school at that time.

THE QUEENS

F. W. POPENOE, A

Among the numerous shrubs and trees which have been introduced to California from Australia, and have found a congenial home here, the Queensland Nut, although it has not become as widely cultivated as many of the others, is nevertheless one of the most meritorious from several points of view.

Basket of Queen

It is only in rare instances that we find a tree which combines the economic and the ornamental to such a degree as this one. And in addition, its hardiness and drought-resisting qualities commend it for culture in every garden. There are several specimens in Southern California which are given little attention, receiving no water except from the skies, yet they have made a fair growth, present a cheerful and ornamental appearance, and bear regularly. Certainly nothing more could be asked of any tree.

Botanically, the Queensland Nut is Macadamia ternifolia, belonging to the Proteaceae. It is remarkable in that it occurs in two entirely distinct forms, one upright and symmetrical, with a single trunk, the other more in the form of an arborescent shrub, sending up numerous

On account of the hard and tough character of the wood, the tree is admirable for windy sections. While it thrives best on a damp, rather heavy soil, it does not seem to be at all particular in its requirements and has done well wherever planted in California. In hardiness it seems to rank w

possibility for a large area in this state, and requiring no winter protection. Taken all in all, the Queensland Nut is one of the most valuable acquisitions of recent years.

Periods of Decay

Warning to Cuba Growers from Our Florida Neighbors.

MR. H. O. Neville, who, by the way, is the delegate here of The Chilean Nitrate Committee, and not of the Nitrate Agencies, as erroneously stated in our December issue, calls the attention of THE CUBA MAGAZINE to the following item from The Florida Grower:

The practical farmer is going to school every day in the school of experience. We have had a lesson for two years in succession that should teach crafty wisdom to the grower and shipper of citrus fruit. It is something the California grower has known for years, but apparently the average grower of Florida has paid no attention to the lesson, though it is possible that it has been repeated in various years covering the history of the Florida citrus industry.

Last season, it may be remembered, that we had a "decay" period in December. The Grower called attention to it at the time, tracing the reason back to a two-day warm rain, preceeded by a long period of dryness, and succeeded by a two-weeks' warm spell. The rains last year came on the 28th and 29th of November.

This past month has been very dry. Rain came three weeks ago, on the 21st and 22nd of the month. The rains were warm, and the weather following was warmer. This week all fruit arriving in the market is showing from 5 to 40 per cent decay.

W. C. Temple has studied these conditions very closely. He says that fruit picked for three or four days following the rain does not show decay, but that picked for the next week is very tender. His theory is that the tree, being dormant at the time of the arrival of the rain, does not wake up for three or four days, but after that time begins to flow sap freely. He says that if an orange is cut on the fifth or sixth day that the stem end will show pure sap that has not yet assimilated with the juices; that in the cut orange it never does assimilate, but ferments and causes the fruit to rot; that if the orange was left on the tree for a few days this sap would change into juice, and the fruit carry all right. This abnormal condition usually lasts three or four days; after that time the fruit will ship all right again.

Mr. Temple says that he was fairly sure that the rains would bring rot, and that he considered for four days about the advisability of sending out a bulletin advising packers of conditions, but that he did not have nerve enough to ask them to stop, when he was not absolutely sure. He did issue a bulletin on December 7th, which was two days before the decay showed up in the markets, advising associations that the fruit was sure to be tender, and that if they ever handled fruit carefully in their lives that now was the time to do it. The results show that he was right.

Photo by Popenoe

The Ideal Commercial Avocado, the California Trapp. Originated in Mexico at an altitude of 7,000 feet and now being propagated in California.

THE QUEENSLAND NUT

F. W. POPENOE, Altadena, California

Among the numerous shrubs and trees which have been introduced to California from Australia, and have found a congenial home here, the Queensland Nut, although it has not become as widely cultivated as many of the others, is nevertheless one of the most meritorious from several points of view.

Basket of Queensland Nuts *Courtesy of West India Gardens*

It is only in rare instances that we find a tree which combines the economic and the ornamental to such a degree as this one. And in addition, its hardiness and drought-resisting qualities commend it for culture in every garden. There are several specimens in Southern California which are given little attention, receiving no water except from the skies, yet they have made a fair growth, present a cheerful and ornamental appearance, and bear regularly. Certainly nothing more could be asked of any tree.

Botanically, the Queensland Nut is Macadamia ternifolia, belonging to the Proteaceae. It is remarkable in that it occurs in two entirely distinct forms, one upright and symmetrical, with a single trunk, the other more in the form of an arborescent shrub, sending up numerous stems fifteen to twenty feet in height, from a large, rhizome-like base. It so happens that both these types have become established in California, although there are not more than a very few bearing trees of either.

The glossy green, serrated leaves greatly resemble those of the holly, so that it can be readily seen that the tree is of unusual decorative value. The leaves are borne in whorls of three (hence the specific name, ternifolia) or four, and the flowers are small, creamy white, in racemes four to six inches in length.

The nuts, which are produced in clusters of three to fourteen, are of exceptionally choice quality. In flavor they are similar but superior to the Brazil nut. They are slightly under an inch in diameter, round, very hard shelled, and light brown in color, on the whole somewhat similar in character to the filbert. The tree does not come into bearing until seven or eight years of age, as is usual with nut trees, but is a very prolific bearer after that time, single trees producing as many as twelve hundred nuts per year.

On account of the hard and tough character of the wood, the tree is admirable for windy sections. While it thrives best on a damp, rather heavy soil, it does not seem to be at all particular in its requirements and has done well wherever planted in California. In hardiness it seems to rank with the Eucalyptus, making it a possibility for a large area in this state, and requiring no winter protection. Taken all in all, the Queensland Nut is one of the most valuable acquisitions of recent years.

CALIFORNIA CULTIVATOR

April 27, 1911.

A WIDENING HORTICULTURAL HORIZON.

By F. W. Popenoe, Pasadena.

With a climate adapted to the growth of a majority of the plants of the temperate and tropical zones, California has an almost unlimited field upon which to draw for new and interesting products. Every year a number of new plants are added to the already large list of those that can be successfully grown here, and yet our horticultural resources have scarcely been touched. The tropics and subtropics of the whole world is the field to which we can look for interesting and valuable things to be grown here. Vast numbers of plants which are commonly found in cultivation in tropical countries have never been given a trial in California, and beyond this there are still extensive regions to be explored. Among the plants already introduced which have proven their adaptability to this climate are several which give promise of coming into general demand in the near future. Some of these are already beginning to attract the attention which their value merits and will soon be counted among the commercial fruits of California.

At present the Avocado is claiming the attention of many horticulturists. This salad fruit promises to rank with the orange as a commercial product, indeed even to outstrip it. Being of a tropical nature, its culture is restricted to California and Florida, and the demand for the fruit is rapidly increasing as it becomes known, so that it is sure to be one of the most profitable that can be grown in the localities to which it is suited. The Avocado possesses a high food value and for that reason will be considered not as a luxury but as a food product. The avocado industry is already established in Florida and the next few years will see its establishment here along the same lines. The California nurserymen are now directing their efforts toward the securing of choice varieties from Mexico which are adapted to this climate, and once these are established it will not be long before the culture of this fruit becomes an important matter.

The mango is one of the most important tropical fruits, and has been aptly termed "the apple of the tropics." In its finer varieties it is one of the most delicious fruits grown. The fruits are commonly red or yellow in color, weighing from a few ounces up to three pounds or more, and the juicy yellow pulp is most fragrant and delicious. It is cultivated in all tropical countries, and in India has been under careful cultivation for centuries. Countless varieties have there originated, of which over two hundred are now catalogued, and it seems practically certain that of the innumerable varieties, suited to a wide range of climatic conditions, some will be found suited to the conditions which obtain here. At Saharanpur, in the northern provinces of India, where a collection of over fifty varieties is successfully grown, the climate is somewhat similar to ours, there being a distinct wet and dry season, and the winters are cool. The superintendent of the botanic gardens there states "undoubtedly a high temperature is necessary for the ripening of the mango, and moreover a dry one is preferred. The fruits ripen here from May to July, and they thus have the hottest and dryest time of the year in which to ripen. Generally there is during May a hot dry wind which no doubt acts on the acids of the fruit." Professor C. F. Baker of Pomona college, an economic botanist of wide experience in tropical countries and a scientist of more than national repute, predicts a great future for the mango in California, and believes the establishment of a mango industry is only a matter of testing as many varieties as it is possible to obtain and finding those which are suited to this climate. The mango has never been given a thorough trial in California, in fact it has scarcely had any trial at all, the few trees which have been planted being seedlings of Mexican fruits from locations widely different in climatic conditions from ours. These trees have, however, withstood the climate for as much as 25 years in one case at least, and made considerable growth and produced fruits of fair size.

A plant which promises to far surpass the strawberry guava as a popular favorite is feijoa sellowiana from South America, introduced into California in 1901 by Dr. F. Franceschi of Santa Barbara, whose untiring efforts for the last fifteen years or more have added many valuable and beautiful plants to California gardens. It is closely related to the guava and resembles it in habit and character. The green, egg-shaped fruits are of most delicious pineapple flavor, and are always appreciated by every one. It is perfectly hardy here, and indeed is found to be hardy in England, and it will probably rank as a commercial fruit in the near future, as it stands shipping perfectly. The shrub is most ornamental, and taken all in all, the Feijoa (pronounced Fay-zho-a, accenting the middle syllable) far surpasses the guava in points of value.

The white sapote (Casimiroa edulis) is a Mexican fruit which has been grown here to a very limited extent for many years, it being brought from Mexico by the Franciscan fathers and claiming the honor of being the first tropical fruit introduced into California. It succeeds perfectly, and the fruits which resemble in appearance an apple or a quince, are of most delicious peach-like taste. When its propagation is better understood, so that the finer varieties can be perpetuated, it will doubtless become common all over California.

The Cherimoya (Anona cherimolia) is fairly well known here already. It is easily grown and the fruits are sold at very remunerative prices in the local markets. The better varieties are of good size and delicious flavor and as these are now propagated by budding this fruit bids fair to become popular here and of considerable commercial importance.

A tree which will undoubtedly become important is the Queensland nut (Macadamia ternifolia). It is very ornamental, having dark green, holly-like leaves, and is quite hardy. The nuts are similar to filberts, but about one inch in diameter and have a much thicker shell. They are of very fine flavor, similar but superior to the Brazil nut, and are said to sell in the London markets for $2.50 a pound. Although the tree is a slow grower and does not come into bearing until seven or eight years old, it produces regular and prolific crops after that time and is certain to be a very profitable tree.

Numerous species of guavas (Psidium), many of them introduced by Dr. Franceschi, are proving well adapted to this climate and will be found valuable additions to our list of fruiting plants. These fruits are widely used in tropical countries for making jellies and jams, and will be grown here for the same purpose.

Several species of eugenias, such as E. Jambos, the Rose Apple, a fruit resembling an apricot but deliciously rose scented, are a success and will become popular in time, although it is doubtful if they will reach a commercial importance.

The papaya or papaw (Carica papaya), is very highly esteemed in tropical countries, has been successfully fruited in the open at Hollywood for a number of years. While the fruits produced have been small and scarcely palatable, by the introduction of varieties better suited to this climate this fruit might become a valuable acquisition. It seems more tolerant of cold than excessive moisture, and for this reason might be found better suited to the dry interior valleys than to the coast country.

There are numerous other fruits which are little known as yet, and the list of fruiting plants which will succeed in California is constantly being added to, so that many which are not known here at present will in time prove their citizenship, and thus through the efforts of those interested in the introduction of economic and fruiting plants, our horticultural wealth will all the time be increasing.

Pasadena Star Oct. 27, 1911

FALL SHOW GAINS HIGHEST OF PRAISE

Distinctly Worth While, Is the General Verdict of Those Who Have.

IT REFRESHES AND ASTONISHES

Gardeners' Association Is Working to Get Horticultural Hall.

"Have you been to the flower show?"

This is the question many people are asking today.

"It is distinctly worth while. Leave everything else you have to do and go if only for an hour," said Prof. I. N. Smith this morning, and he reflected the opinion of others.

"The show will refresh you, it will astonish you, it will give you new ideas of beauty, of the capability of the growers, of the care of the amateurs, and will make you more satisfied with life," said another enthusiast. "Don't overlook it; let nothing interfere with a visit to the big tent. You will come out with new ideas, you will see marvelous forms of flowers and shrubs and you will be all the better prepared to go on with your own business. This sounds extravagant, but try it for yourself," he concluded.

For Horticultural Hall.

Although the attendance at the flower show yesterday was not as large as anticipated, chiefly on account of the showers early in the evening, it is expected that the Maryland auditorium will be taxed to its capacity today. Usually the flowers have begun to wilt by the second day of the show, but this year the weather has been so favorable that the show is fully as good today as it was yesterday. The Gardeners' association has hopes that the receipts from this show will be sufficient to enable it to start work on the Horticultural hall, which it plans to build as a permanent exhibition hall for the spring and fall flower shows. Last fall considerable money was made on the show, and if the profits are as good this season the Horticultural hall, which has been the dream of the association for several years, may become a reality."

The collection of chrysanthemums exhibited by Miss Sadie A. Thomas, a professional grower, gives one an idea of the great variation in form and coloring to be found in this class of plants. Miss Thomas possesses perhaps the larget collection of chrysanthemums on the coast, and has exhibited some of her choicest flowers. Among these a number will be seen which are quite out of the ordinary, and altogether the exhibit is one of the most interesting in the show to the lovers of this flower.

Beautiful Display of Dahlias.

One of the greatest attractions of the show is the large and beautiful display of dahlias. The private exhibit of Mrs. Eva Fenyes is only second in attraction to the professional display of J. J. Bromall, which is the finest display of dahlias ever shown in Southern California. Mr. Bromall has staged between three and four hundred distinct varieties, embracing every color and shade known in the dahlia family.

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botanists of the Pacific coast. This firm always exhibits a number of Dr. Franceschi's new introductions, of great interest to plant fanciers and those interested in new and rare plants. This year Musa Ventricosa, a new banana from Rhodesia, which is considered much superior to the common Abyssinian banana, is one of the most important, and in fruiting plants Lucuma mammosa, Myrtus arrayan and Cupania sapida are things of interest to all horticulturists and of promise for California.

The Fertilizer Law

Comments by a Firm which Handles Fertilizers Largely.

THE CUBA MAGAZINE is indebted to a very well-known American company for the following comments on the fertilizer bill, which we printed in full in December. These comments were prepared by the company's home office, "up north." They give in detail the home office's point of view.

We are indeed very glad that Cuba is working toward the adoption of a fertilizer law, and we are particularly gratified by those paragraphs granting exception of duty on raw materials for fertilizer purposes. This is certainly a step in the right direction tending towards the betterment of agricultural conditions. However, there are a number of points as outlined in the present law and regulations which are absolutely impracticable and under which it will be impossible for manufacturers to work.

There are no comments to be made on Articles 1, 2 and 3 of the proposed law.

Under Article 4, it will be necessary for the *original* certificate of analysis to be posted in a visable place by every manufacturer or merchant selling any fertilizer, that is to say, a separate analysis will have to be made of every shipment of every brand made, either from the factory or from any retail dealer. This analysis must be made by an authorized chemist, and the supposition is that the chemist of the manufacturer will not be an authorized chemist.

Article 5, in stating what the certificate of analysis must state, mentions that the nature and condition of the combination of original materials shall be stated. This means separate analysis for every ingredient of every mixture that is made by the manufacturer, with corresponding expense attached.

Article 6 states that fertilizers intended for tobacco shall show the quantities of chlorine, sal soda and any free acid whatever. There are free organic acids and free phosphoric acid which are beneficial to plants and should not be legislated against. A definite statement as to what acids should be inserted, if this clause must necessarily be left in the law,—inasmuch as it is contrary to the best interests of the manufacturer to have objectionable free acid present, we think that this clause may well be omitted from the law.

No comments to make on Article 7 unless there is the intention to restrict the sale of goods for one crop while the bags are printed with the information that it is for some other crop.

Article 8 states that a copy of the contract of sale must be sent to the Secretary of Agriculture, Commerce and Labor for every sale made and that no sale shall be made, no matter how small a quantity, without a formal signed contract being made. As this clause reads: if a manufacturer sold to a dealer and he again sold to a farmer, two copies of contract covering the same goods would have to be sent to the secretary. In case the fertilizer tonnage of Cuba became any great size this would mean a mass of correspondence and clerical work in the secretary's office which we think would be entirely without benefit to the records of the country.

Article 9.—In case it is desirable that the percentage of chlorine, lime, soda, free sulphuric acid and magnesia, be restricted for certain crops, the law should be so drawn that a certificate or statement by the manufacturer giving the maximum percentage of any one of these ingredients present, should be sufficient, rather than insisting on the expense of analysis for each one of these ingredients on every sale.

No comments on Article 10 or Article 11.

Article 12 is very satisfactory indeed to us and shows the intention of the senators towards the proper appreciation of the benefits to be derived by the farmers and the entire country from the use of commercial fertilizers.

There are no comments to be made on Articles 13, 14, 15 and 16

July 13, 1911.

CALIFORNIA CULTIVATOR

Citrus and Tropical Fruits

THE FEIJOA: A COMMERCIAL POSSIBILITY.

By F. W. Popence.

The feijoa is one of our more recent acquisitions of a subtropical nature which gives promise of becoming of commercial importance in the near future. While native to southern Brazil and Uraguay, it has proved hardy wherever tried in California, and is even grown outdoors in England, so that the area in which it can be grown in this country is necessarily a large one, and the question of hardiness, always an important one with introductions from tropical countries, is satisfactorily disposed of. It has been grown in California for ten years, and thoroughly proved its adaptability to this climate in every respect. But like almost all other fruits, when grown from seed it is liable to considerable variation; thus many of the fruits produced here have been of inferior quality. The only thing needed

Feijoa—Natural Size

to set it on a firm commercial basis is the propagation of some of the finest varieties by some vegetative means. When this is done there is little doubt that the feijoa will take a place among California's commercial products, and the fruit will be shipped to all parts of the country. To be a commercial possibility, a fruit must be absolutely dependable in regard to quantity and quality of its crop, and this the feijoa in the seedling form is not.

In growth and character the feijoa (pronounced, according to the Century Dictionary, Fay-zho-a, accenting the middle syllable) much resembles the common guavas. It is in fact closely related to the guavas, all being members of the natural order Myrtaceae, or myrtle family. The plant grows to an ultimate height of eight or ten feet, making a very ornamental shrub, with brilliant and attractive flowers, silvery white in color, with a tuft of crimson stamens tipped with golden anthers, and foliage of a pleasing combination, glossy green above and silvery white beneath. Planted as a hedge it combines utility with beauty.

The fruits are about the size and shape of a hen's egg, green in color, with sometimes a touch of crimson on the cheek. The skin is thin, as in the case of the guavas. Next the skin is a layer of granular flesh, which surrounds a quantity of white, translucent, melting pulp, in which the seeds are embedded. The flavor of the fruit is one of the most delicious imaginable, combining the flavors of pineapple, raspberry and banana. This flavor combined with the aromatic odor which the fruits possess, is sure to be a winning combination. The seeds are from fifteen to thirty in number, and are so small that they cannot be felt in the mouth, being in fact no larger than strawberry or fig seeds.

The fruit is commonly eaten out of hand, but it can be cooked in almost any way, crystallized, made into jams or jellies, or prepared in numerous other forms, in any of which it is delicious.

The season of ripening is from November to January, but the fruits do not ripen on the bush. They will fall when mature, and can be then taken into the house and laid away for a week or two, when they will be in a fine condition to eat. They keep for a remarkable length of time, and can be shipped to any part of the country in perfect condition.

The culture of the plant is simple, and no difficulties of this nature will be encountered by any who attempt to grow it. While frequent irrigation during the dry season greatly encourages growth, the feijoa is a great drought resister; one of the original plants introduced from France ten years ago, growing on Dr. Franceschi's place at Santa Barbara, has never had a drop of water except from the skies, and yet has made a good growth and is bearing regularly. The plants usually come into bearing the third or fourth year from the seed.

This shrub was first brought to Europe by Edouard Andre, and being found well suited to the climate of Southern France and the Riviera, was planted quite extensively, and the fruit is now produced on a commercial scale. From France it was first introduced to America in 1901, by Dr. F. Franceschi of Santa Barbara, well-known as an economic botanist and introducer of new plants. The few plants which formed the first introduction were distributed over Southern California, and are almost all of mature size and fruiting prolificly and regularly at the present time. Numerous seedlings have recently been raised from them, many of which are just commencing to bear, and among which there is considerable variation in the size and quality of the fruits produced.

There seems to have been some misunderstanding regarding the introduction of this fruit, and Dr. Franceschi has been done an injustice by an article regarding Luther Burbank in a recent number of the Scientific American, in which the feijoa is illustrated and the statement made that it is a fruit never before grown in the United States. Dr. Franceschi's first importation from France was without doubt the first introduction, and these plants have been fruiting here for at least six years.

Pasadena Star, Oct 28, 1911

EXHIBITS ARE DRAWING WELL

Great Fall Flower Show to Be Continued for One More Day.

DISPLAYS BEING WELL REPLENISHED

Weather Keeps Blossoms in Good Condition to Show to Advantage.

In spite of the threatening weather yesterday afternoon and evening, the attendance considerably passed the thousand mark. With the sun showing itself again today and the promise of good weather, the gardeners are confident of a large attendance this afternoon and evening.

One man who was admiring some of Mr. Garvey's chrysanthemums last night was heard to remark: "If I had known what was in here, and they had asked me a dollar and a half admission at the door, instead of 25 cents, I wouldn't have hesitated a minute to pay it. Why, this is the biggest treat I have had this year." This seems to express the sentiments of everyone who has seen the show.

Mr. Broomall's dahlias still continue to be one of the chief attractions. With the replenishing of the exhibit every morning, this display is now as good as it was the first day. The exhibit is admitted by everyone to be the finest show of dahlias ever seen on the coast.

Vieing in popularity with Mr. Broomall's dahlias is the exhibit of tropical fruits by the West India gardens. Yesterday many were given an opportunity to sample the cherimoya, and some of the other Mexican fruits. The cherimoyas are proving to be a prime favorite with everybody.

Mr. Jaeger of the Orchid florist shop is staging this morning two new exhibits, using in one a large quantity of Prima Donna roses. This rose is a new one on this coast, and is believed by the florists to be superior to the American Beauty.

The display of double petunias by the Theodosia Shepherd company of Ventura is the finest ever seen here, and the immense fringed flowers are a revelation to those who only know this flower as it is commonly seen in gardens.

Will S. Laurie's display of dahlias is also popular. The flowers are attractively shown in large vases, and are some of the finest in the show, comprising many choice varieties.

The oddest thing in the dahlia line is that shown by the Montarioso nursery. Hidalgoa Wercklei is the name it goes by, and it is the only climbing dahlia known. It grows on a rampant vine and the flowers are quite attractive, though small. The Paraguayan snail vine shown by this firm is also attracting attention, while the black pea, Chinese litchi nut, ginger and jujube fruit are all of interest to plant fanciers.

Many of the exhibits have been replenished today, and because of the cool and damp weather which has prevailed throughout the show, the flowers are in as good condition, with a few exceptions, as when the show opened.

Wright's flower shop of Los Angeles made a decided hit with the women who attended the show yesterday afternoon, by distributing bonquets of hothouse-grown Killarney roses. This will probably also be a feature Sunday evening.

WILL BE KEPT OPEN TOMORROW

Because of the stromy weather of the last two days, which has prevented many from seeing the flower show, the committee has decided to keep the show open until Sunday evening, so as to give everyone a chance to see it. The show this year possesses so many unique features, and the display of cut flowers is so extensive, that it was thought advisable to continue it one day more.

Everything in the cut flower line looks as fresh as it did Thursday morning. Many of the exhibits have been replenished, and the cool weather has been so favorable to the cut flowers that the usual bedraggled condition in which they are seen the last day of the show is not noticeable. Contrary to the usual custom, the flowers will not be auctioned off at the close of the show, as that comes on Sunday in this instance.

The Feijoa: A New Commercial Fruit

By F. W. Popenoe, Altadena, Cal

AMONG THE FRUITS which have have been exploited as commercial possibilities in California within the last quarter of a century there are few which possess so many commending characteristics as Feijoa Sellowiana, and although subtropical in nature, like the orange, it has been thoroughly proven to withstand greater cold than almost any other subtropical fruit, and thus the area suited to its culture in this State is great.

The cultivation of the Feijoa in this country dates back about ten years, to July 1901, when a shipment of plants was received from Southern France by Dr. F. Franceschi, of Santa Barbara, through whose untiring efforts during the past twenty years an immense number of valuable plants have been introduced to California. These plants were set out in different localities in the southern end of the State, and in the course of a few years' time came into bearing. It immediately became evident that the Feijoa was pre-eminently adapted to California's climate and conditions. The hardiness of the plants, however, was not attested as much by those planted in Southern California, which were all grown in comparatively mild localities ,as by its behavior in France, where it had been cultivated since 1890 and recorded to have withstood without injury a temperature of 5 degrees Fahrenheit above zero. But the fruit produced here was fully the equal in quality to that produced in France or the native home of the Feijoa, Uruguay and Brazil, and attention was soon attracted to it as a very desirable and important addition to our already long list of fruiting plants. A number of trees were propagated, and have now come into bearing, and the popularity of the plant has become such that commercial plantings are being made, and the next few years will undoubtedly see quite an area devoted to the cultivation of this promising fruit.

Feijoa Sellowiana, as this plant is known to botanists, is a native of Southern Brazil, Uruguary and Argentina. It is highly esteemed in its native home and this fact led Dr. Edouard Andre, the noted French botanist and landscape architect, to take home with him on his trip to South America in 1890 several live plants, which were planted out at his villa on the Riviera. Here the plant was a great success and attracted wide attention in Southern France.

In growth and character the Feijoa is quite similar to the Guava, it being a member of the order Myrtaceae, or myrtle family, to which the Guava also belongs. The plant is valuable even as an ornamental, the contrast between the glassy green of the upper surface of the leaves and the silvery white of the lower side being very striking. The flowers are also striking, and are produced in the spring. The ultimate height attained by the plant is about 10 or 12 feet, and it is broad and spreading in nature. The foliage is thick and leathery, being admirably adapte
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California, but it will not be advisable to abuse this characteristic or it will result in the production of small and inferior fruit. Good cultivation and a light, loamy soil containing plenty of humus, are factors which are necessary for best results. California soils seem to be particularly adapted to the Feijoa and for localities never experiencing temperatures below 8 or 10 degrees above zero it can be strongly recommended, and possesses great promise both as a fruit for the home garden and as a money maker for cultivation on a commercial scale.

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drawn the attention of many American capitalists to the profits in this field of endeavor; and in view of this interest it would seem that a brief description of the methods of culture and the cost of production, together with an estimate as to the cost of establishing a complete sugar estate in Cuba, might be of assistance. With this object in view the writer has collected, from planters, engineers, and inventors in the industry, data bearing on the cost of production and the profits to be expected. It must be stated, however, that these figures are only approximate and many

We were reminded of all this by Mr. Popenoe's article on "Opportunities in Tropical Fruits," printed in this issue. There he invites fruit growers one and all to make the most of their special chance in a special line to work out the Creator's best designs in horticulture. The mulgoba mango is new to us. The Hindus have made it, we say: but they had a beginning to work on,—a thready, turpentiny horrid thing pendant on a big tree so tall Eve could barely grab a sample, and doubtless she wished she hadn't succeeded in doing even that. Some of the fruits now commonest in Cuba are in just about the condition in which that lady knew them when she named them according to what they looked like. We would be willing to bet that the original guava hadn't a seed more in it than the last one we broke a tooth on, finding trouble ambushed in a shortcake.

Think as we will we can fancy no labor more worthy a man than this one: to live in the open, subject to none, and to help bring Creation up to what the Creator intended when he did in truth make Heaven and Earth, in six days, if you will have it so (there is no evidence to the contrary). —but made them in potentialities, and gave Man all Time in which to work them out to the utmost of their possibilities. When we have achieved the fullness of Earth's capabilities, who knows but what we shall find it converted into Heaven itself, and, looking up from hard work, we shall discover in ourselves His truest likeness, no longer disguised as an orang-outang, good friend of old, nor even as our present selves, unemancipated, but in our true shape and nature, such as He had us in mind when He laid the commencement of all things in the core of a single germ "in the Beginning."

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which were organized in the United States and old charters granted by different States, but whose stock is owned by persons other than Americans. Their investment amounts to a very small percentage of the whole. The distribution of this total investment through the different Provinces of the island is as follows: Pinar del Rio, $750,000; Habana, $3,000,000; Matanzas, $5,750,000; Santa Clara, $14,500,00; Camagüey, $4,700,000; and in Oriente, $25,300,000.

There are in the island at the present time 173 active mills, of which 34 are

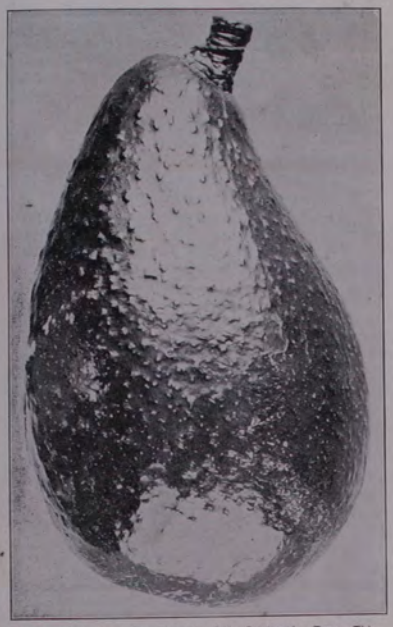
[1] We disagree with this remark. There are great possibilities for the further development of the sugar industry in western Cuba.—Ed.

Citrus and Tropical Fruits

THE COMMERCIAL AVOCADO.

(By F. W. Popenoe, Pasadena.)

At the present moment the question of greatest importance to prospective avocado growers is, "What are the best varieties for commercial purposes?" We have as yet no standard varieties, and it will be well, therefore, before the industry becomes established, to consider the characteristics required in an avocado for commercial purposes, and to obtain only those which come nearest to the ideal in every respect. It would be dangerous, to say the least, to rush into such an extensive industry as this promises to become without having thoroughly considered the question of varieties and having obtained the very best to be had for our purposes. Eventually the better varieties will come to the front any way, and loss of time and disappointment will be avoided by giving careful thought to this matter in the beginning, and securing nothing but the very best for our plantings.



The Lyon Avocado, a Fine Example of the Guatemalan Type. This Specimen Grown at Hollywood. Natural Size

The most promising field for varieties suitable to this climate is, without doubt, Mexico and the adjoining Central American countries. Varieties from these countries have already been tested in different parts of Southern California and proved much better adated to the climate than the Hawaiian or Cuban types. But in this connection there is one point worthy of mention—it should be remembered that there is considerable difference in climatic conditions between the seacoast and the mountainous regions of the interior in all these American countries. It is from the higher altitudes only, at which the climate is in many cases similar to our own, in regard to temperature at least, that we should obtain our varieties. In this way we will get those that are best adapted to this climate. The sea coast region is invariably the same all through the tropics—hot and humid; and avocados from such regions should be left strictly alone. The numerous small purple avocados which are fruiting here now, and which have proven so hardy, in some cases standing without harm frosts which have been very injurious to the citrus trees, are an example of what can be expected in the way of hardiness in avocados obtained from the higher altitudes of Mexico. There are numerous varieties in that country fully as hardy as these small purple ones, and vastly superior in size. We have, of course, to take all points into consideration in selecting commercial varieties, and this question of hardiness is by no means the least important. There are doubtless limited areas here where the Florida and Hawaiian varieties will succeed, but if we can obtain others, fully their equal in size and quality, and considerably hardier, the area in which this fruit can be profitably grown will be greatly extended, and a larger number of people benefited.

Undoubtedly the best season for marketing avocados will be the winter, when there are few other fruits in the market and high prices will be realized. For our main crop, therefore, we should select winter bearing varieties. These we can obtain from Mexico in unlimited numbers. The Guatemalan varieties are also winter and spring bearers and extend the season into May, considerably later than most of the Mexicans. It will, without doubt, be possible to obtain a set of varieties for California which will extend the fruiting season over the entire twelve months of the year, a fact which will be the occasion of much rejoicing on the part of all lovers of the avocado. Already we have varieties fruiting here which provide fruit continuously from August to May, but these are mainly inferior varieties and are only mentioned to show what has already been accomplished in this direction. In Florida the season is limited from late summer to the holidays; the Trapp, their latest variety, going out of market in January at the latest.

The prolificness of a variety is a point in which the grower is naturally much interested. With the avocado, as with many other fruits, there will be found some varieties which are shy bearers. It will be necessary to look out for this and plant only those that will produce sufficient fruit to make them profitable. Most of the Mexican varieties are prolific; it is usually only the extra large ones which are shy bearers.

An idea which is held by many is that the larger the fruit the better. The experience of the Florida growers has proven conclusively that this is not the case when it comes to a question of market fruit. A two-pound avocado is certainly a regal fruit, but for commercial purposes one of half that size is much better. It is the belief of those who have had much experience that an avocado of over one pound and a half is too large. There seems to be more profit in growing the smaller fruits. Of course there is the possibility of the other

extreme—too small a fruit, but the tendency seems to be to grow fruit of the largest size possible. If we keep between 15 and 24 ounces we will probably be safe in this respect.

It has been found very desirable for shipping to have fruits oval or round in form; the necked varieties necessitate considerably more care in packing, and even then are much more liable to injury in transit. The oval or round fruits can be sized in an orange or grape fruit sizer, packed much more compactly and easily, and greatly lessen the danger from bruising in transit. For local consumption the pear shaped fruits are as good as the other forms, and as this form is preferred by some we should certainly not overlook it.

Quality is, of course, a point which must always be given first consideration. Even if ideal in every other particular, a fruit of inferior quality would be undesirable in the extreme. There is a good deal of difference in the flavor and richness of the different fruits, and occasionally a variety is found which goes so far as to be "watery." Those containing the highest percentage of oil are naturally the most desirable from an economic standpoint. Sometimes there will be found numerous small fibres or "strings," as they are sometimes called, extending through the flesh from base to apex. This is a very objectionable feature, but fortunately is rarely met with in the large fruited Mexican varieties.

The skin should be sufficiently thick and tough to stand shipment to any distance. This will be easy to obtain, as many of the Mexican varieties, and also the Guatemalan, have this characteristic developed to a remarkable degree. The color of the fruit would also make some difference in its attractiveness. The purple varieties seem to sell best in the local markets, and in Florida the dark crimson ones are the most popular, but when the people are thoroughly familiar with the fruit this point will probably make little difference, unless some particular color or shade is found to denote a particularly good fruit.

The seed should in all events be tight in the cavity. It has been found that in shipping the loose seeded varieties, the seed in transit pounds the walls of its cavity and causes great injury to the flesh. This is a difficulty seldom met with in the Mexican varieties, but often encountered in Florida. The seed should of course be as small as possible. In time a seedless variety will no doubt be developed, as has been done with the orange and other fruits.

The Sinaloa Avocado, Natural Size

Parent Tree of the Harmon Avocado, Growing at Sherman, Cal. This Tree is Thirteen Years Old, and Shows a Fine Orchard Form for an Avocado

Avocado Tree of the Mexican Type Growing at Redlands, Cal., Showing What the Avocado May Become When Not Pruned or Cut Back

Subtropical Fruits

A Department of Tropical and Subtropical Horticulture

BY F. W. POPENOE

Notes on the propagation and culture of plants and trees coming within the scope of this department will be welcomed, and inquiries are invited.

INTRODUCTION.

The wonderful climatic conditions of California, and especially of the southern portion of the State, permit of the growing of many plants and trees usually found only in the tropics. Some of these, as the Avocado, Cherimoya, White Sapote and Feijoa, have been tested here for a series of years and are known to be adapted to the climate and soil. Others are in the experimental stage. But the rapid development of this phase of our farm and garden life is surprising, even to Californians themselves.

It is for the purpose of giving reliable information regarding the culture and usefulness of these new, yet important, additions to our horticultural wealth, that this department has been established by the Western Empire.

The White Sapote.

Although it was one of the first tropical fruits to be planted in California, the White Sapote is but little more extensively grown at the present time than it was half a century ago. The principal reason for this would seem to be that the first trees planted here produced very inferior fruits, and discouraged further planting. But with the increasing attention now being given to the development of tropical fruits the White Sapote seems destined to become of importance.

Botanically it is known as Casimiroa edulis, and is native to Northern and Central Mexico. It is there cultivated to a considerable extent as well as occurring quite commonly in the wild state, and the fruit is in great demand with the natives. The tree is handsome, having large, palmate, bright-green leaves, glossy on the upper surface, and with age forms a dense, dome-shaped head of foliage. As an ornament alone it is of value, and possesses good possibilities as a street or avenue tree.

The fruits greatly resemble in appearance an apple or a quince, the best specimens being as large as a good-sized apple. When fully ripe the pulp becomes quite soft and has been described as of a delicious, melting, peach-like flavor. The normal season of ripening is from October to December, but the season varies with different varieties, some coming on late in the summer and others extending the season late into winter and in one case clear into May. The fruit may be picked as soon as fully developed and ripened in the house, and is then as good as though ripened on the tree.

ever, are inferior or worthless, and it is only occasionally that a really choice one is found. Of these local varieties only three have been named and described, the Harvey, Paroquia and Gillespie. The Harvey is the largest of the three, and is more highly colored than the rest, it being quite yellow when ripe and overspread with orange on the cheek. It originated at Sierra Madre and as it is a prolific bearer is certainly one of the choicest. The Gillespie originated near Santa Barbara, and although somewhat smaller than the Harvey is of rather finer flavor, but never attains any brighter coloring than a dull green. These varieties are both fall ripening. The Paroquia variety originated in Santa Barbara, and is particularly notable for the fact that it ripens its fruit from October to May. It is oval in form, while the others are round, and instead of having five or six seeds has only two or three. In flavor it is equal to any of the others and on the whole can be considered as one of the best varieties which have originated here thus far. As young trees are coming into bearing every year a number of worthy new varieties will doubtless appear before long.

AN IMPORTANT AVOCADO EXPERIMENT.

The United States Department of Agriculture has recently sent to Southern California a large number of budded avocados which are to be planted by co-operators in different localities. The shipment consisted of four sets of about eighty trees each, one set going to each of the following localities: San Bernardino, Pasadena, Whittier and Altadena. These trees were propagated at the Department's Subtropical Laboratory at Miami, Fla., and contain the cream of all the Florida varieties, named and unnamed, and also desirable varieties from other parts of the world, including Guatamala, Mexico, Cuba, Hawaii, Bahama Islands and Canary Islands. All of the standard Florida varieties, Pollock, Trapp, Mitchell, Baldwin, Family, Wester, Blackman and Peacock are included in each set. The purpose of the department in sending out this material is to assist in the development of the avocado industry here by giving a thorough trial to the Florida varieties to determine whether they are suitable for commercial culture in Southern California and also to try out types from the other localities mentioned.

The Feijoa, or Pineapple Guava.

For the past few years the Feijoa Sellowiana has been attracting increasing interest as a commercial possibility for all parts of California, and it has now reached the point where small plantations are being made. It is only ten years since this plant was first introduced to California, but the time has been sufficient to prove it admirably adapted to the climatic conditions of nearly all parts of the State, and to demonstrate that the fruit is of such superior quality and value as to warrant its cultivation on an extensive scale.

The feijoa is allied to the guavas and closely resembles the latter in growth and character. The shrub grows to a six or eight-foot height, or under the most favorable circumstances, to ten or twelve feet, and is so ornamental that it would be well worthy to cultivation if it produced no fruit. The leaves are small and leathery, glossy green above and white beneath. The flowers are very attractive, the long tuft of crimson stamens contrasting brilliantly with the silvery white petals, and forming a very striking combination.

But as closely as the feijoa resembles the guavas in foliage and flowers, it far surpasses any of them in the value of its fruit. There is no doubt but that an almost unlimited market could be developed for the fruit, and as it stands shipping perfectly there is no reason why feijoa culture should not play an important part in California horticulture. The fruits ripen in December, another point in their favor, as at this season the market of the country are shy of almost all other fruits and the demand for feijoas would be great.

Hitherto the feijoa has had no "common" name, but it has now been christened "pineapple guava" and it is expected it will be popularly known under this name in the future. In the land of its nativity the name "guayaba" is applied to it by the inhabitants, this being the same name applied to the guavas. Being so closely allied to the guava it can correctly be called a guava, and the distinctly pineapple flavor of the fruit has suggested that appelation.

THE HARVEY WHITE SAPOTE, GROWN AT SIERRA MADRE, CALIFORNIA.

The propagation of the tree is very simple from seed, but up to the present time no effort has been made to bud or graft superior varieties. Without doubt this will be done within the next year or two, and this would enable commercial plantings of good varieties to be made with assurance of satisfactory results. As with many other fruits, the White Sapote does not always come true from seed, and the only way to perpetuate a choice variety will be by some vegetative means.

The tree has proved hardy in Southern California, and the fact that it is found in Mexico up to altitudes of 7000 feet would lead to the belief that it can be grown almost anywhere in California with no fear of injury from frost. In addition to being considerably hardier than most other tropical fruits, it is extremely drought-resistant, and should be valuable for locations with a scanty supply of water. Seedlings do not as a rule come into bearing until 8 or 9 years old, but this difficulty would doubtless be done away with by budding or grafting.

Although there have been but few trees planted in California, the variation [illegible] number of varieties originating here. Most of these, how-

THE LITCHI (Chinese Nut.)

The cultivation of the Litchi forms an important industry in China. The dried product is familiar to almost every one in California, but it is well to note that the fruit when fresh is quite a different article from the dried "nuts" so common here around the Chinese New Year. All past experiments indicate that the Litchi would be a success in the warmer portions of Southern California, and grafted plants have recently been introduced with the idea of making a definite test of the proposition. A few seedlings in different localities have made a very satisfactory growth and a tree of the closely allied Longan at Hollywood has been producing regularly for a number of years. The Litchi can not be depended upon when grown from seed, and although a number of grafted plants were introduced from China quite a few years ago none of them lived, and the only test of the tree has been supplied by the seedlings. Since the Department of Agriculture has taken the matter up and is propagating grafted trees of the choicest varieties, it is probable that the tree will be- [illegible] industry may be developed.

OCTOBER, 1911.

Subtropical Fruits

A Department of Tropical and Subtropical Horticulture

BY F. W. POPENOE

Notes on the propagation and culture of plants and trees coming within the scope of this department will be welcomed, and inquiries are invited.

PROF. C. F. BAKER OF POMONA COLLEGE.

Professor C. F. Baker of Pomona College: The work of Professor Baker in subtropical horticulture is doing much for the enrichment of our knowledge along this line. He has been a lifelong student of economic botany, and a very enthusiastic one, and has had many years practical experience in the American tropics. He also has great natural ability, and a love for horticulture that is exceptional. He is thus qualified in an unusual degree for this work.

Although appreciating the tremendous advance already made in this field of endeavor, Professor Baker holds that we are still at the very beginning of our opportunities in subtropical horticulture and that the future holds a development for Southern California we have no conception of now. To advance the day when we will producing a great number of valuable tropical fruits which are now known here only by name, or hardly that, he is directing a large portion of his work at Claremont, and in awakening an interest in this field of usefulness he is being singularly successful.

GUAVAS FOR SOUTHERN CALIFORNIA.

Aside from the popular strawberry or Cattley Guava, found in almost every garden in Southern California, no other species of this highly esteemed tropical fruit are in general cultivation here, although there are several which have been grown in experimental gardens for a number of years and their adaptability to this climate thoroughly proven. At least two or three of these little known guavas are the equals of the strawberry guava, in the opinion of those who have had an opportunity to become acquainted with their merits. While some of the strictly tropical species are doubtless too tender for any but the warmest secticus of Southern California, there are many that will grow wherever the orange or lemon will.

One of the finest of all guavas is the araca (psidium araca,) which comes to us from Brazil and has so many good points that it seems destined to displace the strawberry guava as a popular favorite. The shrub it somewhat similar in general appearance to the latter, but it is considerably more dwarfish, growing usually from four to six feet in height, and the leaves are considerably broader, thicker and more glossy. The plant comes into bearing when very young, and at Pasadena has a habit of bearing two crops yearly, the first one ripening in late summer, and the second or main crop maturing late in the fall. It is certainly one of the most prolific of all guavas. The fruits are light yellow in color, an inch to an inch and a half in diameter, of fine flavor and entirely free from that mysky odor sometimes objected to. The seeds are about the size of those of the strawberry guava, but are not as numerous. The araca is about as hardy as the strawberry guava, and there is little doubt but that it will become very popular.

Quite distinct from the strawberry guava and the araca in both fruit and foliage is the Guiana guava (psidium guianense), said by some authorities to come from Guinea instead of Guiana and so properly psidium guinese, or Guinea guava. This much resembles the so called lemon guava (psidium guayava), which is rather common here, except that the fruits are much less seedy and vastly superior in size and flavor. The shrub grows to an ultimate height of eight to ten feet, the leaves are oval, and more prominently veined than in the strawberry guava, and not glossy. The Guiana guava, while not considered very hardy, will doubtless thrive where the lemon will. It usually drops its leaves during the winter months. The fruits, which ripen in late fall and winter, are round or pear shaped, from two to four inches in diameter, and light yellow in color on the exterior. The flesh is pinkish or whitish in color, and contains but very few seeds, a very remarkable thing for a guava. The flesh is sweet and of excellent flavor.

The common "lemon" guava (psidium guayava), of which there are numerous varieties, has been grown here to a limited extent for a number of years, but has not proved very popular, probably on account of the large number of seeds and the musky odor of the fruits. This odor is characteristic of nearly all guavas in a greater or less degree, and is sometimes objectionable to those unaccustomed to [illegible]

The yellow strawberry guava (psidium lucidum), is distinguished from the common strawberry guava mainly by the colors of its fruits, which are light yellow instead of purplish red. It is quite similar in growth and character to the last mentioned, but its fruits are considered by many to be much superior in flavor.

Another quite distinct guava is the sour guisaro (psidium molle), from Central America, almost unknown in Southern California, but evidently well adapted to this climate. It is of very dwarf habit, and its foliage closely resembles that of the lemon guava. The fruits are produced in late fall in the greatest profusion, and are about one inch in diameter, yellow in color, very seedy and extremely acid. They are said to be excellent for jelly making.

Numerous other species and varieties, many of them introduced by Dr. Franceschi of Santa Barbara, have not yet fruited in California, but give promise of being well adapted to the climate, and will doubtless in time be added to the list of guavas that can be successfully grown here.

A TEST OF INDIAN MANGOS.

To those familiar with it, the mango is considered one of the most delicious and valuable fruits of the tropics. Indeed it has been termed the "king of tropical fruits." In India it has been grown for centuries, and considerable attention has been given to the selection of the choicest seedlings for propagation, which has resulted in there being found in that country the finest mangos in the world. Through propagation by inarching, these choice varieties have been reproduced for planting, as seedlings in the majority of cases will produce inferior fruit, and are not dependable at best.

The United States Department of Agriculture has been interested in the development of a mango industry in Florida for a number of years, and to this end imported from India a large collection of the choicest varieties. Many of these have now been tested in Florida and the best are being propagated quite extensively for commercial planting. It has been found that mangos can be readily shipped from Florida to the northern markets, and the choice varieties often bring a price of fifty cents per fruit, which places the mango in the same class as the avocado as a profitable commercial fruit.

It has long been the belief of those in a position to judge accurately of the adaption of the mango to California climate and soil, that there are, in all probability, at least a few of the choice Indian mangos that would prove suited to this climate, and mango enthusiasts here have had a great desire to test a collection of the hardiest Indian varieties on that account.

Recently the Department of Agriculture has sent to California a large number of inarched trees of the choicest varieties from India and other tropical countries, and these will be planted out under the most favorable conditions and a careful trial given them. Under the strict quarantine regulations covering all plants imported from Florida, it has been impossible to obtain mango trees from the Florida nurserymen, and it required the assistance of the Department of Agriculture, to make possible the experimental planting of inarched trees.

The few seedling mangos which have been planted in Southern California have not given an accurate indication of the adaptability of the fruit to this climate, as they have as a general thing come from hot and humid tropical sea coasts, and as with nearly all seedling fruit trees, could not be expected to come true anyway. In several localities, however, they have made a fair growth and produced fruit in abundance, showing at least that the production of mangos in California was not an impossibility.

While many of the Indian varieties will undoubtedly prove too tender for this climate, a number of them which come from Saharanpur, in the north part of India, where the climate is considerably cooler than in the southern portions of the country, and more similar to our own, have a good chance of being a success here. The varieties sent to California include a large number from Saharanpur, several from warmer portions of India, and some from Brazil, Phillipine Islands and the West Indies.

The list includes the following named varieties: Langra Hardoi, Julie, Divine, Surkha, Chickna, Paheri, Rajapury, Salamar, Ennuris, Amini, Singapur, Bulbulchasm, Malda, Langra Large, Stalkart, Bhurdas, Sufaida, Jamshedi, Davie's Favourite, Mudgoba, Brindabani, Mullgoa, Caraboa, Fernandez, Ameeri, Faizan, Totapari, Sharvati Black, Hafu or Alphonse, White Alfonso, Punia, Langra, Itamaraca, Kachmahua, Mal- [illegible]

If any of these imported varieties prove suitable to this climate they can be readily propagated by budding or inarching and thus Southern California will be enabled to produce in commercial quantities, the choicest varieties of one of the world's finest fruits.

A NOTED HORTICULTURIST COMING TO CALIFORNIA.

The Hon. Parker Earle, formerly president of the American Promological Society, and now residing at Roswell, N. M., expects to move to California during the coming winter and take up his residence in Pasadena. Mr. Earle is well known to horticulturists all over the East because of his many years of active work along horticultural lines. He does not come to California to take up new work, but is, nevertheless, much interested in the avocado, and other of the subtropical fruits which it is possible to grow in Southern California. He has presented to the Pasadena Gardeners' Association, for its consideration, the rather startling query, is the avocado to take the place of meat as a staple food for the American people? He argues that, having all of the food value of meat, and since it can be produced more cheaply and in vastly greater quantity from the same amount of land, being at the same time a more attractive form of food than meat, it is destined to play a very important part in the future food supply of the American people. This argument is based upon sound logic and is certainly convincing. The changes which take place in such matters look when viewed in advance as hardly possible. But, coming gradually as they do, they seem perfectly natural when taking place. Twenty-five years ago banana importation was practically unknown. Now a hundred steamships are engaged in the business, the largest of which can carry sixty to seventy-five thousand bunches on one trip. The banana is more perishable than the avocado, and does not have the food value. Who is to say, therefore, that twenty-five years hence the avocado will not be a part of the daily food of our ninety millions of people?

THE DEVELOPMENT OF THE AVOCADO INDUSTRY

By F. W. POPENOE

Subtropical Fruits

A Department of Tropical and Subtropical Horticulture

BY F. W. POPENOE

Notes on the propagation and culture of plants and trees coming within the scope of this department will be welcomed, and inquiries are invited.

OPPORTUNITIES FOR IMPROVEMENT OF TROPICAL FRUITS.

Very few of the tropical fruits have ever been given any systematic attention with a view to the production of superior varieties either through selection or by breeding. Practically the only example of marked improvement over the wild forms is in the case of the mango, which has been under careful cultivation in India for centuries, and by the marching process choice seedlings were propagated and multiplied. The magnificent varieties now to be found in that country go to demonstrate the possibilities of tropical fruits when systematic attention is given to their improvement.

In the case of such fruits as the pineapple and the banana, which have been propagated asexually from time immemorial, the subject assumes a different aspect. Naturally enough, the aborigines would take suckers from the choicest plants to set in their provision grounds, and in this way through centuries of selection the individual variation of the plants has resulted in the present perfection of these fruits. Both have reached the state where the production of seeds is entirely done away with, and it would seem almost impossible to produce any further improvements in the fruits.

Particularly attractive are the fruits indigenous to the American tropics, as these have been known to Europeans but a comparatively short time, and have had no share in the slight attention that has been given to the improvement of such fruits.

It is a well-known fact that practically all tree fruits will not reproduce themselves true to variety when grown from seed. This has led to the production of numberless forms of the more common fruits of tropical America, such as the avocado, guava, white sapote, cherimoya, etc. Of these numerous and diversified forms many are so inferior as to be almost valueless, while some are considerably superior to the average. Through the application of modern methods of plant breeding what marvelous results could be accomplished in a short time with any of these fruits. Many fruits already considered choice would have their value greatly enhanced, while others classed as of no value could doubtless be improved to such an extent as to make them worthy of general cultivation. The present perfection of our temperate fruits, such as the apple, the peach and the pear, is only due to many years of patient effort on the part of those interested in their improvement. With the same opportunities there is little doubt but that such fruits as the avocado and the guava would undergo such improvement as to be scarcely recognizable to one who was only familiar with their present forms.

It is to be hoped that the day is not far off when these little known, but nevertheless valuable tropical fruits will be given the attention they deserve.

When they are, and when the general public comes to realize that there is the same difference between a budded mamey or avocado of a choice variety and a seedling of the same fruits, that there is between a budded Washington Navel orange and a seedling of some inferior wild type, the present misapprehension with which many of the tropical fruits are looked upon will disappear. No intelligent planter would consider for a minute the planting of seedlings of any of our commercial fruit trees, such as the orange, the apple, the peach, the pear and the plum. Yet this same thing has been done with practically all of the tropical fruits. In a short time people will come to realize this difference between unreliable seedlings and budded trees of a known variety, and the disappointment that has always resulted, and is still resulting, from the planting of seedling trees will be done away with.

BUD AVOCADOS THIS MONTH.

Local experience has shown that November is one of the very best months of the year in which to bud the avocado. While the operation may be performed with success at any time of the year in which the bark will slip, better results have followed budding in November than in any other month.

Seedlings intended to be budded should be in active, vigorous growth at the time of the operation, and for this reason field grown plants are preferable to those grown in pots or cans, as the avocado does not make nearly as vigorous growth when grown in a pot as when in the field. The best size of stock is probably about a half inch in diameter, although trees with a diameter no greater than that of a lead pencil can be budded with good success, the large stocks, however, producing a more vigorous and rapid growth of the bud, as might be expected.

The budwood must be young—of the last growth—as large as possible, with plump, well developed buds. If the buds are blown, that is, beginning to leaf out, they will nearly always drop after taking and leave a blind bud. Cut the buds large, an inch to an inch and a half long, according to the size of the stock in which they are to be inserted, and tie them in firmly with waxed tape. When they begin to swell and show signs of having "taken" which will be from three to six weeks after insertion, according to the season, they should be unwrapped, and then rewrapped loosely to prevent the bark from spreading away and leaving the bud exposed to the air at the point of union. The tree should then be lopped back to within six inches of the bud. Lopping is frequently a difficult operation with the avocado, as a vigorous growing plant will snap off rather than be lopped, and great care must be used in the operation, making a cut at an angle only part way through the stock, and bending it over very gently. The trees should be gone over frequently and all adventitious buds arising from the stock rubbed off. When the bud has made a growth of six or eight inches the stock may be trimmed back to it, and the tree allowed to develop until of suitable size to plant out.

THE FEIJOA.

This month an illustration is shown on the fruit of Feijoa Sellowiana, commonly known as "Pineapple Guava." This fruit is without doubt one of great promise for California and worthy of extended planting. And by its remarkable hardiness it seems quite likely to prove adapted to the entire southern portion of the United State, for it has withstood a temperature as low as twelve degrees above zero with no injury whatever. In a recent number of the Pacific Garden, P. D. Barnhart writes of it as follows:

FRUIT OF FEIJOA, OR PINEAPPLE GUAVA, NATURAL SIZE.

"That it is delicious beyond compare, and that it will bear transportation to long distances there is no doubt. Then, too, it is wonderfully drought resistant. By this expression we do not wish to convey the idea that it may be grown profitably without irrigation during our dry season. The uncertainty of the outcome should not deter every home maker in California from planting it for experimental purposes, and when a good one is found, one that is prolific of fruits, of large size, the finder should be paid a good price for it. A thousand dollars would be small compensation for such a tree, the profits that shall accrue to California from such an acquisition would be of incalculable value.

Subtropical Fruits

A Department of Tropical and Subtropical Horticulture

BY F. W. POPENOE

Notes on the propagation and culture of plants and trees coming within the scope of this department will be welcomed, and inquiries are invited.

THIS MONTH'S WORK.

In localities subject to considerable frost, attention should now be given to providing some form of protection for young avocados, mangos, cherimoyas or tender guavas that have been set out during the summer, or that have not yet formed wood of sufficient maturity to enable them to withstand cold weather. After these trees have gone through their second winter, and have formed mature wood, they will withstand temperatures without injury that would have been fatal to them in their first year. Protection can be given in a number of ways, either by means of palm leaves or corn stalks, as with citrus fruits, or by constructing a frame around the plant and covering it on the top and three sides—leaving the south side open—with burlap.

Avocado budding may still be continued. Buds put in as late as December or January will have to be left dormant until the advent of warmer weather in April or May. Feijoas are now ripening, in the majority of cases, and the seeds should be planted as soon as they are removed from the fruit. For Feijoa seed a very light soil is necessary, and one containing little humus or manure, as these give rise to the fungus known as "damping off," quite fatal to the young plants. The seed will germinate in about one month, and the plants should be potted into two inch pots as soon as they have formed their second leaves. Guavas and Eugenias of several species also ripen during this month, and the seed should be planted promptly. If a glass-covered frame or hotbed is available, germination will be much more prompt.

VALUE AND USES OF THE AVOCADO.

Much has been written lately of the uses to which the avocado can be put as an article of food. In the countries where it is native it is one of the most highly valued of food products. Senor Santiago Martinez contributes the following notes on its uses and the esteem in which it is held in his native home, the Huanico Valley, in Peru. There this fruit is known under the name of Palta, while in Mexico and other Spanish-speaking countries it is known as Ahuacate, and the English have corrupted this name into avocado, which has now been accepted by our government as the most desirable name for an English-speaking people.

The people of the palta's native clime, which is Peru, South America, never peel it, but when it is fully ripe (it should never be eaten until it is fully ripe,) cut it in halves, remove the pit or stone, leaving the soft oily meat in its own jacket, which makes a very convenient cup from which to eat it. It is seasoned with salt and pepper, either black or cayenne, and is eaten from the shell or spread as butter on bread, in which way it is most delicious.

Seasoned with a few drops of lemon or lime juice it makes a most delicious dressing for cold meats, especially lamb, veal, beef, or tongue.

Try palta salad with a pinch of mustard, with cold baked salmon, if you care to leave the supper table in love with the entire human family, the Digger Indian thrown in.

Dr. Valdevaso, a physician of much eminence in the city of Huanico, once said to me: "I have never known a case of indigestion, sour stomach, or constipation with my people who use the palta as a part of their daily food, and many who come from the coast seeking health, who were afflicted with indigestion and its kindred diseases, have been restored to perfect health simply by the free use of the palta as a food."

Let every person living in a semi-tropical climate cultivate the palta in his garden, giving it the greatest care, as it means much to the health of a family, and they will soon learn to appreciate it as one of God's most precious gifts to man.

I would prize a bearing palta tree in my garden above all other fruits I know, except perhaps the king of all fruits, the good old-fashioned apple, and I would rather have one palta tree in my yard than two apothecary shops and a doctor."

THE QUEENSLAND NUT.

As a commercial proposition for Southern California the Queensland nut (Macadamia ternifolia) certainly possesses good possibilities. This tree has been grown here for fifteen or more years, and has proved to be admirably adapted to our conditions in every respect, even to being extremely drought-resistant and able to withstand our dry seasons without artificial irrigation.

In Australia, where the tree is native, the nuts are gathered from the wild trees, and it is reported that a shipment made to London found a market at a price of ten shillings, or $2.50, a pound. No large quantity has as yet been placed on the market, but the quality and value of the nut lend to the belief that it would find a ready market in this country at a very remunerative figure. The trees are prolific bearers, although like most other nut trees they do not come into bearing until about the seventh or eighth year.

The nuts are round, about an inch in diameter and have a thick shell. The kernel is round and of a flavor greatly resembling, but superior to, the Brazil nut. A tree growing in the Elysian Park botanic garden at Los Angeles is producing a good quantity every year, although it has no artificial irrigation, and at the Gillespie place in Montecito, near Santa Barbara, there is a tree about fifteen years old, which has made a splendid growth, and is bearing regularly. Aside from its economic value of the tree is a most ornamental one, so that the planting of one or more trees in private grounds is recommended, and small commercial plantations would undoubtedly prove profitable.

THE TREE TOMATO.

A fruit which ripens during this month, and is not uncommon in Southern California, but nevertheless little known is the Tree Tomato (Cyphomandra betacea,) a native of Central America. It is a shrub of rapid growth, attaining a height of eight to ten feet, and is quite striking in appearance for its large and shining leaves, frequently a foot long.

The fruit is produced in the greatest abundance, and is about the size of a hens egg and of a reddish orange color when fully ripe. While the flavor of the fruit in the raw state is not as fine as that of the tomato, and it is not as generally liked, it makes a fine jelly and is very acceptable in a stewed form. The plant is of the easiest culture, and bears the second year from seed. It is somewhat tender and must be protected during the winter in exposed places. When frozen down, however, it recuperates very rapidly and bears the same year in many instances.

While this is not a fruit that is likely to be of any great importance at any future time, its interesting nature and easy culture recommend it for a more extensive planting in private gardens.

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JANUARY, 1912

THE CHERIMOYA.

The cherimoya is admittedly one of the finest of tropical fruits. Indeed, some authorities rank it as one of the three finest fruits of the world, the other two being the pineapple and the mangosteen. The genus anona, to which the cherimoya belongs, includes also the sweet sop (A. squamosa,) the sour sop (A. muricata) and the custard apple (A. reticulata)—all commonly cultivated in different parts of the tropical world, but none of them nearly the equal of the species under consideration. This tree is a native of Peru and other parts of Northern South America, and is grown in Mexico, Central America and also to a limited extent in other parts of the world. But if its value was fully appreciated it would be one of the most extensively grown of all fruits, in the countries where it will succeed.

The cherimoya has been grown in California for about forty years, the first trees having been planted in Santa Barbara. It has never been widely planted here, but many trees are to be found scattered over the southern end of the State, few of which, however, produce really first-class fruit. The natural variation from seed has resulted in many of the trees planted turning out to be of inferior quality, or not bearing abundantly. Some of the best in California are grown in Hollywood, but there are also good trees in Santa Barbara and at other points. A small quantity of fruit, produced locally, is annually placed on the Los Angeles markets, but in almost every case this is of inferior

FINE TYPE OF MEXICAN CHERIMOYA.

Weight about two pounds. A vegetable ice cream. Some authorities class the Cherimoya as one of the three finest fruits of the world—the others being the Pineapple and the Mangosteen. This Cherimoya is now being propogated in California.

quality, or picked before it is fully mature.

Locally the cherimoya is quite commonly called custard apple, but this name properly belongs to the West Indian species, A. reticulatt, and should not be applied to the cherimoya, particularly as the latter is far superior to the custard apple, but similar to it in general appearance.

The fruit is normally conical or heart-shaped, sometimes attains a weight of three or four pounds, and is greenish or brownish in color. The flesh, in which thirty or forty brown seeds are embedded, is white, soft and creamy, of delicious flavor, greatly resembling the pineapple. In the tropics it is used quite commonly by putting it through a sieve, and then putting it on ice until thoroughly chilled, when it is served as a custard, or ice cream. In this way it is one of the most delicious desserts imaginable.

The variation from seed is considerable, and much can be done to improve and popularize this fruit by selection and propagation of the finer varieties by budding or grafting. It is only recently that budding has been practiced, but it has been shown to be successful, and should entirely do away with propagation from seed, except to supply the necessary stocks upon which to bud. When grown from seed, the tree normally bears in about four years, but it can not be depended upon to bear prolifically, or to produce fruit of the best quality. The great variation which exists among the Southern California seedlings goes to show that it will be necessary to resort to some method of a sexual propagation before best results can be obtained.

Some people have come to look upon the cherimoya with distrust, because of having sampled some of the inferior local seedlings, and formed the opinion that all cherimoyas were equally as poor. However, any one who has had an opportunity to taste a good specimen, such as some grown on the old Miller place at Hollywood, never has anything but the highest praise for it.

The cherimoya seems to reach its greatest perfection in a dry climate, and in fact does not seem to succeed at all in an excessively humid one. In the highlands of Mexico many trees can be found which produce abundantly of fruits weighing one to two pounds each, and of the choicest quality. The climate there is quite similar to that of parts of Southern California, and by budding from the Mexican trees we can obtain varieties which will be almost certain to be a success and will be choice. The cherimoya has been grown in Mexico for generations, and among the countless seedlings there are many choice ones, from which we can select the best for propagation.

While in Florida and some tropical countries the cherimoya sometimes fails to set its fruit, for some unknown reason, this difficulty is not experienced in Southern California and there seems to be no reason whatever why we should not produce this fruit in quantity, and of the finest varieties.

WILL AVOCADOS GROW IN SAN JOAQUIN VALLEY?

MODESTO (Cal.) Dec. 15.—[Subtropical Editor of Western Empire:] Would like to know whether you think avocados can be grown in the San Joaquin Valley? Very truly yours,

S. T.

This inquiry brings up a very important subject. If the avocado proves to be a success in the San Joaquin Valley, a vast territory will be opened to its cultivation, which will have a very pronounced effect on the future food supply of the United States.

There have been but few avocados planted in the San Joaquin Valley, and these within the last year or two only. Therefore, nothing definite can be said regarding the adaptability of the tree, from past experiments. But it seems almost certain that the warmer belts, such as the Lindsay and Porterville orange districts, will be admirably adapted to certain varieties of the avocado. The work now being done in Mexico to secure for California varieties of this fruit suited to cool localities and with a low degree of humidity will, without doubt, result in the procuring of varieties, eminently suited to just such conditions as are found in the San Joaquin. These conditions are almost duplicated in parts of Mexico, where the avocado is successfully grown, and it is from these localities that varieties have been, and are being obtained. Probably nothing could be done with avocados from tropical sea coasts or lowlands, unless in particularly fafored parts of the valley.

In the meantime, a great deal can be done to determine the adaptability of the avocado to different localities by the planting of seedlings. Mexican seedlings only should be planted, as these are the hardiest and the most likely to succeed in the cool and dry parts of the valley. The seedling avocado is of value as an ornament alone, and the fruit produced will in the majority of cases be very satisfactory for home use. After the first winter or two, when the tree has become established and had an opportunity to form mature wood, it will withstand considerable frost, but it should be protected for the first two winters in cool localities. When the seedlings have become established and shown beyond the possibility of a doubt that the locality in which they are planted is adapted to avocado culture, the planting of budded trees on a commercial scale could be gone into with much more assurance of success

THE COCOANUT PALM FOR CALIFORNIA.

Not only its economic value, but the distinctly picturesque and tropical aspect given by the coconut palm to every locality where it is grown, makes the successful establishment of this plant in California one of our greatest horticultural desirerata. It might be said that the one thing necessary to give California a truly tropical appearance is the presence of this palm. It was not many years ago that the cocoanut was first planted on the Florida east coast, and now it is one of the features of that country, and probably adds more to the attractiveness of the coast than any other one thing.

The question of the adaptability of this plant to California has long been considered, and many opinions have been advanced by our leading plant experts. But no adequate trial of the plant has ever been made in this State as yet, and this is, of course, the first thing to be done, if we are to arrive at any definite conclusions regarding the matter.

One of America's foremost authorities on tropical agriculture, O. F. Cook, now in charge of the bionomic investigations in tropical agriculture of the Bureau of Plant Industry, makes some most interesting statements in regard to the possibilities of this plant in the Southwest in a recent number of the American Journal of Science. He says: "The cocoanut is confined to seacoasts only in the humid lowlands of the tropics; in dry regions it is not restricted to coasts, but thrives in many districts remote from the sea. The fact that it received scientic study only as a maritime plant should not longer obscure the fact that it is also adapted The cultural problems of the coconut

The possibility of raising cocoapalm should be investigate quite apart from the idea of maritime habits and distribution.

to interior localities with saline soils. nuts in frost-free localities outside the tropics is not to be tested along the seacoast, but in interior districts where larger amounts of sunlight and heat are available, as in the valleys of Southern California and Arizona. The cocoanut, like many other plants, is not tolerant of shade nor of long-continued cool and cloudy weather. Other species of cocoas that are less exacting in their requirements of sunlight and heat have been found to do well along the California coast.

"The possibility of introducing coconut palms into Southern California is not disproved by the absence of these palms from Egypt and Palestine. Though the climatic conditions are probably favorable, it does not appear that any adequate effort has been made to introduce the palms into those countries.

"The ability of the cocoanut to thrive on seacoasts shows that its requirements of heat are not as great as those of the date palm. Though probably less hardy than the date palm, it is not impossible that the cocoanut may me able to exist in frost-free localities that have not enough heat for the ripening of dates.

"The possibility of introducing the cocoanut palm into Southern California and Arizona can not be fairly tested by the planting of maritime varieties. The chances of success will be very much greater with the varieties that are adapted to the dry interior localities of the temperate plateaus of the Andes."

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FEBRUARY, 1912.

THE LEMON GUAVA.

Only those who have eaten guava jelly in the tropics know how vastly superior it is to that made from the Strawberry Guava in California. It is made from the fruit botanically known as Psidium guajava, a native of tropical America, but now grown in many parts of the world. It differs very materially from the common strawberry guava, both in foliage and fruit. The fruits quite frequently attain a diameter of three inches, are most commonly yellow in collor, and possessed of a strong, musky odor and flavor, objectionable to some people, but which gives to the jelly its distinct flavor, which is so much appreciated. The fruit is but very little used in the fresh state, but is made into jelly, jam and guava cheese.

The lemon guava, while considerably more tender than the strawberry guava, is a success in Southern California, and should by all means be more extensively grown. Those who have had an opportunity to become familiar with the jelly and jam will appreciate this statement. In Florida the manufacture of guava jelly forms quite an industry, as it does also in Mexico, the West Indies, and South America. The product is quite usually put up in wood or pasteboard boxes, and commands a good price wherever it is offered for sale.

There is considerable variation among the lemon guava, and some varieties are much preferable to others. Those which are the most acid are naturally the most desirable for jelly.

NECESSITY OF SEED SELECTION.

In the propagation of fruits from seed, no point is of greater importance than the obtaining of seed from the choicest specimens—those possessing quality, size, productiveness and other desirable characteristics in the highest degree. While it is a well-known fact that the majority of tree fruits do not reproduce themselves true to variety when grown from seed, with those of a tropical nature, which have never been subjected to systematic improvement or breeding, the results obtained with selected seed is used is far greater than re-obtained when seeds from fruits of nondescript character are planted, that it becomes a most deplorable circumstance when seedlings of any but the choicest fruits are grown.

The only way to make an absolute certainty of a fruit coming true to variety, is, of course, to propagate it by some asexual means, such as budding or grafting. But the fact still remains that many of the lesser known tropical fruits have been, and still are being, propagated in large quantities in California solely by seed. It has been demonstrated beyond the possibility of a doubt that when seeds from fine specimens, of good bearing qualities, of such fruits as the avocado, feijoa, cherimoya and guavas are planted the chances of the resultant seedlings producing fruit of good quality are much greater than when the seed is obtained from culls or undesirable specimens. This fact has

THE LEMON GUAVA.

As grown in California. This guava makes one of the finest jellies in the world.

long been recognized by horticulturists, but nevertheless much inferior stock has been propagated by some Southern California nurserymen, simply because no care was used in obtaining the seed. This is demonstrated, for instance, in the cherimoyas now being grown here. Some of these local trees, while probably propagated from good Mexican seed, have not produced choice fruit; nevertheless the nurserymen have planted the seeds of these inferior fruits and disseminated the plants as good cherimoyas. The chances of success would be infinitely greater if the seedlings had been grown from selected fruits. It is merely a matter of chance in both cases, but the percentage of good trees produced when selected seed isused is far greater than resulting from the use of inferior stock. To some people, however, an avocado tree implies merely a specimen of persea gratissima, and the question of quality or the possibility of the seedling proving valuable is given no thought.

THE WORK OF DR. FRANCESCHI.

The importance of introducing and testing new tropical and subtropical fruits in California can hardly be overestimated. It is only by extensive and continued experiments that we are able to acquire real additions to our already long list of fruiting plants, and this work is one which is worthy of the most careful attention from our horticulturists. Among those who have devoted their energies to this work in the past, none stands out so prominently as Dr. Franceschi of Santa Barbara, who, during the past twenty years, has introduced from all quarters of the globe an immense number of fruiting plants and distributed them throughout the southern end of the State for trial. In experimenting with tropical plants in a climate such as ours, which is only semi-tropical, a large number of them prove to be failures, and have to be discarded. But when occasionally such an acquisition as the Feijoa is obtained, the failures are forgotten in the one success. Dr. Franceschi's knowledge of the flora of foreign lands, particularly tropical countries, is probably more exhaustive than that of any other botanist in the State, and equipped with this knowledge he has been able to [illegible] able members of the flora of any country most intelligently. To him we are indebted for the introduction of, besides the Feijoa, a considerable number of Guavas and Eugenias, Vitis capensis, the Evergreen grape, and others which are now well established in California gardens, besides many which are not yet well established or are little known. And apart from his work of introduction, the interest which his writings have stimulated in the tropical fruits on the part of Southern California horticulturists has been of great value in furthering the cultivation of these fruits.

AVOCADO IN MEXICO.

MONTEMORELOS (Mex.) Dec. 2, 1911.—[Subtropical Editor Western Empire:] I have been a subscriber to the Western Empire for a number of years, and have noticed from time to time articles regarding the Avocado, in it. I wish to say that nearly all has not been told of the merits of this tree. It is a beautiful shade tree. It grows very fast, and will commence to ebar fruit in three years if well cared for. The fruit is the best substitute for meat that I know of; you can virtually have meat growing in your yard, if you have an avocado tree. There are a great many ways of preparing the fruit to eat. The varieties here are sufficiently hardy to enable them to be grown from San Francisco to Yuma, Ariz. I have one large tree that bears several thousand choice fruits every season, ripening them about June 15; other trees ripen fruit here as late as October. Any one owning a home in Southern California will certainly miss a good thing if he does not plant some avocado trees.

Yours truly, A SUBSCRIBER.

MAJOR J. S. BAKER

MAJOR J. S. BAKER PASSES AWAY FRIDAY MORNING

Dies after Six Weeks of Painful Suffering—A Resident Here for Thirty-Eight Years—Was Major of First District of Columbia Cavalry During Civil War—Funeral Held Tuesday.

Major J. S. Baker, for thirty-eight years a resident of St. Croix Falls and one of its oldest citizens, died on Friday, May 17, after a painful illness of six weeks duration. The funeral was held at the family residence on Tuesday, the 21st, the officiating clergyman being the Rev. T. F. M. Clark of the Presbyterian church of St. Croix Falls assisted by Dr. James Wallace of Macalaster College, St. Paul, a long time friend of the deceased.

The surviving members of the McKenzie Post, G. A. R. to which Major Baker had belonged for many years and the Woman's Relief Corps were in attendance at the funeral. The pall-bearers were Major Baker's six grown up sons.

Major Joseph Stannard Baker was born on a farm in Stafford, Genesee county, N. Y., March 20, 1838. He came from sturdy Puritan stock. His greatgrandfather was Capt. Remember Baker, one of the leaders with Ethan Allen and Seth Warner of the Green Mountain Boys, whose exploits in the early days of the Revolutionary War, in one of which Capt. Baker lost his life, are among the notable episodes of that great struggle for freedom. Major Baker's grandfather was an officer in the United States army, serving under Gen. Wayne in his western expedition. His father, who was also a soldier, serving in the war of 1812, migrated from Vermont in the early days of the last century and settled in what was, then the untracked wilderness of western New York.

Up to the age of sixteen Major Baker spent his summers at work on the farm and in the winter attended school. His ambition was to obtain a thoro education, and at the age of seventeen he left home, and by teaching school and doing other sorts of work he was able to enter Oberlin college in Ohio. Infected with the western fever, it being the time of the "Pike's Peak or Bust" excitement, Maj. Baker started west in 1859, with his older brother, H. C. Baker. By rail and steamboat, they finally reached St. Paul then a struggling frontier village. The country was still under the baneful influence of the panic of 1857. After a struggle of many weeks, trying to get work when there was no work to be had, Maj. Baker went to Hudson, where his brother, H. C. Baker, had begun the practice of law. Here, luckily, he found work during harvest. In the winter he taught school near River Falls, having among his pupils John E. Glover. With money saved from his work he was able in 1860 to enter the University of Wisconsin at Madison. Senator Vilas, and John Muir, famous as a naturalist, were among his fellow students.

In 1862, Major Baker along with his brother, Byron enlisted in the United States secret service, of which Gen. L. C. Baker, a cousin, was then chief. He was often employed on delicate missions for Edward M. Stanton, secretary of war, and his work brot him more than once into personal relationships with President Lincoln. He was sent repeatedly on dangerous missions within the confederate lines in Virginia, in all of which he acquitted himself with notable success. In such high regard was he held that when the 1st District of Columbia Cavalry was organized, he was offered and accepted the appointment as ranking captain of the regiment. He soon rose to be major and for the greater part of the last two years of the war was in active command of the regiment.

This regiment was composed largely of regular army men, and was armed with the then new and famous Henry repeating rifles, the only entire regiment so armed. While originally intended to serve only as an auxiliary to the United States secret service bureau, the regiment was soon ordered to the front, and being composed of trained soldiers, mounted and armed in a superior way, much more was expected and demanded of it than of an ordinary cavalry regiment. Previous to July, 1863, it was engaged in scouting, raiding and fighting the guerilla bands then infesting northern Virginia, and just before the battle of Gettysburg it was ordered to upper Maryland to hang upon the enemy's rear and cut their lines of communication.

Aug. 24 and 25, 1864, when Gen. Hancock's corps was driven back so disastrously from Reams Station, it was this regiment commanded by Maj. Baker which held the enemy in check during the afternoon and night of the 25th, thus saving Hancock's corps from complete annihilation and giving it time to reorganize.

In September, Major Baker was placed in command of a picket line several miles long. During a fierce night attack, Maj. Baker received a saber wound and was left for dead. Early in the morning he was aroused by the sensation of someone trying to pull off his boots. When he stirred, he heard a voice say:

"He is alive; bring him along."

He was then taken prisoner. He was confined in Libby prison in Richmond for five months. When finally exchanged, tho broken in health, after a few week's rest at his old home in New York, he again went to the front, took command of his regiment and served in all the battles of that campaign, fired the last shots on the field of Appomattox and saw the surrender.

After the war, Major Baker was offered a commission in the regular army, but owing to the state of his health, he resigned. He went into the manufacturing business in Lansing, Mich. But owing to his continued ill health, his business ventures were not successful.

In 1874, after spending some time in Hudson with his brother, H. C. Baker, the major went to St. Croix Falls, where he became resident agent for the large land holdings in northern Wisconsin of Caleb Cushing and Gen. Benjamin F. Butler.

Maj. Baker was married in 1868 to Alice Potter. They had six sons: Ray Stannard Baker, now author and editor of New York City; Prof. Charles Fuller Baker, of Claremont College, California; Harry D. Baker, manager of the business at St. Croix. Clarence Dwight Baker, who died in 1906; Prof. Hugh Potter Baker, of New York State college of Forestry, Syracuse, N. Y., and Prof. James Fred Baker of the Agricultural college, Mich.

Maj. Baker's first wife died in 1883, and he was married a second time in 1886, to Mary L. Brown of New Richmond. They have four children: Winifred Lovila Baker, Florence Irene Baker, Joseph Stannard Baker, jr., and Oscar Roland Baker, who are still at home.

Owing to his deafness, which of late years became extreme, Major Baker took no active part in public affairs. A thoro student, he kept abreast, thru his library, with the best thot of the world, his interest in new things being as vivid as that of a young man. He interested himself in forestry, and conducted extensive experimental plantings near his home.

All of the immediate family, including the nine sons and daughters, gathered from various parts of the country, were present. Other near relatives who came to pay their last respects were Mr. and Mrs. Henry C. Baker of Hudson, Wisconsin; Mr. and Mrs. L. [illegible] Baker of New Richmond; Mr. and Mrs. C. F. Potter of Minneapolis and Mr. and Mrs. C. J. Augus of Glenwood City, Wis.

THE MANGO
IN
SOUTHERN CALIFORNIA

By F. W. POPENOE

The Avocado: A Promising New Commercial Fruit

By F. W. Popenoe, Altadena, Calif.

THE AVOCADO has been called "the most valuable fruit grown." This fact is not yet appreciated by the majority of the people of the United States, but it will be better understood and believed as the avocado industry progresses and as the opportunity is given to become familiar with the fruit. It is so understood and valued in the American Tropics, where it has been grown as a staple food product for centuries.

It is unique in being not only a most delicious and satisfying article of diet, but also a most valuable food product, taking the place of, and ranking fully as high in food value, as beefsteak. A fair sized avocado will make a substantial and appetizing meal for one person. The many ways in which it can be used, the delicious flavor of the fruit and the oil content which gives it its high food value and makes it a perfect substitute for meat, are the qualities which make this fruit unrivaled and place it in a class by itself.

The avocado is a native of tropical America. The tree is handsome, attaining large size at maturity, and with evergreen foliage. The fruit varies greatly in size and form. Some are round, others pear-shaped, and still others long and slender. In size they range from a few ounces up to three pounds. In color they are usually green or dark purple. The skin is so thick and hard in some varieties as to be almost a shell, and this enables the fruit to be shipped long distances. The flesh is of the consistency of firm butter when ripe, light yellow in color, and of a flavor almost impossible to describe; by some it has been likened to crushed hickory nuts, but an adequate conception of it can only beformed by sampling it. The flesh surrounds a single seed of large size, which can be removed from the fruit without difficulty, leaving a cavity very convenient to hold the necessary seasoning. Everyone who has had an opportunity to become familiar with the fruit is extremely fond of it, and its great popularity and the high esteem in which it is held in tropical countries, assure a great demand for it in the United States when once it is placed on the market at a price within the reach of all.

While the avocado is a native of the tropics, it has been acclimatized in man yregions not strictly tropical. In California it has been grown for some thirty years, but to such a limited extent that comparatively few people have had an opportunity to taste the fruit, or have even seen it. A small quantity of fruit has been placed on the markets here during the past few years; some of it grown locally, but the bulk imported from Mexico or Hawaii, though importation from this last named country has now been prohibited on account of the ravages of the Mediterranean fruit fly. Single fruits have sold as high as $1.25, although the average price is from 40 to 50 cents each. At such figures the demand could never be large, yet it has been sufficient to prove that when marketed at a popular price it will be unlimited.

SIX-YEAR-OLD AVOCADO

Such a tree will produce from 200 to 600 fruits per year, according to variety.

During the last four or five years the avocado has begun to attract increasing attention as a commercial proposition, and smoll plantations have been made. Others are being put in as rapidly as the stock can be supplied, and there is no doubt but that the development of the industry will be rapid. An extensive future for the industry is accured by the great value of the fruit as a food product, which taken together with the fact that it is almost a perfect substitute for meat and can be produced infinitely cheaper, warrants the belief that in the future it will supplant meat products to a large extent as human food.

In Florida the avocado has been attracting attention as a commercial fruit for about ten years. Many thousands of budded trees are being set out annually, and every year a considerable acreage is coming into bearing. The fortunate owners of bearing groves are obtaining an average of six dollars per crate f. o. b. for their crop, and when it is considered that only 18 to 48 fruits are packed to the crate, it will be seen that those who had the foresight to get into the industry in its infancy are now reaping their reward.

MEXICAN AVOCADO

Note thick skin, enabling it to be shipped long distances, and small seed, giving a large amount of flesh.

As California has taken up commercial avocado growing much more recently than Florida, no commercial groves are yet in bearing, in fact the oldest are scarcely more than two years. Few parts of California have as yet been thoroughly tested, but the Citrus belt of southern California is known to be eminently adapted to avocado culture, and it is quite probable, indeed almost certain, that large areas not yet proven out will be found in time to be as suited to the culture of this fruit as the territory mentioned. The extension of the Citrus belt during the past few years is sufficient to prove this. The question of variety will of course have considerable to do with this question, as some varieties are much hardier than others. In the highlands of Mexico avocados are found at 7000 feet altitude, where a slight amount of snow falls every winter. Varieties obtained from such localities will be of great value in extending the area in California in which this fruit can be grown. Like other trees, the avocado is much more tender during the first year or two of its growth than when it has attained some size and formed an abundance of mature wood. For this reason it is well to protect the young trees during the first two or three winters in the same manner as citrus trees, —using cornstalks, palmleaves, or any other available material. Along the sea coast the avocado has done remarkably well, but trees are also growing and bearing as far inland as Redlands and San Fernando, at both of which places they seem to thrive as well as on the coast. So that past experiments indicate that the tree will adapt itself to a variety of conditions, and be a possibility for many parts of the state.

Experience in Florida has shown that budding tends to dwarf the tree, and that budded trees will require much less space than seedlings, 20 by 20 or 25 by 25 feet being ample. While many seedling trees have been planted, and still are being planted in gardens and parks, for commercial plantations seedling avocados should no more be considered than seedling apples, plums or peaches. The tree is liable to considerable variation when grown from seed, and although it bears in the majority of cases, it can not be depended upon to be of good quality, and as a uniformity of product is necessary in a commercial plantation, seedlings are of little value. The tree should be pruned to form a symmetrical head, and kept moderately low to facilitate picking. It thrives best in a dry loam, loose and well drained. A clay or heavy adobe is not suitable for its best development, and in soil that is insufficiently drained the avocado absolutely refuses to grow. Transplanting of the young trees is best

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The Avocado: A New Commercial Fruit for California.

(Continued from Page 3.)

done in early spring, after all liability of frost is past, but before the tree has started into new growth.

The question of varieties is of the utmost importance, and can only be determined for any given locality by a thorough trial extending over a number of years. Practically no first-class varieties have as yet originated in California, and those originating in Mexico and now propagated here have not yet fruited so that there are as yet no standard varieties on the market. But in selecting varieties for commercial planting there are a number of points which should be kept in mind, and it should be definitely ascertained that the trees planted possess these requirements to the highest degree possible. These are:

1. Tardiness. One of the most important of all, and which should be given first attention. Avocados from Hawaii and other low and humid countries have proved to be much more tender than those from Mexican and Central American highlands.

2. Season. The best time to market the fruit seems to be in the winter, when other fruits are scarce in market, and consequently one should plant principally of winter bearing varieties although it will be important to have summer bearing sorts also to supply fruit continuously.

3. Yield. Some varieties are shy bearers and should be avoided. A fruit of average size should bear 300 to 600 fruits per tree. Large fruited sorts are naturally less prolific bearers, and less profitable to grow commercially.

4. Size. About 15 ounces is the most desirable. Fruits of two or three pounds in weight are not nearly so profitable to the grower, and do not sell so readily.

5. Form. For shipping round or oval fruits are much the best, as they are not so easily bruised and require less care in packing than the "bottle-necked" sorts.

6. Uniformity. The variety should produce a uniform crop, both in size and form of fruit.

7. Color. Probably this point is of minor importance, but locally the dark purple varieties have seemed to be preferred by buyers.

8. Skin. This should be thick and tough enough to stand shipment across the continent.

9. Flavor and Quality. These should, of course, be of the best.

10. Seed. It should be as small as possible and tight in its cavity, as a loose seed shakes in shipment and bruises the flesh.

MARCH, 1912.

Subtropical Fruits

A Department of Tropical and Subtropical Horticulture

BY F. W. POPENOE

Notes on the propagation and culture of plants and trees coming within the scope of this department will be welcomed, and inquiries are invited.

THE SACRAMENTO VALLEY AS A FIELD FOR SUB-TROPICAL FRUITS.

Although interest in the sub-tropical fruits is at the present time mainly limited to Southern California, there is little doubt but that the Sacramento Valley is eminently adapted to the culture of such as the Avocado, Cherimoya and Feijoa.

While there are doubtless certain parts of the valley not suitable to the culture of such fruits as these, there remain large areas which have proven to be admirable orange land, and if suited to oranges they should also be adapted to other sub-tropical fruits, many of which are fully as hardy or hardier than the orange. It is to be regretted that nothing has been done with these fruits in the valley until very recently, so that nothing definite can be ascertained as to their behavior from past experiments. But with the widespread and growing interest now being taken in these fruits, it will not be long until a thorough test of them will have been made. It is said that many parts of the Sacramento Valley do not experience as low winter temperatures as the Southern California orange belt. With such a condition as this, the field is a promising one indeed. California has neglected her opportunities too long. It is now time for horticulturists in all parts of the State which possess any possibility of being adapted to the growth of sub-tropical fruits, to take hold of them and establish them on a paying commercial basis. When we see of what importance many of these fruits are, in the countries where they are extensively grown, it becomes plain that their establishment here on a large scale would mean considerable to the horticultural wealth of the State.

THE MANGO FOR SOUTHERN CALIFORNIA.

It has been thoroughly demonstrated that the mango can be grown in California. The accompanying illustration shows a specimen produced at Sierra Madre, which compares well in size with specimens of this same type grown in Mexico or other tropical countries. Numerous trees are in bearing in Southern California,two at Sierra Madre, several at Santa Barbara, one at Santa Ana, two at Sherman, a number at Hollywood, and probably others. These all go to show that it is possible to grow the mango here, for they are fruiting regularly and prolifically. But the great drawback with them all is that they do not ripen their fruit until late in the fall, and unless the season is unusually warm it fails to ripen perfectly. There are one or two trees in Hollywood that ripen more perfectly than the others.

MANGO.
King of Tropical Fruits, as grown in Southern California.

and fruits eaten from these trees by the writer a few weeks ago compared favorably in size and flavor with seedling mangoes grown in the tropics. In fact they were fully equal to the average seedling mango.

From the behavior of the trees which are already fruiting here, we know it is a possibility to grow the mango in this State. The thing to be done now is to obtain choice varieties which are adapted to this climate. There is little doubt but that this can be done. The mango has been cultivated from the remotest antiquity in India and other oriental countries. Many varieties have originated there, and the fruit has become acclimated in widely differing regions. By obtaining the best varieties from those regions which have a climate most similar to our own, there is little doubt but that we can establish and successfully produce mangoes in California that are as fine as those grown in India. It is only necessary that these varieties be tested out here, to determine which are adapted to this climate.

Nothing can be done with seedlings, however. The mango does not come true from seed, and almost invariably deteriorates when grown in this way. The difficulty and expense connected with importing grafted trees from India has prohibited private enterprise from introducing them into this State, but the Department of Agriculture, which has been importing Indian mangoes for many years for cultivation in Florida, has recently sent to California for trial a large number of the finest varieties. It will be very remarkable if some choice things are not obtained from this experiment. Already one important point has been brought out by them. This is in regard to the hardiness of the mango. Many authorities have considered that the mango was not sufficiently hardy to withstand our climate. But those in a position to know have stated that this was principally a matter of varieties. Among the trees sent out by the department were two varieties called Langra and Malda, which came from the north of India, where it is said the temperature often goes as low as 20 degrees above zero. During the recent cold weather these trees, although only two years old, and not more than two feet high, went through temperatures of 27 degrees above zero (which is considerably lower than is usually experienced in most parts of Southern California) absolutely uninjured.

PROPAGATION OF THE AVOCADO.

To those who desire to propagate the avocado, the following letter from Mexico may be of interest:

TAMPICO, Jan. 25, 1912.—[Subtropical Editor, Western Empire:] I have lately received many inquiries from people in California, relative to the way in which we propagate the avocado, that I will give the method as nearly as possible, for the benefit of those interested. I think I am safe in saying that there is, down here, very little reliable information regarding this fruit to be had.

The seed should be planted as soon as possible upon taking it from the fruit. Plant it in a ten-inch pot and leave about half of the seed exposed above the top of the soil. Some of them will germinate in four days here, but sometimes they take as long as six weeks. No hothouse is needed. I am budding the seedlings from six to eight months from planting the seed. I use buds from either round or pear-shaped fruit, weighing from two and a half to three pounds each. We do not consider the small blue fruit of any value here.

Yours very truly, W. W. H.

PROGRESS IN TROPICAL FRUIT GROWING.

The Ojai Valley in Ventura county is famed as being one of California's beauty spots, and exceptionally favored climatically. One of Ojai's foremost residents, Mr. E. S. Thacher, is entering the subtropical fruit field on a commercial scale. Mr. Thacher is a successful orange grower, with experience in fruit culture extending over some twenty-five years, and has been for some time particularly interested in the avocado and other subtropical fruits. This interest has been intensified by two trips to Mexico, where he had an opportunity to observe the value and extent of the cultivation of these fruits in their native home.

Mr. Thacher has an orchard of over one hundred avocado trees just coming into bearing, and these trees have so satisfied him as to the adaptability of his locality to avocado culture that he is now preparing to go into the cultivation of this fruit on a commercial scale, using the choicest Mexican stock for his plantings. He also expects to make plantations of some other fruits such as the Cherimoya, which, he believes, has a great future for California.

With the development of the avocado industry in the hands of such experienced horticulturists as Mr. Thacher, it is sure to have the most intelligent attention and to make rapid progress. In fact, it is hard to predict what the extent of this industry will be twenty-five years from now.

A California Botanist and His Work

By F. W. Popenoe, Altadena, Cal.

California is world-famed for the richness of its exotic flora. In few other countries is it possible to grow in the open such a variety of plants from both the temperate and torrid zones, and the great natural advantages of the State, coupled with the persistent efforts of those interested in adding to our horticultural wealth, has resulted in southern California being today a "veritable botanic garden," to quote the words of P. D. Barnhart, through whose able efforts readers of The Florists' Exchange have become familiar with many of our most interesting plants.

Among the factors which are responsible for this wealth of exotic plants from all quarters of the globe, few have been of more importance than the labors of Dr. F. Franceschi, of Santa Barbara. His unceasing work for almost twenty years has resulted in the introduction of an immense number of beautiful and useful plants. In fact, his introductions probably number more than those of any other one man.

As a botanist Dr. Franceschi is well known both in this country and abroad. Among the horticulturists of southern California he is considered by far the best authority on the exotic flora of this State, and when an unknown specimen is presented for naming, someone almost invariably suggests "send it to Dr. Franceschi." Few have appreciated how valuable the doctor has been in this connection, and the many horticultural enigmas he has solved.

For many years he has resided in the city of Santa Barbara, one of the most favored spots in California, climatically, and thus he has been able to carry on his work of introduction and acclimatization with the best possible chances of success.

Quite a large number of his introductions have now attained considerable popularity and become widely planted. Among these the following are the most important and interesting:

1 LIPPIA REPENS.—In 1898 the doctor sent to the Botanic Garden at Rome for living plants of this species, and in response to his request he received about twelve ounces of cuttings. From this small beginning Lippia repens has spread to cover thousands of acres in this Southwest, and its value as a lawn carpet in arid countries can hardly be overestimated. Lippia will thrive in any soil, no matter how poor, and requires only one-tenth as much water as grass. It will withstand intense heat and severe cold, and is excellent for sloping grounds which are liable to erosion by the rains. It is particularly valuable because of the fact that, unlike many lawn coverings, it does not have underground runners, and is consequently easily exterminated when desired.

2 FEIJOA SELLOWIANA.—This promises to become one of the most valuable of Dr. Franceschi's introductions, if not the most valuable of all. It was introduced from France in 1901, the plant having been established in that country through the efforts of Dr. Ed. Andre. The Feijoa is a close relative of the Guavas, but considerably hardier than any of them, and of inestimably greater value as a fruit. Its culture is now being taken up on a commercial scale and without doubt it is one of the coming fruits for California. The fruits are about the size of a hen's egg, green in color, and of a most delicious Pineapple flavor. The fact that it has been proven to withstand without harm temperatures of ten degrees above zero, assures a wide area in this country suited to its cultivation.

A Basket of Feijoas

ACACIA BAILEYANA.—Introduced from Queensland in 1895. The first plants were set out in the city of Santa Barbara and made a growth of 20ft. in the first season, which was certainly not in accordance with information received from its native country, where its ultimate height was said not to exceed 25ft. It took only a few years for the value of this tree to become generally recognized, and it is now one of the most popular ornamental trees in the State.

4 BUDDLEIA MADAGASCARIENSIS.—For scrambling over boulders or stone walls, and for picturesque effect, this plant stands unrivalled. Its large leaves, glossy green above and silvery white beneath, and its vigorous shoots tipped with long panicles of chrome yellow flowers, make it one of the most important introductions in this line yet made to California. The story of its introduction surely goes to show that perseverance is always crowned with success. Many years before he left Italy, Dr. Franceschi had admired this plant on a sea wall at Posilipo, near Naples. The first year that he was in California he hastened to send over for some seeds, which were finally received and planted, but failed to germinate. The second year he tried again, and succeeded in germinating three plants, but all of them died in infancy. The third year seed was again procured, and two dozen plants were successfully raised. These were the parents of the multitude of plants now found in California.

After one of the original plants had come into bloom, and had produced seed, volunteer seedlings began to come up very freely in the doctor's garden, the birds effecting the distribution of the seeds quite widely, on account of their fondness for the translucent, opal-colored berries. One of the first volunteer seedlings which came into bloom proved to be a much finer variety than the parent, with longer trusses of deeper colored flowers. It was propagated by cuttings and distributed under the name of Buddleia Madagascariensis splendens.

5 LYONOTHAMNUS FLORIBUNDIS, VAR. ASPLENIFOLIUS.—The beautiful Fern-leaved "Ironwood" or "Palo fierro," which grows only on the islands of Santa Cruz and Santa Rosa, off the coast of California. This plant had been known to botanists for a short time, but had never been introduced on the mainland. In November, 1894, Dr. Franceschi spent a week on Santa Cruz Island, and after trying in vain to find small seedlings, which were invariably destroyed by sheep, he decided to dig out an old stump and take it home to his garden. Being all alone, and with no tools but a small pick and a pocket saw, it took nearly three hours to dig it out, and then it had to be carried nearly a mile to the beach. It was so heavy that it was necessary to stop and rest every fifty steps over the entire distance. But finally it was gotten home, and planted in the lath house at Montecito. In five or six months it began to sprout, and when a year later Dr. Franceschi moved down to Santa Barbara it was transplanted to his new place, where it is still growing, and blooms and seeds regularly every year.

6 DENDROCALAMUS LATIFLORUS.—The "Giant Bamboo," now so plentiful and much admired at Santa Barbara, and in other parts of southern California. While the credit for the introduction of this plant does not belong to Dr. Franceschi, he was the first to establish it under its correct name, not only in California but in Europe as well. It came about in this way: in the early nineties, plants used to be imported by the Japanese nurseries of San Francisco under the name of "Taisan-Chiku," or "Japan Giant Bamboo." Plants set out in northern California were invariably destroyed by the frost; a few found their way to Santa Barbara, where they did not fare much better, and it was not until 1896 that a specimen at Sawyer's place in Montecito attained sufficient size to attract attention. All attempts to identify it had failed; but Dr. Franceschi was able to ascertain that it was not a native of Japan, as the name would imply. In 1901, a few plants which had just been received from Japan happened to come into bloom, and then the doctor was enabled to identify the mysterious stranger as Dendrocalamus latiflorus, a native of Formosa and Cochin China. This identification was corroborated by the highest authorities at Kew Gardens, and plants were sent for the first time to Europe, from Santa Barbara.

7 TAXODIUM MUCRONATUM. — The "Montezuma" or "Chapultepec Cypress." A majestic tree, closely related to our Redwoods or Sequoias, and to the "Bald Cypress" of the Gulf States. This tree was famed in the history of the conquest of Mexico for having witnessed the last stand of the unfortunate Montezuma, but it was first made known to science only at the beginning of the last century, by the Italian botanist Tenore. Dr. Franceschi had many times admired the splendid specimen planted by Tenore in the Botanic Garden at Naples, and when he came to California he immediately became interested in introducing it to this State, for he foresaw its great value as an ornamental for our parks and gardens. From Naples and other points in Europe seeds were obtained year after year, but always failed to germinate. Finally, after ten years of unsuccessful effort he obtained seeds from the Federal Park in Chapultepec, Mexico, which germinated, and from which were raised the many fine specimens which are so greatly admired at Santa Barbara, and elsewhere in California.

Spray of Vitis Capensis
The Evergreen Vine

8 VERONICA REPENS.—Some thirty years ago a nurseryman of Marseilles, Mons. Deleuil, had introduced into the gardens of southern France this charming plant, which grows in its wild state only on top of two or three of the highest peaks in the island of Corsica, at about 10,000ft. elevation. It makes neat and beautiful carpets of a more pleasing green than Lippia, over which it also has the advantage of standing more cold. It is listed in the catalogs of some Eastern dealers, but plants purchased from them turned out to be something else than the true V. repens. The seeds are so minute as to be almost invisible, but after three years of unsuccessful effort a small number of plants were germinated, which are now being rapidly propagated at Montarioso. This plant is one of considerable promise for California.

9 PSIDIUM LUCIDUM.—The "Yellow Strawberry Guava." When in 1894 the American Pomological Society held its biennial convention in Los Angeles, Dr. Franceschi became acquainted with the late P. J. Berckmans of Georgia, at that time president of the Society, and one of the most famed pioneers of American horticulture. It was from him that the doctor learned that this Guava was grown in Florida, and was given preference to the purple, which was at that time the only one grown in California. Through President Berckmans some seed was obtained from Florida, and a large number of plants were raised, which were scattered all over California. What is offered in some catalogs as Psidium Sinense is probably the same thing. It appears that both the purple and the yellow "Strawberry" Guava had been introduced into England, in the early part of the last century, from China, and it was only

after many years that it was definitely ascertained that all species of Guavas were of American origin, and the occurrence on the coast of China of these species was due to the Portuguese, who must have brought them from Brazil to Macao, as early as the 16th century.

2. VITIS CAPENSIS.—Some 40 years ago, when the phylloxera threatened the vineyards of France with total destruction, energetic efforts were made to procure from every country other kinds of Grapes which might prove immune to the ravages of this disease. Many hopes were placed on the different tuberous-rooted kinds quite numerous on the African continent, and among them upon Vitis Capensis, which was occasionally found in European botanic gardens, and had been since the end of the 18th century. In a few years' time it was proved, however, that only some of the North American Grapes, and some hybrids derived from them, enjoyed the privilege of immunity, and all the African species dropped again into obscurity, neither plants nor seeds of any of them being offered in the trade at present. About twelve years ago Dr. Franceschi happened to obtain seeds of Vitis Capensis from one of the botanic gardens in Holland, and the few plants raised were used for hanging baskets. It was soon discovered that they produced tubers abundantly, and the vines made very luxuriant growth. One specimen, which had been in the ground for a little over two years, when lifted, yielded about one hundred pounds of tubers. This plant has now become very popular in California under the name of "Evergreen Grapevine," and certainly stands unrivaled for pergolas and arbors. The glossy green leaves are persistent throughout the year, and the dark purple berries are sufficiently valuable for making jelly, etc., as to make the plant of some economic merit. In loose, deep soils it would prove of value as a fodder plant, also.

10. ASPARAGUS SCANDENS DEFLEXUS.—It was in 1897 that seeds of this species were received from the Botanic Garden at Cambridge, England. From these seeds the first plants ever raised in this country were obtained. It did not take long for the merits of the plant to become appreciated, for it is much finer and more graceful than Asparagus Sprengeri. By many people it unfortunately became confused with Asparagus decumbens, through the similarity of the names. This latter has sea green foliage and pure white translucent berries, and is very pretty in its way, but is not suitable for hanging baskets on account of its deciduous stems.

11. ACACIA PODALYRIÆFOLIA.—In the year 1900, Dr. Franceschi received seeds of this species from Australia, and succeeded in raising two or three dozen plants, which seemed to be more difficult to handle than other species of Acacia. Some of these plants were sold, and through the unfortunate peregrinations his stock of plants was forced to undergo, the balance of them were lost. But three of the plants which had been sold survived and developed into good trees—one at Redlands, one at Pomona, and one near Pasadena. Since they began to bloom attention has been attracted to the species as one of the most beautiful of all Acacias, and the plant is rapidly gaining in popularity, just as it has been doing in southern Europe. There seems little doubt that in time this plant will be very widely distributed and commonly grown, and be recognized as one of Dr. Franceschi's most important introductions.

12. DENDROCALAMUS STRICTUS.—The "Male Bamboo" of India. In the year 1894 seed of Bambusa arundinacea was received from Calcutta, and over a thousand plants were raised. This plant is the ordinary spiny Bamboo of the Indian jungles, and appears to require more Summer heat than we get on this Coast. Among the tiny seedlings one was noticed that appeared quite distinct from the others; it was carefully watched and nursed, and developed into a good sized plant. A few years later when it was seen in Dr. Franceschi's garden by the director of the Royal Botanic Gardens of Peradeniya, Ceylon, he immediately recognized it as Dendrocalamus strictus and did not hesitate to state that it could not have made better growth in its own country. Although deciduous for a short time during Summer, this Bamboo has proved to be highly ornamental in southern California, and in rich deep soil is sure to prove very valuable for its timber, having very tall stems with no cavity, and in India it is one of the most highly prized of all Bamboos.

13. AGAVE RIGIDA SISALANA.—This plant yields the Sisal Hemp, so extensively cultivated and used at present, but only recently taken up as a commercial proposition. In fact, it was in the early nineties that the first plantations of it were started in the Bahamas, but these were soon followed by others in other countries, and at present it is being planted very extensively in the German colonies in Africa. In 1894, Dr. Franceschi procured some plants from the original stock introduced by the late Dr. Perrine in southern Florida, and in 1899 he planted a long row of them at the northeast corner of State and Guiterres sts., in Santa Barbara, where they have thoroughly established themselves and are reproducing without intermission. The lack of cheap labor may prevent the commercial growing of this fiber plant in California, but it has proved beyond the possibility of a doubt that it grows to perfection here, and plants have been shipped from Santa Barbara to China, Australia and German Africa.

The Loquat

Eriobotrya Japonica. Becoming Popular in California.—Varieties.

By F. W. POPENOE,
Altadena, California.

THE loquat is now quite widely grown in California and the fruit is produced in commercial quantities. In the improved varieties now being brought to the attention of the public, it promises to become a fruit of considerable importance; indeed it is becoming so already.

The tree is evergreen, and very handsome; for this latter reason it has been planted very freely in parks and gardens as an ornamental rather than a fruiting tree. It is of Japanese origin, but has been grown in America for over twenty years, during over half of which time it has been the subject of careful selection and breeding at the hands of Mr. C. P. Taft of Orange, California, who has originated a number of varieties vastly superior to the ordinary seedlings.

The fruit of the loquat, in the finer varieties, is from two to three inches long, and considerably over an inch in diameter, ordinarily oblong or pear-shaped in form. It varies in color from light yellow to orange according to the variety. The delicious subacid flavor possessed by the fruit is agreeable to almost everyone, and in addition to being popular as a dessert fruit it is used for the preparation of jelly, in which form it is a prime favorite. The fruit contains from one to three seeds, quite large in the seedling forms but considerably reduced in the improved varieties.

Propagation is easily effected by budding, both the loquat and quince stocks being used. The method is much the same as practiced with the deciduous and citrus fruits. The tree is quite hardy, and produces abundantly, the season of ripening varying from February to June, according to variety. It thrives in almost any soil, and amply repays any care given it in increased size of fruit.

A number of varieties have been produced and introduced to commerce within the last few years. The principal ones are Blush, Advance, Premier, Victor, Pineapple, and Commercial. So far the Advance and the Victor seem to be the most popular.

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VOLUME I No. 9

THE AHUACATE OR AVOCADO.

By F. W. POPENOE, of Altadena, California.

Right in the beginning I want to say that it is greatly to be regretted that this fruit has become established in California under a misleading and meaningless name. I refer to the term "alligator pear," which certainly has no excuse for existence, and invariably gives those who are unfamiliar with the fruit a wrong impression of it. The name "avoca-

FIG. 164.—Young ahuacate trees growing in nursery rows at Altadena, one year old and ready for budding. (P. C. Jr. Econ. Botany.)

do," however, can be said to be scarcely less objectionable. The correct name is "ahuacate," and I call upon the veteran botanist whose paper is next on the program, Dr. Franceschi, to raise his voice in support of this statement. This I know he will do, as he was one of the first to call attention to this error in language, and has constantly urged upon

Varieties of the Avocado for Southern California

By F. W. POPENOE, Altadena, California

At the present time the varieties being propagated in the largest numbers and by the majority of the nurserymen are those of local origin. The reason for this is evident. Budwood can be obtained at much less expense than from Mexico, and can be used more successfully than when it has been shipped over a distance of two thousand miles. But while some good varieties have originated in Southern California, it certainly can not be said that they are as fine as those to be obtained in Mexico, and the fact that practically all of the local trees are Mexican seedlings, whose ancestors have been grown for generations in the latter country, leaves no doubt in regard to the adaptability of the Mexican varieties, at least those from the highlands, to this state. For these reasons it seems likely that our best commercial varieties will be obtained direct from Mexico, and the work done during the last two years in searching out the most desirable varieties in parts of Mexico having a climate similar to our own, is almost certain to result in establishing here the choicest forms to be had anywhere.

However, several of the local varieties are well worth propagating, and one or two seem to be really first class and desirable in every way. The Taft must be ranked as one of the very best. It originated with Mr. C. P. Taft of Orange, from a seed obtained from Southern Mexico about ten years ago. It is of the thick-skinned, spring bearing, green type known as the Guatemalan, because of the frequent occurrence of the type in that country, although it appears to be quite common in southern Mexico as well. It is one of the most desirable types from a commercial point of view, because of its thick, hard skin which enables it to be shipped long distances, and also because it ripens during the late winter and spring, when the fruit can be marketed to good advantage. The Taft is a fruit of excellent quality, about one pound in weight, and with a seed of medium size fitting snugly in its cavity. The flesh is smooth, absolutely free from fiber, and of excellent flavor. The tree has only been in bearing a few years, and is increasing in productiveness very rapidly. Without doubt the Taft will take a place in the front rank of local varieties.

A variety which attracted considerable attention during 1911 but which has not been so much heard from lately, is the Lyon, originating at Hollywood. This variety is very similar in appearance and in general characteristics to the Taft, and ripens at the same season. But instead of being low and spreading in growth, like the Taft, it is a tall and slender grower. The parent tree bore a good crop in 1911 but failed to produce this season. This is, of course, not an infrequent occurrence with practically all varieties of avocados. Until the Taft entered the field, the Lyon was considered the best local variety, but from now on it will doubtless have to share honors with the former. It will require the test of time to determine which of these two is the more desirable.

Among the fall bearing varieties, which are invariably (so far) of the thin-skinned Mexican type, the Harman, Chappelow and Ganter are the best known. The Harman has been the most extensively propagated. It is a fruit of excellent quality and desirable for home use. Its large seed cavity is against it, but the fact that the recent heavy frosts have shown it to be the hardiest of the local varieties is very much in its favor. It is an oval fruit, about eight ounces in weight, and a good bearer.

The Chappelow was the first of the local varieties to receive any attention. This is accounted for by the fact that the seed was sent out by the Department of Agriculture, and the tree has been under observation by the Department. The Chappelow is a slender, long-necked fruit, dark purple in color, and very attractive in appearance. Its exceptionally fine flavor and quality make it one of the most desirable varieties for home use. With care in packing the fruits can be shipped to almost any distance, but it is not likely that the small purple Mexican type, of which the Chappelow is a selection, will ever attain prominence as a commercial fruit.

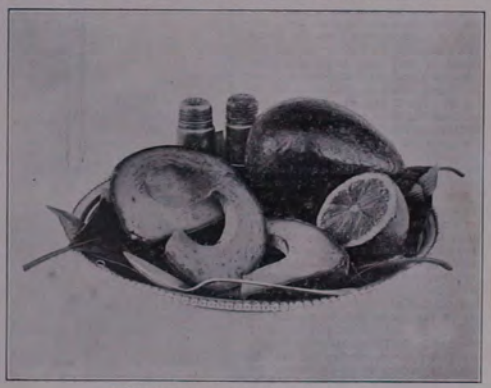
The Ganter originated at Whittier, and was notable for the enormous crop it bore in 1910. Like many of the local trees, it failed to bear well the past season. The main drawback to this variety is the fact that it does not keep well, and before thoroughly ripe at the base will begin to decay at the neck. For home use its good flavor and productiveness make it desirable, but it will probably never rank as a commercial variety.

Several other varieties have been propagated by the trade to a small extent, but the above includes all those which are being generally grown at the present time. Among the lesser known varieties might be mentioned the Blake, Fowler, and Miller. Several others exist which would be propagated if the owners of the parent trees would allow it. These local varieties are all sufficiently hardy to be valuable for practically all of the orange belt. They are all, so far as known, of Mexican origin. The fact that the Mexican or Guatemalan varieties have been the most successful here argues strongly in favor of these types. It is well known that in many parts of Mexico the climate closely resembles that of Southern California, and avocados from such localities have without exception been successful in this state. The question of hardiness is a most important one in establishing avocado varieties which will succeed in the cooler portions of Southern California. It has been pretty definitely proven that varieties from tropical seacoasts or low elevations will not do much in Southern California, as a rule. During the recent cold weather seedlings from Hawaii and Florida were frozen to the ground, while those from the Mexican highlands were untouched.

The fact that the avocado has been grown in all parts of Mexico for centuries and in countless numbers, and that many varieties have there originated through seedling variation, has led those interested in the development of an avocado industry in California to turn their attention towards that country for obtaining choice varieties suitable for commercial purposes. During the last two years a great deal of the "tierra fria" of Mexico has been searched over to find the most desirable types for this state, with the result that there are now growing in Southern California budded trees from the most desirable of the Mexican varieties, embracing both fall and spring bearers, and fruits of numerous forms. The fact that the ancestors of our local varieties were grown for generations in the very country from which these varieties were obtained makes it certain that they will be a success here, as far as adaptability to the climate is concerned. The greater opportunity for selection makes it reasonably certain that these Mexican varieties will be found much more desirable than any which have originated as seedlings here.

None of the Florida varieties have as yet fruited in California so far as known, but a large number of them are on trial and a few years more will definitely determine what can be expected of the Florida type in this state. There is no doubt but that this type is much more tender than the Mexican, and it will only be a possibility for the most frost-free localities—past experience has proven this. The set of budded trees sent to several points in Southern California last spring by the Department of Agriculture will provide a thorough test of this type of avocado. Time may determine that some of them are valuable for the milder parts of the state, and there seems no reason to believe they should not be, for apart from being more tender than the Mexican varieties they appear to do equally as well here. Named varieties from Florida now under trial include the Trapp (the standard Florida commercial variety), Pollock, a very large variety, but a shy bearer and not being widely planted in Florida, and Family, Wester, Quality, Sterling, Cardinal, and others, little known as yet even in their native country.

Hawaiian varieties have not been a success here up to the present time. Of a number of Hawaiian seedlings eight or ten years old which are growing in Southern California, not one has been fruited, so far as known. The Hawaiian forms, having been naturalized under the tropical conditions which prevail in the Islands, are rather tender here, and will probably have to be classed with the Florida varieties.



A Fine Mexican Avocado, Ready for Serving

FEIJOA SELLOWIANA:

ITS HISTORY, CULTURE AND VARIETIES

By F. W. POPENOE

Subtropical Fruits

A Department of Tropical and Subtropical Horticulture

BY F. W. POPENOE

Notes on the propagation and culture of plants and trees coming within the scope of this department will be welcomed, and inquiries are invited.

AHUACATE OR AVOCADO?

Dr. Franceschi of Santa Barbara, well-known introducer of new plants and botanist of international repute, sends the following interesting contribution regarding the correct name for this fruit. Since there are at least three names that have been in common use in this State, and since, as pointed out in this article, there is only one that is correct and desirable, this subject is one which merits attention. The name, "Alligator Pear," has always been a bugaboo to all intelligent people. "Avocado," while not quite so objectionable, is nothing more than a corruption of the correct name, and since this fruit is one which is now coming into prominence and holds promise for a great future importance, it behooves Californians to guard this subject with the greatest care and see that this superb fruit does not become established under anything but its correct name:

Subtropical Editor of the Western Empire: What's in a name? A great deal more than one thinks at first glance. A witty Frenchman once wrote a story of a country where it had been decreed that every child should receive, instead of a name, a number which through subsequent additions in progress of life of appropriate algebraical symbols would plainly show the physical, moral and social qualities of each individual, since it was to be worn in plain sight. Moreover, there was the idea of extending this ingenious system to all other living or inanimate things, so that every one of them should be represented by a formula of a few figures in different combinations. Incidentally this would be a perfect solution of the problem of universal language, leaving "Esperanto" far in the background.

There is no record that this ingenious system worked well. At least it is not in vogue in any of the most progressive countries at the present time. True it is that something similar was adopted in penitentiaries, for a diametrically different purpose, viz.: to conceal the personality of each individual. Leaving aside the names of men and women, concerning which the most bewildering mix-up exists in the United States above all other countries, let us have a look at the names of "things," in plain American English. How did they originate? The greatest bulk of them came from the mediaeval English, which had taken them from one of its many parent languages. Also a great number were adopted from other modern languages, and in more recent times new names had to be created for new things. The rule established by Horace 2000 years ago still holds good: "New names for new things." There is no place in any self-respecting language for new names for old things, least of all for names with no historical nor etymological foundation. What can be said of names which were born of ignorant blunders made by ignorant people?

This is the especial case with the "Ahuacate," PERSEA GRATISSIMA, one of the coming fruits for California, of which hundreds of thousands were planted recently in our State, far in excess of any other country in the world. Where does this name "Ahuacate" come from? Four hundred years ago, when Cortez landed in Mexico, this fruit was well known and much prized by the native Aztecs, who had called it "Ahuacahuitl" for centuries. "Ahuacate" and "Aguacate" (both pronounced Ah-wah-cah-te, accenting third syllable,) were easily explained adaptations to the Spanish language, which soon after was transplanted to the islands of the so-called West Indies, and there many queer transformations took place. In the Spanish islands "Ahuacate" became "Abogado," this being the Spanish name for lawyer or attorney. In the French islands "Abogado" was again changed to "Avocatier" and to "Poire d'Avocat," meaning "lawyer's pear;" then in the English islands the nonsensical combination of "Alligator Pear" came out. Was it a retaliatory joke of some unfortunate nigger who had been "eaten alive" by unscrupulous lawyers? They call them "sharks" in our times. It has never been explained, and most probably never will be.

Now from the East we are told that we Californians must conform to the rubbish heap our musical and immemorially old "Ahuacate" and adopt in its place the meaningless "Avocado," and why? Principally because the hotel and restaurant men in the East have printed that name on their bills of fare. Is this serious? That the light comes from the East is an old saying, but the sun shines pretty brightly in California, and we are accutomed to know good things when we see them. The name "Ahuacate" possesses a well-marked individuality of its own; it carries us back to the primeval civilization of this continent and to the harmonious Castillian language. Must we sacrifice all this to the whimsical blunders of West Indian niggers or to the bonifaces of the East? Surely not!

PLATE OF AVOCADO SALAD MADE FROM A SINGLE FRUIT.

POMELO SEED-BED STOCK.

As a side proposition—a by-product of the pomelo grove, as it were—seedbed stock upon which to bud the orange and lemon bids fair to have a great future.

The pomelo root is more thrifty, has a larger and stronger top root and a greater wealth of fibrous roots than either the Florida sour stocks or California sweet stock. The fibrous root of the pomelo takes up and assimilates a greater proportion of food elements than the orange stock and is altogether a better foundation.

Orange and lemon budded on the pomelo produce at least one-third more wood growth in the nursery row in a season than on any other foundation. The union is more perfect and at least a year's time is saved in growing a three-fourths-inch tree.

An ocular demonstration of this is shown in the Malone citrus five-acre nursery in Azusa. The pomelo seed was planted in May, 1909, transplanted in April, 1910, budded to navel, valencia oranges and Eureka lemon in November, 1910, cut off to 28 inches in July, 1911 and now show 5-8 to 7-8 trees, vigorous and rapidly producing wood. This nursery stock is already as large as three-year-old post stock with either sweet or sour roots, and attest the advantages of the pomelo as a foundation for the orange and lemon.

Looking forward to the future of the pomelo in California, Western Empire can see a bright prospect for this valued fruit, but the growers will have to remedy present faults in growing, naming and marketing the crop and educate the masses to its uses and benefits.

SPROUTING AHUACATES.

PUEBLO VIEJO (Vera Cruz, Mex.) Jan. 20, 1912.—[Editor Western Empire:] I am sending you today by mail some Ahuacate seeds. You will place them on a dish with some nice white stones (same as China lilies) and keep one-half an inch of water on them all the time. They will grow to an elegant desk ornament and a novelty as well. Tie up with a nice ribbon as they grow, that will help them to grow erect. When eighteen inches high transplant in pots or cans, and as soon as established plant them out in permanent locations and they should be in fruit in four years. If you know of anybody wanting any sprouted Ahuacates next season would be pleased to hear from them.

Yours truly, H. C. COLEMAN.

METHODS OF USING TROPICAL FRUITS.

An article in the February issue of the Pacific Garden brings to notice a most important matter in connection with our little-known or newly-acquired fruits. This article is on the subject of the Granadilla, or edible Passion fruit (Passiflora edulis,) and quotes from a letter received from Glendale: "This fruit is considered, in Sidney, Australia, a great delicacy. Passion fruit and cream is all the vogue for ladies when shopping. As popular as ice cream is here." The writer of this letter also states that she grew at Glendale, which is not far from Los Angeles, a vine which bore delicious fruit. The editor of the Pacific Garden goes on to say that of all the plans of this species he has seen in California, not one produced fruit which could be considered of any value.

This incident illustrates most admirably the reason why many of our tropical fruits are not liked by some people in this State. It is because they do not know how to prepare them for eating. Here is this lady who has lived in New South Wales, the home of the Passion fruit, and she considers it delicious as produced by her vine at Glendale. But doubtless she does not eat the fruit out of hand, as has been done by the editor of the Pacific Garden and others—she knows how to prepare it to bring out its fine qualities and make it a really delicious fruit.

The same condition obtains with many other fruits. In the case of the avocado, many recipes have been published for its use in this State, yet many have not yet learned how to prepare it to bring out its delicious and delicate flavor, with a consequence that they "cannot see much in the avocado." Nor do we prepare the cherimoya here in any of the delicious forms in which it is served in the tropics. Lemon Guavas are frequently allowed to go to waste in Southern California, yet they make the finest jelly in the world, a jelly that is famous throughout the tropics and commands a high price in this country.

The chayote, a tropical vegetable coming into use here, is superior to asparagus when properly prepared.

The sapote prieta (Diospyros ebenaster) is delicious when used as a dessert with lemon juice and sugar—otherwise it is "flat."

In fact, this instance of the Passion fruit is only one of a multitude of similar instances that might be named. The moral is plain. Californians should not condemn a fruit as being of little value until it has been served to them in one of the ways in which it should be served, for few fruits are used only in the fresh state, unseasoned and unprepared, as Californians have seemed to consider all tropical fruits should be used.

Posadena Star. April 11 and 12. 1912

FLOWERS OF SPRING SEEN

Beautiful and Artistic Are Displays at Annual Exhibition.

KEEN COMPETITION IN BULB CLASSES

Full List of Awards Are Announced by Judges This Afternoon.

The Seventh Annual Spring Flower Show of the Pasadena Horticultural society, which was formally opened this afternoon by Mayor Thum, is in several respects the finest yet seen in this city. At a natural setting for a flower show, Central park is unexcelled, and it is this more than anything else that has resulted in the present show being one of the most artistic and pleasing to the eye of any yet seen here. The fountain and pool which have been enclosed by the tent are banked with pot-grown decorative plants, and during the evenings the fountain will be electrically illuminated.

While the unfavorable weather of the past few weeks has resulted in the exhibits of outdoor-grown flowers being smaller than usual, particularly in respect to roses, carnation and sweet peas, those that are shown are considerably better in quality than last year, and all bulbous flowers are exceptionally fine. Especially noteworthy is the magnificent display of hybrid Hippeastrums made by Howard and Smith of Los Angeles, which for beauty of coloring and size of flowers has never before been equaled. Annuals with the exception of sweet peas are well represented, the display of pansies being particularly fine.

Some Large Exhibits.

A. J. Morris, who won the cup last years for the best collection of Iris, is back again with an even finer collection. The different species and varieties are labeled, enabling the many who will desire to grow these beautiful flowers in their own gardens to obtain them without difficulty.

Ranunculus and tulips are finely represented. E. D. Sturdevant's display of rare ornamentals is as usual of great interest to all plant fanciers.

That the people of Pasadena are taking an increased interest in pot-grown ornamental plants is the belief of Otto Heutschy, a former manager of the flower show, who says this interest is evidenced by the increasing number of these plants being exhibited at the flower shows. Ferns, Rex Begonias, Dracaenas, Asparagus and many others are plentiful this year.

From Santa Barbara.

Those who are interested in new and rare plants are pleased to see Dr. Franceschi of Santa Barbara again. The doctor's absence from last fall's show was regretted by many, and now that he is here again he is being plied with questions regarding exotic flora, on which he is Southern California's best authority. His exhibit of novelties in ornamental and economic plants is extensive and interesting.

That it is an ill wind that blows nobody good, is demonstrated by the fact that the rainy weather, which seems likely to hold out for another day at least, is keeping all the cut flowers in splendid condition, and the bedraggled appearance which a flower show usually presents on the second and third days will not be apparent this year. With clear weather Friday and Saturday a large attendance is expected.

Commercial Exhibits.

One of the prettiest and most interesting commercial exhibits is that of the Dean Iris gardens, where a large variety of this popular flower is shown. This exhibit is a revelation in that the range of color and form is greater than many have any conception of. Another very interesting exhibit is that of J. H. Teekamp, importer of Dutch bulbs. Mr. Teekamp shows a large variety of late tulips. Will S. Laurie's exhibit of bulbs contains a large number of varieties, attractively arranged in a naturalized form among wild grasses.

Mrs. E. U. Smith's decorated table, which carried off first prize, is acknowledged by all to be a thing of beauty. Pink sweet peas and asparagus are used in the derocating.

Some Competition.

Competition was not very keen in most of the classes. In pansies and bulbous flowers the hardest fight was put up and those who won first prizes in these classes could well feel that they had earned them. Mrs. M. B. Fowler, Mrs. S. W. Allerton, Mrs. Eva Fenyes, Mrs. H. R. Johnston, J. C. Torrance, A. J. Morris and H. C. Herd were conspicuous among the winners of the coveted blue ribbons.

The floral baskets exhibited by the different schools of the city are attracting considerable attention. That of the McKinley school, which carried off first prize, is exceptionally fine, and one of the best things in this line ever seen at the local show.

SECOND DAY ADDS TO BEAUTY OF DISPLAYS

Flower Show Is Attracting Large Attendance of Admirers Today.

SCHOOL CONTESTS ADD TO INTEREST

New Feature This Season Proves to Be One of Great Value.

While the flower show is ordinarily at its best on the first day, this year the contrary is the case, and it is actually better today than yesterday. Many of the bulbous flowers, which did not open yesterday on account of the unfavorable weather, are to be seen in all their glory this afternoon, and will be even better tomorrow than today. Those who have put off seeing the show until the last day will not be at disadvantage this year, since it is likely that the flowers will be in better condition as a general rule on Saturday evening than they were at the opening of the show. The attendance was large today.

Annual flowers, although not as abundant this year as ordinarily, have never before been exhibited in such perfection. The cold weather, while retarding growth, has resulted in flowers of perfect texture and coloring, lacking the faded appearance which is often the result of an abundance of sunny weather.

Cup Winners.

Particularly noteworthy is the showing made by the different schools of the city in the class for the best floral basket, to be decorated by the members of the sixth grade. In this class competition was keen, there having been eleven entries. That of Garfield school was unique in that the basket was made by the boys. The first prize cup was awarded to McKinley school, Grace A. McNeil, teacher, and it is acknowledged by all that the basket easily outclassed all its competitors and was well worthy of the honor. Cups for second and third prizes went to the Academy of the Holy Names, Sister Mary Hermogene, teacher, and Marengo Avenue school, Miss Lena Kirley, teacher. The members of the sixth grades of the eleven different schools which have competed in this class are to be admitted to the show free of charge this afternoon, accompanied by their teachers.

The cup for best twelve carnations donated by the J. Herbert Hall company; that for Cinerarias in class 91, donated by Mrs. Eva Fenyes; for Cineraria hybrida in class 92, donated by Wm. H. Hoegee company, and that for best group of plants, donated by the society, were all won by Mrs. S. W. Allerton.

Ed. Kirby, gardener to Mrs. Allerton, is now receiving the congratulations of his friends on the excellent showing made. The cup donated by Mrs. Thomas Chisholm, for the best collection of ferns, was won by Mrs. H. M. Singer, Louis Brandt, gardener.

Large Exhibits.

As usual, the exhibit of Howard & Smith of Los Angeles is the most extensive and striking in the show. Among the choice strains of flowers shown by this firm are flowering Clematis, Bignonia cherere, a beautiful scarlet trumpet vine, large flowered Ranunculus, Pelargoniums in variety, Delphiniums improved Shasta daisies, Narcissus, hybrid Gerberas, and the magnificent display of hybrid Amaryllis, the result of Fred Howard's skill in hybridization.

The Germain Seed and Plant company has a large booth in which a variety of seedling ornamental trees are shown, grown in flats and ready for transplanting to the open.

Those who are interested in that coming commercial fruit, the Avocado or Alligator pear, are attracted to the display of the Coolidge Rare Plant Gardens, where five varieties of this valuable fruit are shown. These were grown at Orange by C. D. Taft, the "loquat king," and some of Mr. Taft's choicest loquats are also shown. Mr. Coolidge's display of ornamental and decorative plants, many of them new or rare, is also of interest.

One corner of the tent is given over to the exhibit of the Figueroa Street nursery of Los Angeles, and is most tastefully arranged to represent a Japanese garden. Some fine specimens of Wisteria and many conifers are used.

Other interesting commercial exhibits are those of the Rosa Nursery, where some beautiful bedding plants from Germany are shown, that of Campbell Seed Store, Robert Pegg of the Mentor Nursery, who shows a fine display of decorative plants, and Edward H. Rust of South Pasadena, who as usual exhibits some splendid things.

Fine Dutch Bulbs.

Unique and beautiful is the exhibit of John H. Teekamp, importer of Dutch bulbs, and the greatest interest is evidenced in this display. It is composed almost entirely of tulips, and many of the varieties have never been seen before in this country. Bulb growing is second nature to Mr. Teekamp and a member of his family is one of the largest commercial growers in Holland. The plants exhibited are remarkable for their splendid foliage and strength of stem, and almost every possible shade of color is represented, not to mention many striking combinations. Most of the first prizes in the competitive classes were won by bulbs supplied by Mr. Teekamp.

The Montarioso Nursery of Santa Barbara, shows a number of Dr Franceschi's new introductions, and some fine things in flowering plants. Chief among the latter are Hidalgoa Wercklei or climbing Dahlia, Dombeya spectabilis, and a new hybrid rose, a cross between Rosa gigantea and Rosa moschata, produced at Santa Barbara.

That enterprising woman florist, Sadie A. Thomas, is well represented. Miss Thomas has the unique and enviable reputation of having the largest collection of chrysanthemums on the Pacific coast, including no less than four hundred and eighty-six distinct varieties. She issues an attractive catalogue of these plants which goes to all parts of the country and is doing much to add to Pasadena's floral reputation. She is florist at the Raymond Hotel.

The exhibit of Will S. Laurie, grower of bulbs and cut flowers, is attractively arranged in a naturalized fashion among wild grasses, and contains many varieties of Iris, Narcissus, Ixia, Allium, Scilla, Soaraxis, Tulips, Hyacinths and others.

Those interested in the Iris are much pleased with the display of the Dean Iris Gardens, in which a large variety of this beautiful flower is shown. A. J. Morris, in his first prize collection, shows a specimen of the finest Iris in existence. Iris, Lorteti, whose beauty is made all the more attractive by the fact that it is extremely difficult to grow. Probably this is the first specimen ever seen in any Southern California flower show.

Wild flowers are well represented. Hazel Dell's first prize collection including almost all that it is possible to obtain at this season of the year.

CALIFORNIA CULTIVATOR

An Illustrated Weekly Magazine, Devoted to the Rural Home and Ranch.

LOS ANGELES APRIL 11, 1912 SAN FRANCISCO

The Mango in Southern California

Seedling Mango at Hollywood.

Red Number Eleven Mango at Sherman.

Courtesy F. W. Popence.

"The mango, with which but few people of California are intimately familiar, is throughout the tropics where extensively grown, the fruit of first importance. While systematic cultivation on an extensive scale has been applied to it in comparatively few countries, in all parts of the tropics it is grown in the greatest profusion and valued about as those of temperate climates value the apple. To those who are familiar with its finer varieties it is held in the highest esteem, but it is a regrettable fact that in many localities it is found only in inferior seedling forms, and this is accountable for the misunderstanding which exists in the minds of some Americans in regard to this fruit.

"The fruit has been termed 'the king of tropical fruits' or 'the apple of the tropics.' Its beautiful coloring and delicious flavor, together with its extensive use in all tropical countries, seem to warrant these appellations. In many countries it is one of the commonest of fruits, growing in a semi-wild state, and forms an important part of the diet of the natives during the season when it is to be obtained."

The Mango for California

A Fruit of First Importance in the Tropics. Suitable Varieties May Prove Popular and Profitable in This State. By F. W. Popenoe.

It is not generally known that the mango has been grown in California for over thirty years, and that trees are now bearing in several different localities. So few trees have been planted, however, and these have been of such nondescript character, that an adequate trial has not been given this fruit. Not until superior forms from countries whose climatic conditions are similar to our own are given a trial under favorable conditions will we definitely know what can be expected of the mango in this state; yet the behavior of some of the trees already fruited here leaves little room for doubt. It should be remembered that many of them have been subjected to the most adverse conditions. Planted in poor soil in some instances, and left to shift for themselves, getting no care whatever and no water except from the skies, how could they be expected to do their best? Subjected to such treatment, which would prove fatal to the majority of our temperate fruits, it is little wonder that their growth has been stunted and that many of them have failed to mature their fruit. The few trees which have had reasonable care have done much better, and although they have shown that the growth of the tree will be much slower here than in tropical countries and the same immense proportions will never be reached, fruit has been produced abundantly and in some cases ripened perfectly.

Red Number Eleven Mango Grown at Sherman.

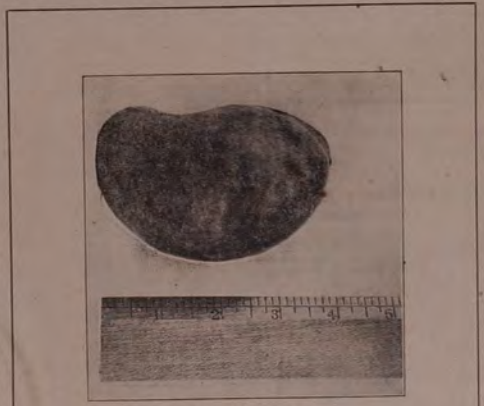
At Hollywood and Sierra Madre the best results have been obtained. Sierra Madre is directly at the foot of the mountains and receives a large amount of reflected heat during the summer. Two trees, planted about fifteen years ago and receiving no care whatever, are producing abundantly and ripening their fruit to a fair degree. The thirty year old tree on the Miller place, in Hollywood, the largest mango tree in California and the best known, produces enormous crops of fruit but does not ripen them, due without doubt to the cool and foggy weather, since one of the principal requirements of the mango is a warm season of long duration, with high temperatures. In another garden several trees of smaller size produce fruits which, due to the protection afforded by their surroundings and the admirable culture given them, become deliciously ripe and sweet. Some of the fruits produced here are as highly colored and as finely flavored as seedlings of the same type would be within the tropics.

Two trees growing in the foothills near Sherman, only a few miles from the ocean, are in thrifty condition and bearing well, but show that more heat than is experienced near the sea coast is necessary for perfect ripening. One of these trees is an inarched Red Number Eleven, sent from Florida some years ago, and is of great interest on account of its being, so far as known to the writer, the only grafted mango now bearing in California. It is a regular and prolific bearer, and the fruits are of a uniform, normal development, a condition rare with seedlings. If it could have been planted farther inland it would be producing first class mangos, as it is only the lack of heat which prevents the fruit from ripening. The cool and foggy weather experienced in such a locality as this during the summer months greatly retards the development of the fruits, and they mature at the beginning of winter, resulting in their being unable to ripen properly on account of the cold weather.

A five year old seedling near Santa Ana has made a splendid growth and is producing regularly, although rather sparsely. Not much can be said of the adaptability of this locality to the mango until it has been more thoroughly tested, but it would seem that it, too, lacks the necessary degree of heat during the summer months.

At Montecito, near Santa Barbara, there are several trees some sixteen or eighteen years old. These trees have never had a healthy look, their growth being stunted and their foliage yellow. From the appearance of other plants in the same vicinity it would appear that this was due more to the soil than to the climate. The trees bear regularly a fair crop of fruit, but it does not mature sufficiently to be of any value.

As far as can be judged by the varieties already tried out in California, the mango is much better adapted to the most frost free localities of the interior than to the sea coast. It is only inland that the requisite degree of heat during the summer months can be obtained. It seems reasonable to believe that the inland valleys, such as the San Joaquin and Imperial, will produce first class mangos. This has been questioned by some, the contention being that a high degree of humidity is necessary for the perfect development of the mango. The behavior of the tree in this state and in the highlands of Mexico, where conditions are almost identical with our own, as well as the statements of the best authorities on the subject, would argue that the necessary moisture can as well be supplied at the roots as through the atmosphere. It is well known that a dry season of considerable duration is desirable, since rains at the time of flowering greatly interfere with polination, and without some artificial means of checking the growth, such as is supplied by an extended dry season, the tree is not encouraged to produce fruit.



Santa Ana Mango.

The question of hardiness must necessarily be largely a matter of variety—and this is well demonstrated by an experience during the cold weather of the past winter. Three inarched trees of Indian varieties, two years old, were subjected without protection to the frosts in an exposed location. Two of the three were killed, but one came through uninjured, it being a variety from Northern India, where it is reputed to have gone through a freeze of twelve degrees above zero with little injury. There can be little doubt that many varieties will be entirely hardy here. In cold localities protection can be supplied during the first few winters if necessary, it being well known that the tree will withstand without injury, after it has attained a few years growth and thoroughly matured its wood, frosts which would prove fatal to it in the young stage.

While there are, of course, certain limitations of climate and soil which govern the cultivation of the mango, the question of variety must have a great deal to do with the varying of these limitations. Having become acclimatized in widely distant localities and under such varying climatic conditions, it is reasonable to believe that a variety which has become adapted to one locality, through years of acclimatization, would not necessarily be a success in another one of widely differing character. The seedlings or varieties which have been grown in California thus far are not worthy of consideration for future planting. Hence it is necessary for us to set to work at once to produce superior forms by selection and breeding, or obtain from other countries desirable varieties which will succeed here. This latter method is obviously the most advantageous, and there is little doubt that we can obtain from the highlands of Mexico, Northern India, and other subtropical countries, varieties of merit which will be well adapted to this climate.

It is to this work that our efforts

(Continued on Page 479.)

THE MANGO FOR CALIFORNIA.

(Continued from Page 451.)

should now be directed. It has already been begun by the Department of Agriculture, by sending out to several points in Southern California, during the past summer, sets of about forty inarched trees, including choice varieties from several parts of the world. One of the most promising sources for varieties adapted to this climate is Saharanpur, in the northern part of India. Here many of the choicest mangos are grown to perfection, yet the climate is more severe than in Southern California, as evidenced by the following extract from a letter written by Prof. C. V. Piper when traveling as [illegible] States Department of Agriculture:

"Saharanpur is only a short distance from the Himalayan foothills, and the mercury commonly goes down to about twenty degrees in the winter. It is on this account that both tropical and temperate trees can be grown here successfully. It is quite strange to see cherries, plums, pears, and even apples, growing alongside mangos, dates, guavas, etc. In a general way it is comparable to Chico (California) so far as temperature is concerned, possibly a little hotter in summer, and hardly so cool in winter. Judging from this place, why won't mangos do well in California?"

In this communication from Prof. Piper there is much food for thought on the part of horticulturists in Southern California. The mango is one of the most highly valued and esteemed of tropical fruits, and its addition to our list of commercial products would mean much to this state. To quote Professor Baker of Pomona College, "the day will surely come when fine mangos and avocados and many other splendid subtropical fruits are regularly among our standard products."

SUNDAY TRIBUNE: LOS ANGELES, CAL., MAY 26, 1912

New and Gratifying Industry Suggested to City Dwellers---Palatable Table Fruit

AVOCADO CULTIVATION INCREASES—VIEWS OF TREES AND REGAL FRUIT

Left to right, top—The Taft avocado, an excellent variety which originated near Orange, Cal., one of the finest yet grown in the state; a large seedling avocado tree near Monrovia; budded trees do not grow to such large size, hence are better for the small city lot. Bottom, left to right—A young avocado in Los Angeles' front yard, producing about 500 fruits a year; interior of a fine avocado; such a fruit as this will practically make a meal for two persons.

By F. W. POPENOE, Altadena

A subject of great interest to both the city dweller and the suburbanite is the selection of fruit trees for the home garden. Especially in the city is this a difficult question, because of the limited amount of space that is usually available.

In selecting the fruits which are to be planted in your miniature orchard, there are several questions which present themselves for attention. Not the least of these is the matter of adaptability, although this is a subject which is usually ignored altogether. But it must be remembered that in the small city or suburban garden a tree does not usually get the same care and the same environment that it would have in a commercial orchard, and it is not every tree which will thrive and produce satisfactory results under adverse treatment. It requires but a glance in almost any Los Angeles back yard to see that the majority of the fruit trees therein are not flourishing, and if one goes so far as to inquire into the cause, it will be found to be principally the lack of care and attention. Black scale holds full sway in more than one such fruit garden, and what the scale does not succeed in doing to the trees, the lack of cultivation and water does.

Grow Your Own Avocados

For the back-yard garden the avocado is exeptionally valuable, for experience in and around Los Angeles has shown it to be remarkably tolerant of abuse and to withstand more neglect than almost any other fruit tree, at the same time continuing in vigor and producing abundantly of its valuable fruit. Furthermore, under such conditions as result in an orange tree becoming a most unsightly object, the avocado keeps up a good appearance and is of unusual value as an ornamental tree. As has been frequently pointed out, there are few of our ornamentals which possess greater merit than the avocado, and if it produced no fruit whatever it would be valuable for this purpose alone.

Although remarkably tolerant of abuse, naturally the best results are only obtained when good care is given. Many trees in Los Angeles gardens are producing abundantly, with the ground around them like adamant and never having seen the hoe since the day the tree was planted. City dwellers as a class are neglectful of their plants and trees. Were a reasonable amount of intelligent attention giving to supplying the needs of a tree, finer fruit and more of it, would be the result.

A Regal Fruit

Those who are familiar with the avocado practically without exception are ardent devotees of this regal fruit. As with the olive and other subtropical fruits to which the northern palate has not yet become accustomed, the taste for the avocado has sometimes to be acquired. Rarely is this a difficult operation and if one chances to experiment on a perfectly ripened fruit he is likely to require little urging to partake of his second spoonful. After the third trial his gustatory apparatus becomes accustomed to the flavor and consistency of the fruit, and the unfortunate individual is well on his way toward that state where he will squander his hard-earned money on avocados at fifty cents apiece without a murmur. Many immature and half ripe avocados have been sold in Los Angeles markets, and not a few that were several degrees over-ripe, and it is little wonder that those who have essayed to familiarize themselves with the avocado under such conditions have given up in disgust and remarked that they "could not see anything in that fruit." Another difficulty has been that people have set about to eat the avocado, after having been told by the all-wise fruit vendor that it was an "alligator pear" much the same as they would a Bartlett pear, and then have been forced to conclude that the fruit lacked character and individuality, or in other words, that "there was nothing to it." To appreciate an avocado, it is just as essential that it be properly ripened and prepared, as it is with many other fruits.

Despite the delicious and incomparable flavor of the avocado, it is not a delicacy nor a dessert fruit, but a food product of the highest order. It is its high food value that places it in a class by itself among our cultivated fruits, and justifies the predictions now being so freely made as to the future extensive development of the avocado industry.

Not only is the food value present, but it is present in a much more attractive and appetising form than can be found in any other product. And I leave it to some of our authorities to say whether a fruit containing eighteen to twenty per cent of vegetable oil in a very digestible form is not likely to play an important part in the future food supply of the country, when it can be produced in the same quantities from an acre of ground as apples or other products of low nutritive value.

An advantage held by the avocado and possessed by very few other fruits is that by a proper selection of varieties, ripe fruit may be had throughout the twelve months of the year. After maturity, Avocados of most varieties can be left on the tree for two or three months, actually improving in quality up to the moment they are picked. Thus by planting a tree of a fall-bearing variety fruit can be had from October, when it first commences to ripen, until January or February. And with a spring ripening variety the crop will last, if one can keep his appetite under control, from March until June or July. Two trees will thus supply fruit for a greater portion of the year, and by extending the number to four or five it will be easy to have avocados as a part of one's daily diet every day in the year. It is doubtful if this would be possible in tropical countries, but in California's favorable climate it has been proved to be a fact.

The Cherimoya in California

By F. W. POPENOE

Subtropical Fruits

A Department of Tropical and Subtropical Horticulture

BY F. W. POPENOE

Notes on the propagation and culture of plants and trees coming within the scope of this department will be welcomed, and inquiries are invited.

Left to right, top—The Taft avocado, an excellent variety which originated near Orange, Cal., one of the finest yet grown in the State; a large seedling avocado tree near Monrovia; budded trees do not grow to such large size, hence are better for the small city lot. Bottom, left to right—A young avocado in Los Angeles' front yard, producing about 500 fruits a year; interior of a fine avocado; such a fruit as this will practically make a meal for two persons.

PLANT A QUEENSLAND NUT.

The Queensland Nut, Macadamia ternifolia, is one of the most valuable of recent additions to California horticulture. For a combination of ornamental and fruiting tree it is almost in a class by itself. The leaves are very much like those of the holly, and the tree is evergreen, symmetrical, and so drought resistant that numerous trees in Southern California, which never receive any irrigation whatever, are doing well and bearing abundantly. This feature makes the tree one of especial value for arid and semid-arid countries, such as our own.

The nuts are round, about an inch in diameter, very hard shelled, and light-brown in color, somewhat similar, on the whole, to a filbert. The kernel is of excellent flavor and quality, and the nut is one that is sure to become popular. Single trees bear as high as 1200 nuts in a season.

Although of rather slow growth, the tree is one that should be planted in every garden. It is excellent for windy regions, as the wood is very hard and tough.

HOW TO PRONOUNCE "AHUACATE."

Through a typographical error in last month's issue, an incorrect pronunciation of the beautiful Aztec word Ahuacate, the only and original name for the Avocado, Alligator Pear, Palta, etc., etc., was given. To the novice, the sight of this word may be somewhat frightening, but when one gets his tongue adapted to the swing of the thing, it is much easier than one would suspect, and it is not difficult to get used to it, either. It is Ah-wah-cah-tay, with the accent on the third syllable. The last syllable must be very quick and sharp, almost as though it was spelled teh. Get out behind the barn and practice on it a few minutes, and then show your friends that you are up to date. The name Ahuacate has every argument in its favor, and has certainly come to stay.

THE TAFT AHUACATE.

During the last year there has appeared upon the scene of action a new variety of Ahuacate, originated in Southern California, and promising to take place in the very front rank among Ahuacates for home use and commercial purposes. This is the "Taft," not named for our honored President (ex.) but for C. P. Taft of Orange, Cal., the originator. Mr. Taft is one of the pioneer Ahuacate (or Avocado) growers of California, and [illegible] ing propagated by the nurserymen. His greatest achievement he has named the Taft, and the accompanying illustration gives an accurate idea of the appearance of this regal fruit.

Single fruits of this variety frequently weigh a pound, and occasionally as much as twenty or twenty-two ounces. This is as large as an avocado should be, and the most desirable size for market purposes. The skin is thick and tough, adapting the fruit for shipping long distances, and is an attractive light green in color. The meat is thick, fine grained, buttery, and without a trace of fiber or string, or even discoloration. In flavor it is simply the best there is. The seed is rather under the average in size, and is perfectly tight in the cavity.

The Taft is a spring-ripening fruit, hanging on as late as June or possibly into July. It is a good bearer and an exceptionally vigorous grower. It will without doubt become one of the most popular varieties in California, since its hardiness makes possible its culture in practically any region where the orange can be grown.

THE NATAL PLUM.

For a hedge plant, combining utility and beauty, the Natal Plum, botanically known as Carissa Grandiflora, stands unexcelled. The plant is of dwarf habits, never growing over a few feet in height, and makes a very compact body of foliage. It is well supplied with strong bifurcated thorns, which make a hedge of it practically impassable. The leaves are oval, about an inch in length, thick and glossy. The flowers, which are produced in spring and summer, are like those of the Jasmine, over an inch in diameter and very fragrant. They are followed by fruits the size and shape of a plum, bright scarlet in color, and of peculiar acid flavor, not much liked in the raw state, but very useful for jams and jellies. Taken as a whole, the plant is one which merits a much wider cultivation, as it is hardy, requires little care, and is very ornamental.

"CIRCUMSTANCES ALTER CASES."

When buying a fruit tree, the amateur almost invariably asks "How soon will it bear?" "Is it hardy in Southern California?" and a long list of other questions of a similar nature, all reasonable and logical ones to ask, but in the answering of which the unfortunte nurseryman takes a large chance of having the [illegible] or that he misrepresented the facts. The nurseryman may answer every question correctly, but in so doing he has reference to the behavior of the tree if it is afforded good culture and attention, and this, horrible dictu, is not always done, particularly by the owner of a city lot, who plants trees in the backyard for supplying his table with fresh, home-grown fruit.

A certain variety of Ahuacate, let us say, will commence to bear when three years old from the bud, when grown under favorable conditions. But if this same tree is stuck in a hole in the back yard and left thereafter to shift for itself, in all probability it will not bear in three years, nor in four, as its growth will be stunted to a severe degree, and at five years of age it will be about half the size of one which has been given good culture, and weak and sickly to boot.

The matter of hardiness involves a wide range of conditions. Not the least important is the matter of variety, it being well known that some varieties of subtropical fruits are much hardier than other varieties of the same fruits, and the planter should give consideration to this matter first of all. Many varieties of ahuacates, although hardy enough for any ordinary location in the orange districts of California, may be frosted severely in some instances. Frequently this is because of the fact that the grower has been forcing his tree with water up to the very night of the frost, and consequently the tree is full of new and tender growth that is not sufficiently matured to withstand even a light freeze. The thing to be done is to withhold water from the tree after about the first of November, or even earlier, and allow the wood to harden up. Again, the matter of protection or exposure of surroundings is important, and plants placed in an exposed, low spot with no air drainage are almost certain to be frosted when those on a slope will be untouched. One might proceed through a long list of conditions, all of which have a greater or less effect on varying the degree of frost it will require to injure a tree.

Let the planter remember, that the behavior of a tree is in a large measure dependent upon the intelligent care which he gives to it, both in supplying its needs as far as food and water are concerned, and in protecting it from frost through situation, drying off, or in other ways.

THE MANGO.

Five hundred years ago Amir Khrussn, one of the greatest of Hindu poets, wrote in Persian verse: "The Mango is the Pride of the Garden, the choicest fruit of Hindustan; other fruits we are content to eat when ripe; but the Mango is good in all stages of growth."

The verdict of present day philosophers is an even stronger indorsement of the mango than that of five hundred years ago, and in all parts of India the mango is now held in such high esteem as to be almost sacred. English writers have called it the "King of Fruits" and the "Apple of the Tropics," and indeed throughout southern Asia it is of such supreme importance and superb merit as to be worthy of these titles. That it is in disrepute in some parts of the world, notably certain sections of the American tropics, is not due to any inherent fault in the fruit itself, but to the fact that in these regions seedlings only have been growing. And, as with all other cultivated fruits, seedlings are as a rule immeasurably inferior to grafted varieties.

Strolling through the market in Bombay, India, in October last, the writer noticed some fine specimens of the Alphouse mango, famed not only throughout India, but elsewhere as being one of the finest varieties ever grown. These specimens were most alluring in appearance, and their delicious fragrance was noticeable for some distance around. The price was five rupees, about a $1.50 a dozen.

It would be hard to imagine any more attractive fruit was this Alphonse mango—oval, plump in shape, of a beautiful deep golden color, and exhaling an aroma that made one's mouth water. By making a longitudinal cut around the fruit the skin can be readily peeled off, exposing the rich golden flesh, of about the same consistency as a well-ripened peach, and dripping with juice. You dip your spoon into it and it comes out smooth and clear, without a trace of fiber. Placing it on your tongue, it fairly melts in the mouth and is of the most delicate, spicy flavor, sweet but not cloying, as are some tropical fruits, and in fact with a sufficient trace of acidity to make just the proper combination to please the palate.

Such is the Indian mango at its best. The question which must arise in the mind of every Californian who is privileged to taste one of them is: "Can this fruit be grown in California?" And although there have in the past been some discouraging statements made and many reasons given as to why we cannot grow mangos, there is, without doubt, even more to be said on the affirmative side of the case than on the negative.

Although it is not generally known, good mangoes have already been produced in California, and are, in fact, being produced every season. That they are not up to the Indian standard is due in a large measure to the fact that they are seedlings, and of poor parentage in addition, so that their failure to turn out Alphonses or Mulgobas is not entirely due to an unsuitable climate. The second reason why they have been poor is that most of them have been grown in sections not suited to their culture. The mango demands a certain degree of heat and moisture; without these it cannot reach perfection. And it will not withstand as much frost as some other subtropical fruits, although this is to a considerable extent a matter of variety, and varies even more greatly than one would be inclined to think. The essential conditions may be summed up as follows:

Temperature—During the period when the fruit is coming to maturity, which is from about May to September, the weather must be not only warm, but hot. Daily temperatures of 75 or 80 degrees will not suffice. It must be considerably above 90 for good results, and if the nights are so cool as to greatly retard the development of the fruit the warm weather must last until October in order to ripen them perfectly.

The amount of cold that the three will stand not only varies with different varieties, but depends to a considerable extent upon the condition of the tree at the time of low temperature, and the duration of the cold snap. Last winter a young tree of an Indian variety, two years old and growing at Altadena, went through a temperature of 26 degrees without injury, although other trees the same age, but of a different variety, were badly cut back. A mature tree will naturally withstand much more frost than a young one. Protection should be given the first few winters.

Atmospheric Humidity—It is not necessary at any time of year to have a high relative degree of humidity, although on the other hand the dry air of the desert has so far proved too much for the mango. It is very advantageous to have the air dry during the ripening season, and in fact, throughout the entire period when the fruit is developing, from the appearance of the flowers until the ripe fruit is picked. The tree must have abundant irrigation at the roots, but does not require high atmosphere humidity as has sometimes been stated.

Soil.—This does not seem to be as important as the preceding factors, but the tree will not thrive on a heavy, poorly drained soil. It does best on a good loam; sandy loams suit it well and light clay is not inimical.

The above conditions are fulfilled in some parts of Southern California to a sufficient extent to permit of the production of choice mangoes. In the foothill regions good fruit has been produced during the last few years, both at Sierra Madre and Monrovia, the summers being warm in these regions, and free from cold, foggy nights and mornings that are so prejudicial, and are the usual thing near the coast.

Through the efforts of the United States Department of Agriculture many of the finest Indian varieties are now being tried out in the regions mentioned, and in a few years more we shall know definitely what to expect from them. It seems almost certain that the mango will prove to be an extremely profitable crop.

Don't Call It "Alligator Pear" or "Avocado" but "AHUACATE"

It Is Successfully Grown in Southern California and Is a Fruit of High Value as Food

BY F. W. POPENOE

From a Paper Read Before the State Fruit Growers

RIGHT in the beginning I want to say that it is greatly to be regretted that this fruit has become established in California under a misleading and meaningless name. I refer to the term "alligator pear," which certainly has no excuse for existence, and invariably gives those who are unfamiliar with the fruit a wrong impression of it.

The name "avocado," however, can be said to be scarcely less objectionable.

The correct name is "ahuacate."

In tropical America the ahuacate is not placed in the same category as other fruits, but is considered as a staple food product of equal importance with rice and beans as a part of the daily diet.

Laborers going into the fields carry with them one or two ahuacates as a substantial part of their noonday meal.

Americans going to the tropics become familiar with this fruit, almost invariably learning to relish it as one of the most delicious and satisfying of tropical products, and at the same time one which can supply a part of their daily nourishment.

Returning to the United States the traveler goes into ecstasies at the sight of "ahuacate salad" on the hotel menu.

Learning that the fruit can be grown in California, he immediately asks why it is not extensively planted here and made a part of our daily fod.

The ahuacate has now progressed trees come into bearing in differability to California is questioned. Every year a number of young trees come into beaaring in different localities, and today we have sufficient facts at our command to prove that the ahuacate is entirely successful in a large area.

During the past two years fully 100,000 seedlings have been grown at various points south of the Tehachapi Many of these are being budded this season.

The difficulties of propagation, which were considerable during the first few years, have now been practically overcome, and the production of budded trees can go on at a fairly rapid rate.

Already several small acreages of budded trees have been set out, and the coming year will see a total planting of 200 acres, as a conservative estimate.

Innumerable trees will go into small home gardens and back yards, for the value and interest of an ahuacate in the dooryard are appealing to everyone.

The varieties now propagated and offered by the trade are mainly of local origin. The difficulty and expense connected with obtaining budwood from foreign countries has prevented any large quantity of trees being propagated from them, but a good start has been made in obtaining the choicest varieties and budded trees which are now established here will soon supply enough budwood to permit their extensive dissemination.

Of the local varieties several are first-class in every particular and would almost seem to fulfill the commercial requirements, as we understand them at the present time.

The propagation of most of them has only been begun during the past two years, and no large quantity of stock is yet available; but another season will see quite a change in this respect.

The best season for transplanting ahuacates has been found to be early spring, after danger from frosts is over but before the tree has started into new growth.

The ahuacate requires an abundance of water, especially during the first two or three years. On the whole the tree seems to require about the same treatment as the orange. It will stand more frost than the orange.

Viewed, therefore, from every standpoint it may be said that this fruit is the most promising that has been brought to the attention of California orchardists for many years.

Subtropical Fruits

A Department of Tropical and Subtropical Horticulture

BY F. W. POPENOE

Notes on the propagation and culture of plants and trees coming within the scope of this department will be welcomed, and inquiries are invited.

SEEDLING MANGOS.

It is now beginning to be generally known that California can grow the mango, and considerable attention is being given the fruit. The United States Department of Agriculture considers the matter of such importance that it has sent out for trial in several parts of the State extensive collections of the world's choicest varieties, obtained after years of effort and a large expenditure of money. When these choice varieties come into bearing, there is little doubt but that some of them will be found to be especially adapted to California climate and soil, and give mango culture a great impetus in this State.

It is well known that seedling mangos are as a rule inferior, and even when grown from selected seeds tend to deteriorate. This has been the accepted view for many years, but with the recent attention which has been devoted to the subject has come the discovery of some very important facts in connection with reproduction by seed.

It has been recognized for some time that certain races or types of mangos come more nearly true from seed than do others. The reason for this has now been ascertained; certain races are monoembryonic, that is, each seed contains only one embryo and will produce only one plant. Other races are polyembryonic, each seed producing several plants, sometimes even as many as thirty. The polyembryonic races, when grown from seed, reproduce the characters of the parent almost exactly. The monoembryonic races, on the other hand, always exhibit considerable variation and tend to deteriorate.

Investigations made in Florida have brought out the reason for this difference. It was found that in the polyembryonic races the embryos were adventive; that is, they were not the product of the fertilization of the germ cells in the ovaries, and hence had no opportunity to be different from the parent tree. The monoembryonic seeds, on the other hand, are the product of the fertilization of the ovule, and thus is there not only an opportunity for cross-fertilization, but the seedlings, like those of many other cultivated fruits, exhibit considerable variation.

These differences are well illustrated by the mangos of different countries. In the Philippines all mangos are polyembryonic, and only the slightest varietal differences are shown among the immense number of seedlings of several races which are found in the Islands. Even more significant is the fact that in Mexico the so-called "Manila" mango of the present day maintains the characteristics of its Philippine race, despite its two or three hundred year's sojourn in America, where it was brought by some of the Spanish galleons. It would seem natural that in this time some of the characters of the fruit would be lost, that it would undergo some alteration in its new home, but such is not the case.

The indian mangos, many of which are monoembryonic, have been repeatedly grown from seed in this country, only to show that the choice varieties from which the seeds were taken were not reproduced, but an inferior fruit in almost every case.

This difference in seedling reproduction is of the utmost importance to the future of the mango industry in California. It does not, however, entirely eliminate the necessity of vegetative propagation, since it has been found that the seedlings of the polyembryonic type are in some cases shy bearers, and in order to insure productiveness the trees must be either budded or grafted. What it does mean is this: that by planting seeds of the best polyembryonic varieties one will stand a much larger chance of getting a good fruit than by planting seeds of one of the monoembryonic forms. It means, in fact, that there will be no further necessity for the presence of inferior or worthless seedlings of the "turpentine" type, which have done so much to give the mango a bad name in the West Indies. It will be much better to risk an occasional tree turning out to be a shy bearer than to have the country filled with the sort of mangos which require to be eaten in a bathtub on account of the large amount of fiber with which they are filled. We need, of course, to grow grafted mangos for best results, but here as elsewhere there will doubtless be a large number of seedlings planted for home use, and it is merely a question of whether we prefer to have our seedlings of uniformly good quality or a heterogeneous lot of worthless trees such as are found in the West Indies.

DIVIDING PERENNIALS.

It is not yet too late to divide most of the perennials, phlox, delphiniums, peonies, Shasta daisies, gaillardias, aquilegias and a number of others are benefited by it. The divided plants will produce better flowers than the old undivided clumps, and while the proper time to divide perennials is in early fall, it is better to do so even now than to let any old plants remain undivided another season. There are several ways of dividing the clumps. We have found an extra heavy pruning knife the best tool to do the work nicely; by removing as much of the soil from the plant as is possible, and laying the plant on its side on a heavy piece of board or plank, one can have or quarter the plant, starting to cut with the point of the knife between the young growth, and by carefully giving the knife a gentle twist while cutting the plants. Divisions can be made in most cases without necessitating the cutting away of all the roots, which is done in every case in which a spade is used.

THE GREAT FERN FAMILY.

The fern family is a very large one—indeed, there are known to be some 4000 species, besides varieties. Hardly an eighth-part of this number are found in cultivation, and probably less than 200 species are to be found in cultivation in this country. They grow almost all over the world, and range in size from the tiny, thread-like Schizaea pusilla of the New Jersey pine barrens, to the gigantic tree ferns of New Zealand and Australia. Their profusion and greatest number of species are in the insular regions of the tropics; the Island of Java is probably richer in species than any other part of the world. The species in cultivation in greenhouses in this country represent some of the best members of the whole family.

CALIFORNIA WILD FLOWERS.

In a few weeks now, after the rain has showered the earth with its life-giving drops, the wild flowers will respond, springing up blithely and clothing the valleys, the foothills and the mountain slopes with living gold and purple, blue and red, scarlet and white, and all the colors that nature spreads upon her great palette of the out of doors.

Although not the first of the wild flowers to appear, the beautiful orange-colored Eschscholtzia, commonly called the California poppy, is undoubtedly the most popular, as it has been adopted as the California State flower. This gorgeous flower formerly covered so much territory, and grew so thickly on the foothills, and was of such brilliancy, that it made a landmark for sailors far out at sea. But now most of the great virgin fields where once it grew have been turned by the plows of men, who desired them for other uses. There are several varieties of this flower, the largest and most brilliant being found in the foothills and inland valleys; the light-colored and smaller varieties grow near the sea coast.

The Matilija poppy is a beautiful white ruffled flower, with a large deep yellow center, which grows in a few of our most favored canyons. The seed of this poppy like the seed of many of the California flowers, has great vitality, enabling it to pass successfully through the long dry summer.

Many flowers that originated in California are grown in gardens the world over, but as they grow wild here they are noted for their brilliancy and delicacy.

"ALLIGATOR PEAR" OR AVOCADO.

An Attractive Fruit Coming to the Front in California—How to Win With It.

[Paper by F. W. POPENOE, read before the State Fruit Grower's Convention at Santa Barbara, June 17, 1913.]

RIGHT in the beginning, I want to say that it is greatly to be regretted that this fruit has become established in California under a misleading and meaningless name. I refer to the term "Alligator Pear," which certainly has no excuse for existence, and invariably gives those who are unfamiliar with the fruit a wrong impression of it. The name "avocado," however, can be said to be scarcely less objectionable. The correct name is "ahuacate," and I call hearts and stirred upon our suspicions. My partner thought I was loafing on the handles of the sled. I thought he was an old woman at the

The Reserve Ahuacate, cut in halves. Grown at Long Beach.

A cluster of Ahuacates grown in Los Angeles.

A young budded Ahuacate at Hollywood.

The ahuacate or avocado. (Alligator pear.)

statement I have such an eminent authority as Parker Earle, well known to many of you as a former president of the American Pomological Society, and one of America's foremost horticulturists. Mr. Earle says: "We cannot help wondering, as we look ahead for a hundred years, how people will live—what they will eat—when there are four hundred millions to be fed in the United States out of the land that now supports one hundred millions. With this great density of population, will there be room for producing much animal food in that time? Will it not become a necessity of existence to utilize all the

"An acre of land can produce, let us say, a quarter of a ton of beef, or upon the veteran botanist whose paper is next on the programme, Dr. Franceschi, to raise his voice in support of this statement. This I know he will do, as he was one of the first to call attention to this error in language, and has constantly urged upon Californians the necessity of adopting the historic and euphonious name "ahuacate," rejecting for all time to come the several others by which the fruit has been known.

In tropical America the ahuacate is not placed in the same category as other fruits, but is considered as a staple food product, of equal importance with rice or beans, as a part of the daily diet. During the ahuacate season laborers going into the fields carry with them one or two ahuacates as a substantial part of their noonday meal. Americans going to the tropics become familiar with this fruit, almost invariably learning to relish it as one of the most delicious and satisfying of tropical products, and at the same time one which can supply a part of their daily nourishment. Returning to the United States, the traveler goes into ecstasies at the sight of "ahuacate salad" on the hotel menu, and learning that the fruit can be grown in California, immediately asks why it is not extensively planted here and made a part of our daily food.

FOOD VALUE.

It is this unique feature of the ahuacate—its food value—that has made firm the belief that it is destined to play an important part in the future of California horticulture. The pessimist is always ready to point to certain fruits, which, though well adapted to this climate, have never become of commercial importance, and voice his opinion to the effect that a quarter of a century will see the ahuacate in a like position. But in doing this he forgets the nature of the product which he is attempting to malign. It is not on its value as a dessert fruit that we can base our belief as to a future important ahuacate industry, but as a food product which can do much toward the solution of the distressing problem of high cost of living. To what state of this land in a way that will yield the greatest tonnage of human food?

other animal food, per year. It can produce one ton, or possibly two tons, of food in wheat, or corn, or rice. It can produce five, or ten, or possibly twenty tons of an incomplete food ration in the form of apples, or grapes, or bananas. And there may be from one to two tons of very rich food in the form of nuts—notably pecans—from an acre of ground. But with ahuacates there would seem to be a possible yield of food of very high nutritive value in tonnage equal to apples with their low nutritive value.

"This ahuacate business is new. It has to be worked out. But is there not great potential value in the few facts we have? If men can produce many tons of food of best value from an acre of land in trees that can only yield a fraction of a ton in the form of animal food, is it not pretty certain that they are going to plant trees?"

DETERMINED QUESTION.

The ahuacate has now progressed beyond the point where its adaptability to California is questioned. Five years ago if you had mentioned the ahuacate as a horticultural possibility for California, nine tenths of the men whom you were addressing would have turned away with the remark that the ahuacate was all right, but California would never grow it. They simply had not seen any of the numerous seedlings in bearing in southern California, and did not know that many of them had been producing regularly and abundantly for years. Every year a number of young trees come into bearing in different localities, and today we have sufficient facts at our command to prove that the ahuacate is entirely successful in a large area. Just what can be expected of it in the hot interior valleys such as the Imperial and the San Joaquin can not be stated as yet, as no adequate trial has been made of the tree in these regions. There are bearing trees at Redlands and San Fernando, and with these to act as a stimulus planting is being extended much farther into the interior, with the hope that success will result. And while definite knowledge must come from actual demonstration, it seems likely that it will be possible to grow certain types in the San Joaquin and Sacramento valleys at least. It must be constantly borne in mind that the success of the ahuacate in the interior valleys will depend on obtaining varieties which are suited to the conditions which obtain in such regions. It stands to reason that an ahuacate from Honolulu or Mazatlan would not have the same chance of success in the San Joaquin Valley as one from an elevation of six thousand feet in Mexico, where the winters are quite cold and the summers hot and dry. There are several ahuacate regions in Mexico whose climatic conditions almost parallel those of some parts of the San Joaquin Valley.

In regard to the coastal regions from Santa Barbara to San Diego there is not a vestige of doubt remaining. The ahuacate has been too thoroughly tested in this region to leave any room for doubt as to its adaptability, and with this to rely upon, planting is going on with confidence.

(Continued on Sixteenth Page.)

MANY TREES.

Although the general public is not yet familiar with this fruit, it is evident that Southern California has been very much alive to its possibilities during the past two years by the fact that fully one hundred thousand seedlings have been grown at various points south of the Tehachapi. Many of these are being budded this season. The difficulties of propagation, which were considerable during the first few years, have now been practically overcome, and the production of budded trees can go on at a fairly rapid rate. Already several small acreages of budded trees have been set out, and the coming year will see a total planting of two hundred acres, at a conservative estimate. Innumerable trees will go into small home gardens and back yards, for the value and interest of an ahuacate in the door yard are appealing to almost everyone.

TYPES.

The subject of varieties and types is probably the most important which must be considered in connection with the development of the industry and the extension of the region in which the fruit can be successfully grown. Little is known of the different types which are grown in other countries, and their relation to each other since this subject has received almost no systematic attention. It is possible broadly to divide the seedlings which have fruited in California into two classes, based on characteristics of growth, foliage and fruit. By far the largest number have come from Northern Mexico, especially from Monterey and other sections of the State of Nuevo Leon. The type from this region is a small, pyriform or oval fruit, purple in color and thin skinned, coming into bearing at three or four years from the planting of the seed, and ordinarily very prodigious. It is so distinct from other ahuacates, that some botanists have formed a separate species for it, and called it Persea drimyifolia. The Mexicans as a rule seem to consider it superior in flavor to other types, but it has several characteristics which disqualify it for commercial purposes and it is consequently attracting little attention from the nurserymen.

The second type has become quite generally known as the Guatemalan, for the reason that it is most common in Guatemala and was first brought to notice in that country. The same type appears to occur in Southern Mexico, however, and many examples of it which are growing in this State have come from there. The principal characteristic which distinguishes it from the Mexican type is the woody skin of the fruit, which is sometimes a quarter of an inch thick and could properly be called a shell. The foliage lacks the anise-like fragrance possessed by the Mexican type. The fruits are normally larger than those of the Mexican type and seedlings do not usually come into bearing until seven or eight years old.

Seven years ago G. N. Collins of the Bureau of Plant Industry called attention to this type and asserted that it was the most promising type from a commercial point of view. At that time it was not generally known that the type was growing in California, but experience with it in this State more than bears out Mr. Collins's assertion. The thick woody skin permits the fruit to be shipped to distant markets without undue care in packing and with loss in transit reduced to a minimum. It possesses another advantage over the type grown in Florida in that the seed is nearly always tight in the cavity, and cannot roll around and bruise the flesh.

The type grown in Florida, sometimes known as the West Indian-South American, has also been planted in California, but too recently to permit definite statements in regard to its adaptability to be made. It has proved to be more tender than the Mexican or Guatemalan types, either of which will stand several degrees of frost, but in favored localities it suffered no injury during the cold weather of the past winter. The oldest trees in this State should come into bearing within a year or two.

SHIELD BUDDING.

The ahuacate has been most successfully propagated by the method known as shield budding, the operation itself being much the same as with citrus trees. During the first two or three years in which budding was attempted by California nurserymen many difficulties were experienced and failures frequently met, but sufficient experience has now been gained to enable the work to be done with assurance of success. Under glass, grafting has been quite successfully practiced, but budding seems to be the more desirable method.

Seedling stocks are easily raised either in a lath house or the open ground, a lath house being preferable as conditions of moisture and temperature can be better controlled and are more uniform. The seeds are planted in four-inch pots with the pointed end up, leaving about one-third of the seed projecting above the surface of the soil. Almost any light, porous soil will do to germinate the seeds in, but as the ahuacate is a gross feeder the young plants should be shifted into larger pots and richer soil as soon as they attain a height of eight or ten inches. If it is desired to bud them in the field, they can be shifted from the four-inch pots to the open ground.

When the plants have attained a diameter slightly larger than that of a lead pencil that are ready to be budded. This should be in six or seven months from the planting of the seed, if conditions have favored rapid growth.

While it has been shown that the ahuacate can be budded at any time of the year when the bark will slip readily, the greatest success attends budding in late spring. The trees should be watched and as soon as it is found the bark will slip readily, indicating an abundance of sap, the work can begin. In ordinary seasons this will be about the first of May, but it varies, of course, in different localities and with different trees, and some will have to be left for a second budding.

The selection of proper budwood is one of the most important matters in connection with budding the ahuacate, and one which is more apt to give the amateur trouble than any other. If the wood is too old or the buds too far advanced, they are almost sure to drop and leave a blind bud. On the other hand, young wood from the tip ends of the branches can not be used successfully in the open ground, although a fair degree of success may be had with it in the lath house. The ideal wood is that of recent growth, but which has hardened up sufficiently so that it will not snap on bending, and on which the buds are plump and strong, but have not begun to open.

Lath house budding has not been so widely practiced in California as field budding, but if performed at the proper season and with the proper kind of budwood it is very successful, and has the advantage that the young budded trees can be protected from winds and heavy frosts with much less trouble than when in the field. Six or eight-inch pots are suitable, or a very good receptacle can be made from redwood shakes, six inches square and twelve inches deep, leaving a crack half an inch wide in the bottom to provide drainage. If in the field the plants should be grown in rows four feet apart, and fourteen or sixteen inches apart in the rows.

THE CUTTING PROCESS.

Probably more failures are the result of cutting the buds too small than of all other factors combined. It is essential that the buds be cut not less than one inch in length, preferably an inch and a quarter, and thick enough so that a small quantity of wood will be taken with the bud. In budding large stocks, three-quarters of an inch to an inch in diameter, two inches is not too long for the bud, provided the bud stick is, as it always should be, of a diameter not less than three-eighths of an inch. The budding knife must be as keen as a razor. For this reason it is advisable to keep a small oilstone and strop in the budding kit, and whet the knife after cutting each twenty or thirty buds.

The incision in the stock may be made either in the form of a T or an inverted T. The inverted T is probably the best, and has the recommendation of the most successful ahuacate budders. In lifting the bark be careful not to injure the delicate tissues which lie under it, and push the bud in very gently. Tie it in firmly with waxed tape, leaving the eye exposed. The waxed tape is easily made by tearing up strips of cheap muslin about six inches wide, rolling them on iron wire until a roll an inch in diameter is obtained, tying with string at both ends, and boiling them for four or five minutes in a wax made of three parts of beeswax, three parts of paraffin, and one part of linseed oil. Avoid having the wax boiling too vigorously, or it will kill the fibres of the cloth. After the rolls are cool the cloth can be torn into strips of the proper length, and about three-eighths of an inch in width.

In three to five weeks the bud will have united with the stock and the [illegible] may be removed, however, until after the bud has made a growth of three or four inches, but it must be carefully watched to prevent its cutting into the stock or growing bud. The bud may be forced into growth by partially ringing the stock at a point three or four inches above the bud, or by cutting out the top of the tree. Lopping is dangerous, as the wood of the ahuacate is very brittle and nine times out of ten will break off rather than be lopped. When the bud has made a growth of six or eight inches the stock may be cut off close above it.

The best season for transplanting ahuacates has been found to be early spring, after danger from frost is over, and before the tree has started into new growth. At this season the tree is practically dormant and there is no difficulty in moving field grown trees if they are carefully balled.

The ahuacate requires an abundance of water, especially during the first two or three years. A liberal dressing of manure about once a year will assist the young trees to make a good growth. On the whole, the tree seems to require about the same treatment as the orange. It needs little pruning other than that required to keep it in good form. Budded trees, which do not grow to such large size as seedlings, may be set twenty-five feet apart in orchard f

A New Fruit for Mild Regions

Pineapple Guava—An Acquisition of Real Value

By F. W. Popenoe

IT IS only at rare intervals that horticulture acquires an absolutely new fruit that is of real value. Most of the novelties nowadays are either new varieties of standard fruits, or such things as the Wonderberry, which appear in glowing colors on the front cover of the seedsman's catalogue one year, and by the following are either relegated to a two-inch space on the last page or discarded to make room for some new product destined to "revolutionize horticulture." In the Feijoa, or Pineapple Guava, however, we have an acquisition that is neither an old friend under a new name nor a member of that class of horticultural products which come under the category of "edible but not eatable."

A score of years ago this plant was known only to botanical science. It was first introduced to horticulture in Southern France, whence it found its way to California in 1901. It proved to be well adapted to California climate and soil, and as soon as the first plant came into bearing, about 1906, the nurserymen began to propagate it. If planting continues at the present rate it will not be long until every garden contains one or more.

Feijoa Sellowiana, as this fruit is botanically known, is a native of Southern Brazil and neighboring parts of South America. It is a member of the great myrtle family; but, unlike most other members of the family which are cultivated for their fruit, the Feijoa is not tropical in its requirements and thrives best under conditions which are by no means those of the tropics. In Southern France and Italy, where the winter temperatures are sometimes as low as ten degrees above zero, it has been found to succeed splendidly, and requires no protection from frost. It seems, therefore, that this new fruit is one which will be adapted to a wide area in the United States, possibly including the milder portions of the Gulf States as well as the entire Pacific Coast. In a few years we shall know better what to expect, since it is now being planted in Arizona, Texas, Louisiana and Georgia.

A Basket of Pineapple Guavas, or Feijoa, of Unattractive Appearance but Highly Perfumed and Deliciously Flavored

The plant is a large shrub, frequently attaining a height of ten or twelve feet at maturity. For its ornamental value alone it would be well worth cultivating in any garden, the contrast between the glossy green upper surface and the silvery lower surface of the leaves being very striking. The flowers, which are produced in May and early June, are a gorgeous combination of yellow, crimson and white.

The Feijoa—pronounced Fay-zho-a, accenting the middle syllable—has earned the name Pineapple Guava through its similarity in general appearance and characteristics to the common guava and its distinct and pleasing pineapple flavor. Though some have likened the flavor to a combination of raspberry, strawberry and banana, it bears the most pronounced resemblance to the pineapple, and when fully ripe is not only of delicious taste but so highly scented that a basket of the fruit will perfume a whole room. The fruit is about the size and shape of a large plum, and even when fully ripe remains a dull green in color, unattractive in appearance but irresistible in its aromatic odor. The thin skin incloses a layer of granular flesh and a quantity of soft, translucent pulp, in which thirty or forty seeds, so small that they cannot be felt in the mouth, are embedded. Many uses for the fruit have already been devised, as it lends itself readily to cooking in almost any form. It is as a fresh fruit, however, that it is best liked. Ripening in November and December, the Feijoa comes into market at a season when it will find a ready sale at very remunerative prices, and this fact, together with the admirable shipping and keeping qualities of the fruit, is stimulating Californians to set out small commercial plantations an acre or two in extent.

Since it has been known to horticulture but a score of years, and in this time has been given no attention with a view to its improvement either by selection or breeding, this fruit is as yet in what could almost be termed a wild state.

Nearly all of our cultivated fruits have reached their present perfection only through generations of systematic improvement. Hence, although the Feijoa is very desirable even in its present form, the possibilities which it will have, when placed in the hands of the scientific plant-breeder, can hardly be over-estimated.

Subtropical Fruits

A Department of Tropical and Subtropical Horticulture

BY F. W. POPENOE

Notes on the propagation and culture of plants and trees coming within the scope of this department will be welcomed, and inquiries are invited.

THE DATE PALM.

Growing dates is now far past the experimental stage in California, for the production in this state and Arizona last fall was twenty-five tons, and by the end of the present year there will be at least sixty acres of palms in bearing. If the price of the fruit could be long maintained at $1 a pound, the figure at which home-grown dates of the best variety are now quoted on the Los Angeles market, it would be so profitable as to be demoralizing, but even at 15 to 50 cents a pound, prices that are likely to prevail for a good many years, careful growers should clear $400 or $500 per acre.

The Coachella and Imperial valleys are pre-eminently the land of the date in this State, and anyone who has land that carries an abundance of water can be pretty sure of success in the date business, even if it is somewhat alkaline or his water brackish. Of course, the culture requires intelligence and attention to details, just as any other does, but there is less labor connected with it than with most other fruits.

At present dates cannot be recommended for commercial planting in any except the two desert valleys. They can be planted for home use with fair chances of success in any part of the State where the summers are hot if the proper varieties are chosen.

The best way to get a start is undoubtedly to plant offshoots of established varieties—those who plant seeds will get just about the kind of results that would be expected if one tried to grow oranges or peaches from seed. There are not enough offshoots produced in the State to supply the demand, but importations have been made from various foreign countries with great success, and a large quantity of offshoots will be brought in during the coming winter from the Persian Gulf, which is the largest date-growing region in the world, and furnishes some superlative varieties, especially in the neighborhood of Bagdad.

Offshoots are planted in nursery rows until they have rooted, which will often require a year or more; and during this period they must be carefully watched and kept in moist ground. After that, they are set in orchard form, thirty or forty to the acre, and will begin to bear fruit in from three to five years, continuing for a century or more. A good yield is 100 pounds per tree.

Profits have been largely increased by the perfection of the system of artificial maturation, which allows the berries to be picked when they have reached full size, but before they have begun to soften. They are put in an oven, or incubator, filled with moist heat, for eighteen or twenty hours, and taken out in perfect condition to eat, intact and not sticky. Those who have not seen California dates, treated in this manner, can hardly imagine the contrast with the dirty, syrupy dates sold in the market, full of dirt, and packed by Arabs under disgusting conditions. It is certain that the superior handling of the local product will always enable it to claim a large premium over the imported fruit. At present, the annual consumption of the United States is only 22,000,000 tons, but when people can get clean home-grown dates their use will probably increase much faster than the supply.

One of the biggest discoveries in California horticulture during [illegible] control or eradicate two scale insects that were imported from North Africa on date offshoots and for several years caused an immense amount of worry, even threatening the life of the date industry. These have now been found to yield completely to the Braucco spray, and horticultural commissioners, government officials and private growers who met at the Santa Barbara convention, agreed that the danger was past and that date culture was put on a safe footing as one of the most promising industries in the State.

Those who get in the business early are likely in some cases to reap profits that will amaze the public, but when the production becomes larger, and date-growing gets down to a bed-rock, non-speculative basis, the careful grower who has good varieties should clear at least $400 or $500 per acre per year.

YOUNG PLANTATION OF IMPORTED DATE PALMS IN THE IMPERIAL VALLEY.

SOME OTHER PALM FRUITS.

This department has often pointed out the desirability of substituting better species for a great deal of the common nursery stuff that the average landowner plants without thought, and the situation is nowhere more pressing than as concerns palms. The invasion of Phoenix canariensis and Washingtonia filifera has gone about as far as is desirable for the beauty of the State, and it is time that some more attractive and useful genera were represented.

No palms thrive better in California or are more useful or ornamental, than the Cocos, of which the species plumosa is best known and very properly esteemed. But the fruiting possibilities of the Cocos are almost ignored.

The question can be well studied at the Gillespie place, near Santa Barbara, where forty-two species of cocos are growing. It has been found that some of them, admirably suited to climatic conditions of nearly any part of the State, give fruit of great excellence. Cocos Australis, the best-known in California, probably gives the poorest fruit, but even it is not to be despised for making a beautiful jelly.

C. Bonneti, C. Alfonsa and C. Schizophylla, however, give the best fruit, which can almost be compared to a peach in its freedom from fiber and sweet, pleasing taste. No one who eats it fails to like it. The first two are reported to bear most heavily, and C. Alfonsa is perhaps the most desirable for planting for fruit, bearing several hundred pounds each year.

These species are still rare, but could be introduced on a large scale without great expense, and would give us palms not only more ornamental than those we ordinarily plant at present, but of distinct commercial value. Until they are more easily obtainable, property owners should plant any other species obtainable. C. Australis and C. Campestris are fairly plentiful, and the fruit by no means to be despised; in Southern France it is often found on sale in the markets.

The more new fruits we can introduce to California, the greater the reputation of the State, and the more interesting it will be to both visitors and residents. By planting fruiting palms we have a unique opportunity to gain several ends by one operation.

THE AGUACATE IN DESERT REGIONS.

There has been a good deal of discussion as to whether the aguacate is adapted to desert valleys of the interior, such as the Imperial and Coachella. All the experiments which have been made in the Coachella Valley indicate that the climate is entirely too severe for this fruit, the extremely dry heat of the summer months being more than the tree can stand. In the Imperial Valley few tests have yet been made, and these, while not successful, have not been such decided failures as in the Coachella. One rancher near Brawley who has a number of seedlings of the hardy Mexican type, is confident that with proper protection the first few summers it will be possible to successfully grow this type.

While it is not improbable that varieties or types will be found which will succeed under such conditions as obtain in the Imperial Valley, it cannot be said that California possesses them as yet, and planting in such regions should be done only in a very limited, experimental way.

PRUNING AHUACATE AND FEIJOA

A subscriber at Encanto asks at what season of the year and to what exent the Ahuacate, or Avocado, and Feijoa should be pruned.

The Ahuacate, particularly when budded requires little pruning other than that required to keep the tree symmetrical and shapely. As the wood is rather brittle, it is desirable to keep the head of the tree as compact as possible so as to lessen the danger from heavy winds. The tree when young, should be trained to a good form, branching two or three feet from the ground, and leaving three or four main branches to form the head of the tree. All weak and scraggly wood should be cut out, but as the fruit is borne on the young wood, not much pruning should be done on the outside of the tree. Seedling Ahuacates are inclined to grow up very tall and spindling and should be severely topped to check this tendency. As they usually grow to a large size, it is well to keep them cut back as low as possible, in order to facilitate picking the fruit. This will also result in increased size of the fruit, although diminishing the quantity. Pruning should be done in early spring, before the tree starts into new growth. During late March and early April the Ahuacate assumes a semi-dormant condition, except in those localities where the weather is so warm that the tree is forced to keep right on growing.

The Feijoa requires no pruning except that necessary to keep the bush in good form. Frequently it is inclined to make an open and spreading growth, and this should be checked by a judicious use of the shears. Occasionally pinching out the ends of the branches will help to keep the plant bushy. As with the Ahuacate, all weak and scraggly wood should be cut out. This can be done at any season of the year.

DATES.

The editor of the subtropical department of the Western Empire left here last July, as was announced in these columns at the time, for a tour of the world along horticultural lines. Many interesting messages have come from him, telling of his quest for choice varieties of the mango in India, that would be hardy enough for Southern California, of the delight with which he experienced his first taste of the celebrated mangosteen, and of his finding many new and interesting fruits for trial here.

For four months he has spent his time on exactly the opposite side of the world from Los Angeles, assisting his brother, who accompanied him, in a search for new varieties of dates of sufficient merit for introduction, and in arranging for an importation of offshoots in limited number of these new varieties, as well as a large shipment, 9000 in number, of the offshoots of varieties that have already been tried in California and Arizona and that have proven worthy of cultivation on a large scale.

Cable advices have now been received from Mr. Popenoe that he and his brother sailed February 23 for home, bringing the shipment of offshoots with them. It is necessary for them to accompany the plants as far as Liverpool, where they will be trans-shipped for New York, in order to give them proper care on their long journey, and to keep them from drying out.

Needless to say that the experiences of our subtropical editor have been interesting and varied, and the places visited have been far off the beaten paths of ordinary tourist travel. It is known that only one other American horticultural explorer ever visited the Persian Gulf countries in the search for dates. That explorer was David Fairchild, of the Bureau of Plant Industry, who visited the region eight years ago. It is a most inhospitable region, both so far as the people living in it are concerned, as to means of travel, and as to the food and drinking water to be obtained. In speaking of the matter Mr. Fairchild said: "While I escaped without any serious illness of the five friends I made during my trip there, four of them were dead by the time I reached America. I do not believe you will find anywhere in the world more unhealthful or dangerous conditions of life than those through which he Popenoe brothers have passed during the last few months."

While our subtropical editor escaped with nothing more than two weeks of malarial fever, his brother, Paul B. Popenoe was not so fortunate, and for six weeks was ill from a severe run of typhoid fever at Basrah, Turkish Arabia. Through the great care he received at the hands of the American missionaries, he was permitted to recover, and later was enabled to continue his work of arranging for the importation of date palm offshoots.

Mr. Popenoe writes us that the varieties being brought over for commercial planting include the famous Khalasa date, from Hasa, said to be one of the three finest dates in the world, if indeed it does not lead all others; and the Ascharasi, a semi-dry date grown at Baghdad which is of first quality, the Kustawi and Maktum from the same locality, and the Khadrawi from Busrah. These varieties have all been fruited either in California or Arizona, and are considered by Mr. Popenoe to be better than anything to be found in North Africa barring the famous Deglet Noor.

When this shipment of offshoots reaches Europe and is reshipped to the United States, Paul B. Popenoe will proceed to Algeria and Tunis to add from the date gardens of that region 2000 palms of the Deglet Noor and 3000 of other varieties, making a total number of 12,000 offshoots, which will include the best varieties of practically all the famous date gardens of the world.

This importation, having a value of $80,000, is by far the largest ever brought into the United States, and will be the means of giving commercial date culture an imeptus which will be practical and pronounced. It is being brought over for the Coachella Valley customers of the West India gardens, horticultural importer at Altadena.

While his brother is spending the necessary time in Algeria and Tunis, our subtropical editor will be in England, taking advantage of the library of the Royal Horticultural Society, London, of which he is a member, to increase his knowledge of subtropical plants and trees. He expects to reach New York in May.

To the development of the date industry, which is now well started in Southern California and Arizona—an industry which Dr. Galloway, chief of the Bureau of Plant Industry, says will become a $60,000,000 business in this region—the Western Empire will give its best efforts, and its assistance in every way possible. Nothing in the way of agricultural or horticultural work anywhere bears promise of richer return than the growing of dates. It has been thoroughly proved out in every way, men of horticultural experience are becoming interested, and are investing substantial sums of money in it, but the demand for fresh, ripe, clean dates will probably always exceed the supply.

KHASAB DATES DRYING ON HOUSETOP, SEMAIL VALLEY, OMAN.

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THE PASSION FRUIT.

Regarding the Passion plant (Passiflora Edulis) a fine fruit which thrives lustily in California, but which has not yet come into general use, I have the following from Prof. Howard Newport, instructor in tropical agriculture to the government of Queensland, Australia:

"I am not aware of any method of preserving this, and I know of no publication regarding it. So far as I am aware no attempts have been made to preserve the fruit here by any means of cooking or canning. The fruit is found to keep fairly well and travel well in ordinary wooden Buschel fruit cases. The outer skin darkens and wrinkles considerably so as to present a not too leasing exterior for table use. It is nevertheless a very popular fruit and consumed in much the same manner as an egg, viz.: by cutting off one end and removing the contents with a small spoon. The pulp is also used as a flavor in cakes, iceing, ice creams, drinks and sweetmeats, and is a much appreciated addition to fruit salads.

"The seed is generally consumed with the pulp as in the case of the Granadilla (P. Quadrangularis) and may be even left in cakes, iceing, etc., but are usually removed by straining when the fruit is used for ice creams, sweetmeats, etc. The case or outer covering of the fruit I have seen candied, but is tough and very rarely made use of.

"The fruit packs and travels better if 'cured' by a few days' exposure to the air, and should not be gathered until ripeness is indicated by the purple coloring.

"Where the fruit is known there is a ready market which varies according to the supply from 10 to 15 per cent. per case."

NEW DATE BULLETIN.

The October issue of The Bulletin, the monthly publication of the State Commission of Horticulture, will contain a new and valuable date article. We suggest to those of our readers who are interested in the culture of this valuable fruit, that they request a copy of this issue be sent them. It is free. Apply to E. O. Essig, secretary of the commission, Sacramento.

DATE GROWING.

Now that the fruiting season is at hand, and the palms which are old enough are laden with big yellow bunches, the growing of dates in our desert country has received a sharp stimulus. The illustration of the Khadrawi fruits, from the Johnson ranch at Indio, will suggest the attractiveness of this industry. At the Mecca government garden, where there are many palms now in full fruit, the sight is a rare one, and will convince anyone of the promise of the future for date growing in the Coachella and Imperial Valleys.

JAPANESE UDO.

The produce dealers will soon have a new plant food to offer to housewives. It is called the udo and this year the first bunch of it ever grown in America was put up by W. E. Meek, who has for years been recognized as one of the largest asparagus growers in the West. This new vegetable did not get into the markets. There was not enough of it, but as an experiment it promises well and it is expected that in a few years it will be as common on the table as most of the generally known garden products.

The udo is an importation and one of the plant immigrants of the United States Department of Agriculture. Mr. Meek's ranch near Antioch was chosen as its cradle from where it is to be nursed to maturity, and finally distributed to any parts of the United States where it will grow. It is as easy to grow as asparagus and it yields a crop sooner. It is believed that it can be grown in most of the States of the Union.

This plant comes from Japan. On the streets of almost any Japanese city the fruit stalls have for sale this attractive blanched vegetable. It is a near relative of a well-known plant in New England, the spikenard, but it is much larger.

There are many ways in which it is prepared by both the Japanese and the foreigners who live in Japan; but, either as a salad or cooked in the same way in which asparagus is cooked, it deserves to rank as one of the important vegetables of the world.

It is easy to grow; it does not require replanting oftener than once in nine or ten years; it can be cropped in the autumn or in the spring and it yields large crops of shoots which are over two feet long and an inch or more in diameter at the base. These brilliant white shoots are edible to their very bases without the least objectionable fiber, and not in this respect like asparagus of which only the tips are eaten.

It is an encouraging sign when an asparagus grower will undertake to develop a new vegetable that will in a measure take the place of the asparagus. It is an indication that California planters are progressive.—[Orchard and Farm.

ANOTHER OUTLET FOR BEANS.

A factory for canning green Lima beans is now being erected a few miles from Los Angeles in Sawtelle.

It is said to be the first of the kind on the Coast and will be in operation late this summer.

It will cost in the neighborhood of $40,000, and will have a capacity of 50,000 to 60,000 cans a day. This year it is hardly expected that more than 150,000 cans will be put up as the run will last only about two weeks.

If this factory is successful, as it gives every promise of being, two or more like establishments will probably be built in Ventura county, the great Lima bean district. This will mark a new era in the development of the industry, as it will furnish a new commercial outlet for a considerable portion of the great crop.

The Khadrawi Date,

In fruit at the ranch of Fred N. Johnson, Indio, in the Coachella Valley, "Where Dates Grow." This is a valuable variety from the Persian Gulf.

9000 DATE PALMS ARRIVE.

THE glamor of romance surrounds a shipment of 9000 young date palms which arrived in Coachella Valley today after a 12,000-mile journey from Turkish Arabia, where 3000 Arab troops of the Sultan of Oman were dispatched to rescue two Altadena boys, Paul B. Popenoe and his brother, F. W. Popenoe, who were bringing the date trees by camel caravan to Busreh on the Persian Gulf, made famous in the Arabic tales of Sinbad the Sailor.

SHIPMENT HURRIED THROUGH.

In seventeen Southern Pacific refrigerator cars, iced to prevent the trees from sprouting, the shipment was hurried from Galveston to Thermal in record time, according to freight traffic officials, as the trees were desired by various owners for immediate planting. At the Southern Pacific office, F. O. Popenoe, president and manager of the West India Gardens, which is importing the date palms, expressed satisfaction at the success of their long journey.

The palms will be set out around Arabia, a new town, which is to be entirely built in the Arabian architecture on the site of Durbrow siding. Arthur B. Benton, the architect of the Mission Inn at Riverside, has been engaged to lay out the townsite and make the plans for all the buildings. Every store and house in Arabia will be Arabic in each detail of construction, although Americans, many of them Angelenos, will people the town.

In July, 1912, F. O. Popenoe of Altadena sent his two sons, Paul, aged 25, and F. W., aged 21, to the Persian gulf to study date culture and to bring back choice offshoots. They made a caravan trip into the interior of Oman, back of Muscat, where the Fard date is grown. The Sultan of Oman took a fancy to Paul Popenoe, loaned his best riding camel to him and gave the boys an escort. Paul secured a splendid lot of offshoots wrapped them in wet palm fiber and burlap, and started back toward the coast a few weeks later.

It was a tedious and dangerous trip. The season had changed. The wind whirled clouds of sand upon them, and at times they seemed likely to be buried alive. Trails were obliterated and much time lost in finding their way. The Arab escort displayed the stoicism of their race. No hardship wearied them into complaint. Much of the traveling was done by starlight, as the sun was blinding hot.—Los Angeles Tribune.

THE AHUACATE OR AVOCADO IN CALIFORNIA.

Although introduced to California in 1870 or 1871, the ahuacate did not receive much attention until after 1900. The few trees planted in the early days around Santa Barbara, Hollywood and Los Angeles had in some cases been quite successful, but the majority of nurserymen and horticulturists were not familiar with these trees nor with the value of the fruit, and little attention was given to their propagation. When, shortly after 1900, the ahuacate began to be planted in Florida in small acreages, it evidently aroused the interest of Californians to a certain extent, but the difficulties encountered in propagating the tree by budding or grafting, as well as the scarcity of good varieties from which to propagate, made it a hard matter to place any quantity of good stock on the market. Gradually both these difficulties have been done away with; budding can now be done with a reasonable assurance of success, and excellent varieties have been introduced from Mexico, in addition to many first-class ones that have originated locally as seedlings. There should be no further obstacles to encounter, and at the present time the development of an ahuacate industry is going ahead at a rapid rate.

The ahuacate has been found well adapted to the citrus belt and coastal region of the southern part of the State, but what it will do in other sections has not yet been determined. There are several different types of the ahuacate, adapted to different climatic conditions, some of these will doubtless prove sufficiently hardy and drought-resistant to succeed in the milder portions of the San Joaquin and Sacramento Valleys, some parts of which are doubtless as favorable to their growth as any part of Southern California.

The question of ahuacate types or races is an important one, and at the present time it cannot be said that our knowledge of it is perfect. On the contrary, it is the one subject in connection with ahuacate culture which most needs thorough scientific investigation, for our limited experience in California has been more than sufficient to demonstrate that on it depends, to a large extent, the adaptability or non-adaptability of the ahuacate to any certain region.

Propagating the ahuacate by budding requires more care and skill than in propagating the citrus fruits. From the beginning, however, the results obtained have been commensurate with the amount of experience possessed by the budder,—failures were the rule during the first year or two. Several nurserymen seem to have mastered the thing lately, and budded trees are being produced in fairly large numbers. Grafting, when done under glass, is also successful and is practiced to a limited extent.

Ahuacates command fancy prices in the local markets, so that no commercial shipments have as yet been sent out of the State. The average price for a good fruit, about a pound in weight, is 50 or 60 cents. The different types which are grown in California bear at opposite seasons of the year, and this with the variation in season of the different varieties, permits the fruit to be in the market, in small quantities at least, for about ten out of the twelve months.

A number of named varieties have been offered by the nurserymen. Among the most promising are Taft, Meserve, Lyon, Murrieta and Chappelow.

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THE POMEGRANATE.

PLANO (Cal.) [Editor Subtropical Department.] I read with interest the article in your paper entitled "A neglected opportunity." That part of the article interested me most where it stated that the pomegranate can be and is used for the purpose of preparing a cooling drink. Please inform me how to prepare a cooling drink from the pomegranate, and whether the juice of this fruit can be preserved in some way so as to be used for preparing a cooling drink later.

The answering of these questions and any other information you may give on this subject will be greatly appreciated by a constant reader of your paper.

tain to gain in popularity for its widely grown in California, it is cer-

Although the pomegranate is not fruits, its ornamental flowers, and its resistance to a great amount of heat and alkali. The ordinary varieites, however, are so full of seeds as to be difficult to eat. Riley M. Fletcher-Berry in his book "Fruit Recipes" recommends pressing the pulp through a sieve, when the seeds can be removed without difficulty. He gives the following methods of utilizing the juice.

POMEGRANATE ICE—Cut a dozen ripe pomegranates in half and remove seeds from rind carefully. In the juice stir till dissolved one pound of sugar. Add gradually a pint of water, strain again and freeze.

POMEGRANATE SYRUP—Press and strain the pulp and cook down juice until thick, when add sugar. The uncooked puice in considered very cooling in fevers and the syrup makes a delicious drink. It is in this form that the fruit is usually employed by the Arabs. pomegranate shrub being one of the things for which Bagdad is famous.

POMEGRANATE JELLY—Use the tart varieties or those somewhat overripe and proceed as for other such preparations. The jelly resulting is particularly beautiful.

Pomegranate wine may be made with successful results and the fruit, seeds removed, served cooked, or fresh with flavoring of orange blossom, or rose water, or cocoanut and sugar.

ABOUT THE AHUACATE, MANGO AND CHERIMOYA.

GLENDALE, (Cal.) [Editor Subtropical Department.] I have just finished an article by you on the 'Ahuacate' the possibilities of which as a staple food, I have long been interested in. I lived some time in Mexico where the ahuacate thrived, and learned to appreciate it, and believe it possesses many possibilities as a food hitherto unthought of. I have been very much interested in the discussion of the various names, and am wondering if you or any one else interested in the fruit, can give me the meaning, or derivation of the word. I have always seen it written 'aguacate' and took it for granted that it was derived from the word 'agua' meaning water.

Can you tell me anything of the mango culture? Has it been tried here, and if so with what success? There is such a difference in the varieties of the mango, that often one tasting for the first time never cares to try them again, while an under-ripe mango is an unpleasant as an under-ripe persimmon.

The fact that the cherimoya, to attain its best flavor, would be picked a little green and packed in straw to ripen, ought to solve its shipping question. Very truly yours,

JULIA B. CUMMINGS.

'Ahuacate,' the proper name for this tree, is from the Aztec 'Ahuacatl,' a proper name, having nothing to do with the Spanish word 'agua' or water; but seems later to have been confused with 'agua' as the common spelling of the word in Mexico is now 'aguacate.'

Seedling mangos have been successfully grown and fruited in Southern California. There is no question but that hardy varieties of this fruit, and of good quality, can be successfully propagated in many localities here. This work is gradually being undertaken by those interested, and the future will see many commercial orchards of the mango bringing a rich reward to their Southern California owners.

THE FREEZE.

The unprecedented freeze which Southern California experienced early in January made some changes in the horticultural map. Some surprises were experienced in the sub-tropical field. If properly used the results will be of great value. To the nurserymen who lost their stock this will [illegible] not seem of much comfort just now perhaps; but while we all feel hard hit, there is no use to make too loud a groan over an affair that occurs only once in fifty years.

The avocado makes a vigorous growth in its earlier stages, and especially does it grow rapidly in the late fall. On this account there is a succulent, tender growth which, while not especially easily damaged, was not the kind of growth to withstand the low temperature recently reached. Avocado nurserymen all report heavy damage. It is safe to say that more than one-half the budded stock was wiped out. The trees two or three years old, or older, went through better than citrus trees of the same age. The result, so far as the avocado is concerned, shows this valuable fruit to be hardier than the orange, and thus a better commercial culture in California. An especially important point to note is that the fruit itself practically never freezes.

The Queensland nut, macadamia ternifolia, in two-year-old trees withstood a temperature of 18 degrees, which places it in a hardier class than heretofore believed.

No damage seems to have been done to the Natal plum, Carissa grandiflora.

The white sapote, Casimaroa edulis, found its leaves being injured at 20 degrees, but the wood sustained no injury.

So far as the papaya is concerned, hardy varieties have not yet been propagated here and those being experienced with were frozen.

The feijoa sustained no damage.

THE KUDZU VINE.

San Jose, Cal.

[Editor Subtropical Department of the Western Empire:] Can you give a number of interested readers any information of the kudzu (Japanese) vine as a forage plant in California? It seems to be making a good record as such in the Southern States, and C. V. Piper of the Plant Bureau of Forage Investigations, Washington, also makes a very favorable report of its value. Would like to learn of any experience with it in our State.

As an attractive and rapid growing ornamental (known as "Jack and the Bean Stalk") it is well and favorably planted by many as a hardy perennial.

Yours,

J. L. L.

The Kudzu vine, Pueraria Thunbergiana, which is remarkable for the great rapidity of its growth, has been grown in California for some time as a covering for fences or pergolas. It makes a most remarkable growth, and is desirable for the purpose stated. But we know of no use having been made as a forage plant. The roots are fleshy and yield starch of excellent quality and the tough fibre of the inner bark is manufactured into a sort of cloth in Japan and China. In certain situations the vine is unparalleled for ornament and shade.

DATES.

Although Arabs cook the date in so many different ways that it is said a good Bedouin housewife will provide her husband with a different dish each day of the month, their use in any manner except for eating raw is too little known in the United States. The following selections from Riley M. Fletcher-Berry's book on "Fruit Recipes" will perhaps be acceptable, in view of the rapidly increasing cultivation of the palm in the desert parts of California.

STEWED DATES—Wash and cover a pound of dates with one pint of water, and let stand over night. In the morning place on the stove and let them come to a boil. Let them simmer gently for a few minutes, adding a few drops of lime, lemon or orange juice, then remove the fruit, add a little sugar to the water left in the cooking vessel, and simmer until the syrup is thickened. Pour over the fruit and serve when cold.

DATE FLUFFDUFF—Stew one cupful of dates, stoned, until tender, then put through colander and mix with one cup of sugar in which has been sifted a teaspoonful of cream of tarter. Beat thoroughly the whites of five eggs with a pinch of salt and when perfectly stiff add the yolks of two and whip again. Now mix lightly a little at a time, with the dates and sugar and place in a buttered baking dish. Sprinkle over the top one-half cup of finely chopped nuts and bake for 15 minutes. Serve this with cream, plain or whipped.

DATE MACAROONS—Beat the whites of three eggs stiff, then add gradually a half-pound of powdered sugar (a dessertspoonful of corn- [illegible] half cup of finely chopped nuts and one of dates, and the grated rind of an orange. Work well together gently, add enough grated cocoanut to make stiff enough to form into balls. Very little cocoanut will be required, so it is best to add but a tablespoonful at first and bake a try-cake as a test.

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"STEWART SUN METHOD" OF PROPAGATION.

A novel method of rooting cuttings of hard-wooded shrubs has been perfected by Mr. Stewart, foreman of the glass department of the Royal Botanic Garden at Edinburgh, Scotland. This method has proved to be successful with the feijoa, and other guavas, which require a long time to root by ordinary means and of which a large percentage of cuttings is usually lost.

With this new method, shrubs that are usually considered impossible to grow from cuttings have been successfully rooted, while those which usually require two or three months to form roots will strike in ten days.

The cuttings, which should be of young, but firm wood, are placed in pure sand in a box or frame covered with glass. The box is then placed on the south side of a building, giving it full exposure to the sun. The heat inside becomes so intense that one would expect the cuttings to be killed, but if they are kept liberally supplied with water, during hot weather they must be literally soaked every hour, they will not die, but will form roots within ten days.

The value of this method lies, of course, in the fact that the intense heat stimulates the cutting to callous and form roots very quickly. In a climate such as that of Southern California, however, it is quite likely that the method will have to be modified somewhat. In the latitude of Edinburgh the sunlight is not so intense, nor so warm as in California during the summer time. Probably it would be safer, in practicing the method, here, to keep the box out of the direct rays of the sun during the hottest part of the day.

THE DOWNY MYRTLE.

This plant, botanically known as rhodomyrtus tomentosa, should be more widely grown in California, not alone for its fruit, but for its ornamental value as well.

It is a small shrub, with thick oval leaves, a native of the mountainous regions of Ceylon, South India, and Malaya. In early spring it bears a profusion of pink flowers, over an inch in diameter, and looking much like single roses. These are followed by small berries, like black currants in appearance and taste.

The plant is quite hardy, and seemingly well suited to California conditions.

PROPAGATION OF THE CHERIMOYA.

Although the majority of the cherimoyas in California are seedlings, the tree can be readily budded or grafted, and it is only through these or some other vegetative means of propagation that desirable forms originated as chance seedlings can be perpetuated, and cherimoya culture on a commercial scale made profitable.

Seeds are sometimes obtainable in fall, but more frequently in early spring, as it is at that season that the main crop ripens in this State. If a glass-house or hot bed is available, planting may be done at any time; otherwise, it is best to defer planting until warm weather. For germinating the seeds an excellent medium is a mixture of two-thirds silver sand and one-third old, thoroughly rotted, redwood sawdust. Lacking this, any light, porous soil can be used with good results. The seeds should be covered to the depth of half an inch, and if conditions are favorable they will germinate within three or four weeks. The young plants should be potted off when they have attained a height of three or four inches, using pots three or four inches in diameter. A porous, well-drained soil is essential.

Budding should be done in spring, shortly after the sap has begun to flow. The trees should be watched and the work begun as soon as it is found the bark will slip readily.

Stocks should be three-eighths to one-half inch in diameter, seedlings of this size being usually eighteen months to two years old. They may be either in pots or in the open ground.

Wood of the previous season's growth, from which the leaves have dropped, is the most suitable for budwood. The buds must be cut at least an inch and a quarter long, and are inserted in the same manner as [illegible]. Wrap with waxed tape, covering the bud entirely.

At the expiration of three or four weeks the wrap should be removed, and if the bud has united with the stock, rewrap it loosely, leaving the eye exposed so that it may start into growth, forcing it out by lopping the stock.

In grafting, 2-year-old seedlings should be used, the operation being a simple, cleft-graft, the same as used for numerous other trees and plants. The scion should be of the same growth as advised for budwood.

THE PINEAPPLE IN CALIFORNIA.

That Southern California can grow the pineapple is shown by the fact that good fruits have been ripened both at Hollywood and Santa Barbara.

As a general rule, however, more heat is required for the perfect ripening of the fruit than is found in most frost-free localities in this State. The nights are too cool, and the maximum temperature not high enough, along the sea coast to permit of successful pineapple cultivation. Further inland, in such regions as the San Joaquin Valley, the heat is doubtless sufficient, but it is difficult to find locations free from frost. It is necessary to have a situation, where the thermometer does not drop below 27 or 28 degrees.

Along the base of the Sierra Madre Mountains, in such locations as Sierra Madre, Duarte and Glendora, the pineapple should succeed much better than it has at Hollywood and Santa Barbara, since these locations receive a large amount of reflected heat during the summer, and are comparatively free from frost during the winter.

It is frequently stated that the pineapple requires a moist atmosphere for its perfect development, its past behavior in California, however, proves that our atmosphere, although dry, is not inimical to the plant, and we may hope to see, in the not far distant future, first-class pineapples grown in our foothill regions.

WEED KILLING IN LAWNS.

There are two classes of weeds that come in lawns, and each demands a different method of treatment for extinction. This makes the having and the keeping of a good lawn a possibility and a pleasure; but it is sometimes neither when people do not know just how to go about the remotal of the obnoxious and ever-interfering weeds.

With the first coming up of the seed grass there is generally a large amount of light growing weed seed, like pig weed, alfiliria and squirrel grass. These weeds are dependent for their sustenance upon the air quite as much as on the earth. By constantly cutting off their tops they will gradually be all killed off and leave the lawn filled with its proper kind of grass. The lawn mower is the best method of extinction with these. Run it over frequently, whether the seed grass needs it or not, and the results will soon show by the more flourishing growth of the lawn and the death and destruction of the weeds.

But there is still another class of weed; these grow close to the ground, have flat, broad leaves, are hardy of root, and do not demand so much from the air as those others. These will not be caught in the knives of the mower, only about half way down the long flat leaf and will stay alive and growing no matter how many times the lawn is mowed. They belong to the plantain family and are also of others like the dandelion and wild dock. They are decidedly a nuisance to get rid of, and must be dug up by the roots.

One of the best methods is to take a sharp pointed paring knife and a fork, run the knife down close up to the place where the leaves start up from the ground, about three inches into the ground is sufficient, and all around the stalk; then take a three-tined iron fork and pry the plant up by the roots. The knife may be used with the fork, also, in the process. After a bit the operation becomes quite as easy as removing a raw oyster from its shell.

This is the only way to really get rid of these weeds successfully, because anything that would kill them, like a chemical, would also destroy the grass of the lawn.

Subtropical Fruits

A Department of Tropical and Subtropical Horticulture

BY F. W. POPENOE

Notes on the propagation and culture of plants and trees coming within the scope of this department will be welcomed, and inquiries are invited.

THE DATE PALM.

Paul B. Popenoe of the West India Gardens, Altadena, who is now in the Persian Gulf country studying the varieties of dates there with a view to bringing back a large shipment of offshoots for growers in Southern California and Arizona next spring, writes to the Western Empire as follows:

"I have just completed a month's tour of Northwestern India, where the cultivation of the date palm is rapidly assuming importance, and have gathered a great deal of information that will be of value to Southern California growers, since climatic conditions in the Sind desert, the best date growing district here, are almost identical with those in the Coachella Valley, the largest date growing district in California, and declared by Dr. W. T. Swingle of the United States Department of Agriculture to be the finest country in the world for growing dates.

"A good deal of experimenting has been done with seedling dates in times past here, but the government experts say the variation among them is too great to make that method of propagation desirable from a commercial point of view. It was reported at the Lucknow gardens for instance where there were 272 seedling date palms 12 or 13 years old, that there were scarcely two alike. Seedling dates are also said to be short-lived their root systems being too much on the surface.

"Offshoots imported from the head of the Persian Gulf, or taken from palms now growing here, which were formerly imported in that way are the reliance of the growers of India, and it has been found, by repeated experiments, that there is slight danger of losing any offshoots in shipment, the only danger being in neglecting them after they have been set out.

"The two varieties most highly prized at Basra, and also in India, are the Halawi and Khadrawi, both of which have been tested out in the United States and found highly desirable. The British Consul at Basra, in an official report, states that Khadrawi bears earlier than any other offshoots, beginning to yield a profitable crop at the age of 3 years, if given good soil and plenty of water. Halawi usually comes on a year later. The latter variety is the principal one exported to the United States from Basra, millions of pounds being shipped to New York every fall and sold usually under the trade name of 'Golden Dates'—a name that also includes a good many of Khadrawi and other varieties.

"A crude sort of artificial ripening is practiced here, the dates being boiled in water just before they are ripe, and then dried in the sun, when they become quite hard and will pack and ship as easily as our ordinary dry dates. They retain a good deal of astringency, however. These Persian Gulf varieties in general ripen earlier than those of Algeria, which have formed the bulk of our importations of offshoots in past years. With our scientific methods of artificial ripening, which allow us to take dates from the palm a week or ten days before they naturally mature, we not only save a great waste through fermentation and insects, but can get them in the market that much sooner and thereby get the high prices which always are commanded by early fruit. With our Persian Gulf dates ripening from August on, and our Algerian varieties continuing until November, the season for fresh dates will be long enough to suit the growers and consumers, who are certain to buy fresh dates in immense quantities, as soon as they find how delicious they are.

"The average yield of bearing palms in the government botanic garden at Saharanpur is stated by the superintendent to be 160 pounds per year, and it is reported that the variety Zahidi of Bagdad regularly bears 200 pounds per year. In California, we can make handsome profits if we get only 100 pounds per year. We are so far ahead of the Indians and Arabs in the application of science to horticulture that I am convinced California is going to produce the finest dates in the world."

GOOD AND BAD CARISSAS.

This department has already called attention to the Carissa, or Natal Plum. In doing so, no mention was made of the fact that a large proportion of plants, indeed, almost all of those in California, produce rather sparsely, thus detracting from their value as fruiting plants.

[illegible] does the [illegible] State it is said to be a prolific bearer, but so far as known none of the Florida plants have shown such a tendency in California. Many theories as to the cause of this have been advanced by local horticulturists, some believing the difficulty to be due to the inferiority of our stock, but the majority have placed the blame on our climate. It has been said that in South Africa, the native home of the Carissa, the plant is only successful at low elevations near the seacoast. At several of the Pasadena Flower Shows fine Carissa grown at San Diego have been shown, and the advocates of the sea-level theory have advanced this as additional evidence in their favor.

There has been a lot of guesswork, however, and no thorough investigation of the facts, or attempt to get at the root of the thing. Now comes an account from Hawaii which seems to throw the first real light on the subject and gives us something tangible to work on. J. E. Higgins, horticulturist of the Hawaii Experiment Station, in his experiments with the Carissa, has found two distinct types of the plant, one a prolific bearer and the other practically sterile. These types cannot, of course, be propagated by seed, some vegetative means of propagation must be used, of which cuttage seems to be the most readily applicable, and by far the simplest.

In the light of Mr. Higgins's discovery, there can be little doubt but that our trouble is due entirely to having obtained stock of an inferior type. The thing to be done now is to obtain the prolific type, and perpetuate it by vegetative means. In this way we can almost certainly remedy the whole difficulty.

The prolific type, as grown at the Hawaii Experiment Station, is a fine thing, and would certainly become popular in California. The plant, which grows to the height of six or eight feet, is compact, broad and spreading, its glossy leaves and large, star-shaped white flowers giving it an ornamental appearance excelled by few of our best ornamental plants. The fruits are borne in the greatest abundance, and almost throughout the year, there being very few times when ripe ones cannot be gathered. In size and shape the fruits can be compared to a small plum, which they also resemble in color, a bright red when fully ripe. The flavor is not unlike that of the black raspberry of the Eastern United States. On the whole, the fruit is one which would be very acceptable to every housewife, and could be used in a number of ways. The Carissa is admirable as a hedge plant, this being one of its principal uses in its native country, and it is safe to venture the assertion that the near future will see Carissa hedges scattered all over Southern California. The plant is as hardy as the orange, and not particular in its cultural requirements.

LOQUAT IMPROVEMENT.

As a class, the Japanese fruits are notoriously inferior, most of them being but slightly removed from the wild state, although under cultivation for a long period. The Japanese people, in their effort to develop landscape and ornamental gardening to the maximum, seemed to lose sight of fruits and vegetables and allow them to remain in their primitive condition. Hence horticulture has been able to draw but few fruits from Japan, in comparison to the wealth of ornamentals. Japanese plums and persimmons have been introduced to other countries to good advantage, and one or two citrus fruits of merits have also been obtained. The loquat, while not perhaps as valuable as either the plum or the persimmon, must be placed among the most important.

Judging from the frequency of the loquat in dooryards and gardens throughout Japan, it must be highly esteemed by the people, yet the varieties they cultivate cannot be much of an advance over the original wild form. There are one or two exceptions in such varieties as Tanaka and Mogi, which are greatly superior to the ordinary forms, but are not widely grown.

In California, although there is an abundance of better fruits, the loquat is becoming quite popular, probably because it comes in to the market before any other fruit, and thus has almost the entire field to itself.

With such a demand for loquats as there is at the present time, it is really regrettable that we have no choice forms to offer, with which to build up an even larger trade. California is not, however, going to be as dilatory in producing improved varieties as has Japan, for in the few years in which the loquat has been grown in the State, a number of improved forms have been produced and placed on the market. These are practically all the work of one man, C. P. Taft of Orange. Through his efforts we now have loquats so far superior to the common seedling forms as to permit of no comparison, yet Mr. Taft himself states that the improvement of the loquat has only been begun, and that the future will surely see great advances in the way of larger and finer flavored forms, with a smaller proportion of seed.

The ease with which the fruit is grown, and the great abundance in which it is produced, makes it one of the most attractive to the plant breeder that can be imagined, for could it be developed to the size of a small apple, with no increase over the present size of the seeds, we would have a fruit which, coming at the season it does, would be immensely popular and valuable. If the work so well started by Mr. Taft can only be carried on, we shall, without doubt, in time attain the goal.

AVOCADO SHIPMENTS.

A good suggestion comes from E. S. Thacher, an orange grower at Nordhoff, Cal. He is now also growing avocados. He has a five-acre orchard of avocados that is just coming into bearing and this year made his first shipments to San Francisco. He suggests a one-fourth orange box as a convenient package in which to ship this fruit. If this is adopted and make standard it will enable avocado growers to have their fruit shipped with carloads of oranges. Mr. Thacher has made what we believe to be a valuable suggestion and we recommend its consideration by those who are now growing or are about ready to grow the avocados in commercial quantities.

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The Cherimoya

Not much grown in California yet, but will be more as the merits of this valuable member of the Anona family are known. Mr. Coolidge has article in this issue as to frost resistance of this excellent fruit. Photos on this page taken by F. W. Popenoe and used by courtesy Pomona College Journal of Botany

A prolific Cherimoya tree at the C. W. Mitchell residence in Sierra Madre, California.

Above is shown the Golden Russet Cherimoya as grown at Orange, California.

In Mexico. On the left a view in Mazatlan, showing a young Cherimoya in bearing; on the right, a large tree photographed during the winter season and showing the deciduous nature of the tree in cold climates.

THE RURAL CALIFORNIAN

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The Cherimoya in California

Notes on a Little Known Fruit by F. W. Popenoe

That the cherimoya has not assumed an important position among the commercial fruits of California can not be attributed to any fault of the fruit itself, since in its better varieties it is one of the finest known to horticulture. Neither can it be said that the climate and soil of Southern California are not adapted to it, since forty years of cultivation have shown the tree to be hardy here, and fruits of fine quality have been produced.

Fifteen Year Old Seedling at Hollywood.

This regrettable state of affairs must be attributed to the negligence of our horticulturists. We have been growing cherimoyas in a haphazard way, propagating only by seed and perpetuating a race of inferior seedlings. Had the precaution been taken to propagate from the choicest of our local seedlings, to say nothing of introducing better varieties from other countries, we should, without doubt, have many good cherimoya orchards in the state at this time. Had we established here in the beginning the most desirable varieties which cherimoya growing regions of the world can furnish, there would be a different tale to tell at the present time.

In many countries where this fruit can be successfully grown it has reached a stage of consid-

NEWS FROM HONOLULU

By F. W. POPENOE, West India Gardens, Altadena, Cal.

Horticulturally speaking, much can be seen in Honolulu that is of interest to the Californian, and of practical application to Southern California conditions. Honolulu does not have a tropical climate in the strict sense of the word; while the thermometer rarely falls below 52 degrees, the high temperatures of the equatorial belt are never experienced, and the amount of precipitation is remarkably small,—about thirty inches a year, although other parts of the islands have four or five times that amount. It is a happy combination indeed,—a comparatively dry climate, free from the extreme heat of the tropics, yet permitting the cultivation of practically every tropical product.

Honolulu's distinctly tropical aspect is gained by the use of such subjects as the Royal Poinciana, the Cocoanut and Royal palms, the Saman (Pithecolobium saman), Acalyphas and Crotons. And while California may never grow these same things, it is worth emphasizing that with the use of less delicate subjects, of which we have an abundance, we can produce an effect fully as beautiful and almost as tropical. The Royal palm is replaced by Cocos plumosa or some similar species; the gorgeous Hibiscus hedges, characteristic of tropical countries, we can duplicate with ease; and bamboos, Ficus, and many other species of ornamental plants do as well in Southern California as in Hawaii.

The Royal Poinciana is certainly the queen among flowering trees. Wallace remarked that it is worth a trip to the Orient to eat the durian; I would add that it is worth a trip to Honolulu to see the Poincianas in bloom. The tree is flat-topped and spreading, with finely pinnate leaves; when in flower it is one mass of vivid scarlet, and by far the most prominent object on the landscape. As well as being grown in almost every dooryard, it is often used as a street tree.

The saman attains immense proportions,—a nobler tree would be hard to imagine. Scarcely less striking than the Poinciana is Cassia fistula, the Pudding Pipe tree. It is used for street planting, and when in bloom is a sight to remember, its brilliant yellow flowers, two inches in diameter, being produced in such profusion that the tree is a solid mass of color. Caesalpina pulcherrima, the "Barbados Pride" or "Flower Fence" is somewhat similar to Caesalpinia gilliesii, common in California gardens; its more brilliant coloring, however, makes it far superior to our species. Ixora coccinea, a small shrub bearing large clusters of brilliant red flowers, is common in the gardens, as is also Thevetia neriifolia, the Willow Apple, occasionally seen, and perfectly at home in Southern California.

The most characteristic feature of a tropical country is, of course, its palms. Honolulu possesses a good variety of them, the most prominent being the Royal palm (Oreodoxa regia) and the Cocoanut. There is nothing that lends so much charm and picturesqueness to the landscape as the Cocoanut palm; it fulfills a mission of its own and cannot be replaced by anything else. It might almost be said that the Cocoanut is the one thing California lacks to make it truly tropical in appearance. Grown along the seashore, it is usually the first plant that greets the visitor's eye, and it creates an impression that cannot be effaced. The Royal palm is used extensively for avenues and drives, and while it is admittedly a beautiful palm, I cannot see that it is any finer than some of the species of Cocos we grow in California. Comparing an avenue of Royal palms with the avenues of Cocos at the Gillespie place in Montecito or on the Huntington estate in Pasadena, I believe the latter are the most beautiful of the two.

Several species of Phoenix are common, but it is a relief not to see P. canariensis, so much in evidence as in California; it is not widely grown here, most of the representatives of the genus being confined to other species, according to J. E. Higgins, horticulturist of the Hawaii Experiment Station, many of them are natural hybrids. Caryota urens, the Fish Tail Palm, several lesser species of Cocos, an occasional Washingtonia, Archontophoenix (Seaforthia), Corypha, Livistona, and others are occasionally seen. On the whole, the list of palms is an excellent one; it is to be regretted that we have not made our plantings in California more varied, instead of allowing Phoenix and Washingtonia to usurp the whole field.

The use of ornamental hedge plants is

In the Gardens of Japan

By F. W. POPENOE, of the West India Gardens, Altadena, California

Upon arriving in Japan, a Californian cannot help being impressed by the luxuriance of vegetation which greets the eye. On all sides the hills and valleys are clothed with verdure of varying shades of green, making a picture of almost tropical beauty that would not be expected in a temperate latitude. It naturally requires a very favorable climate to produce such a growth of vegetation; with her mild winters and hot, humid summers Japan must come about as near to supplying ideal conditions for plant growth as it is possible to find outside of the tropics, but like all other countries where vegetation runs rampant, cultivated fruits do not seem to reach the perfection that they attain in a semi-arid region such as Southern California.

Conifers and bamboos, with an undergrowth of shrubs and ferns, cover the mountainsides and extend down to the cultivated areas. One sees among these members of the indigenous flora many species which are common in California gardens, particularly in regard to ferns, of which, doubtless, all the common species that are worth growing have many years ago been introduced to America and been widely disseminated. Some of the Japanese shrubs, too, have already become common in California gardens, as have also the best bamboos.

Wherever it is possible to put in a crop the land is under cultivation, the density of population necessitating the greatest economy of space and the constant cultivation of the soil to its greatest productive capacity. Many of the hillsides, such as we would never think of using in California, are covered by a succession of terraces, and planted with "paddy", as rice is commonly called, or other food crops. In the valleys practically every inch of ground is under cultivation. Most crops are grown in small patches, surrounded by low ridges to retain the water when irrigating; with rice, as is well known, it is necessary to keep the fields inundated through a large part of the growing season.

The Japanese farmer practices intensive cultivation of the most practical kind, and he does not confine himself to one crop, but cultivates four or five different food products, thus making almost his entire living from the soil, and proving that he is a believer in diversified agriculture. Apart from rice, one of the commonest food plants is the Colocasia, said to be one of the oldest cultivated vegetables in the world. Yams and beans of various kinds are also grown, and the egg-plant seems to be a particular favorite.

It must be admitted, however, that of the vegetables grown in Japan which are also grown in the western world, they have no choice varieties, despite centuries of cultivation and a natural fondness for plant life on the part of the people. Introductions of choice forms from Europe or America do not appear to have been made, Japanese seedsmen, if there are any such, evidently not being as enterprising in this line as are Europeans or Americans. If introductions have been made, they have had no effect on the country at large, and the Japanese farmer goes on cultivating year after year varieties of egg-plant with fruits no larger than an apple, squashes with enormous seed cavities in proportion to the amount of flesh, and so on down the list. The Imperial Department of Agriculture certainly has an opportunity to do some important work for the truck farmers.

As compared to Japanese fruits, however, the vegetables are so fine as to deserve a place in Burpee's catalog. It has been pointed out that the climate of Japan is unfavorable for fruit culture; nevertheless a number of fruits are grown in considerable quantities. One of the most popular is the pear, of which two varieties appear to be in common cultivation. Both are roundish-oblate, one being russet in color and the other light yellow. Although quite juicy, the flesh is woody and flavourless, making a fruit which is, on the whole, of about as little value as one could find. The method used in growing these pears is interesting, however. A bamboo frame is placed over the young orchard about six feet above the ground, and as the branches grow up through this they are bent over and tied down to the frame. No

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THE GARDENS OF BAGHDAD

By W. F. POPENOE

The word Baghdad immediately conjures up in the mind of the average Westerner pictures of Oriental splendor and elegance—of magnificently decorated palaces, of richly dressed men and women, and of secluded gardens where the afternoon coffee is taken in the shade of the orange and the oleander, while the air is redolent with the perfume of the jasamine and the rose.

Such, at least, was my own conception of the glories of the Orient after having read the "Thousand and One Nights," and I left Southern California with the expectation of finding a counterpart of our own splendid exotic flora in some of those Oriental gardens, although a perusal of saner and more recent literature than the stories of Sinbad and Ali Baba had somewhat shaken my faith in Oriental magnificence and splendor, and prepared me for low mud buildings, donkeys, and fleas, in the place of palaces and "gaily caparisoned" camels, as some writers are pleased to put it.

After a voyage of seven days up the river Tigris from Busrch, at the head of the Persian Gulf, I awoke one morning to find our steamer at anchor in Baghdad, just below the omnipresent customs house. I hastened on deck, to meet a scene which restored my faith in the City of the Caliphs and imprinted an indelible picture on my memory. In front of us was the bridge with a caravan of camels just crossing it, entering the city to be on hand at the opening of the bazars. On the right bank of the river was a large mosque, whose shining dome and stately minarets were beautiful indeed in the early morning light; above and below this the buildings, while typically oriental in design, were large and substantially built and gave the scene a business like appearance which one does not often find in this part of the world.

But it is to the gardens that we must turn our attention, and it was not long after getting on shore that I began to look about for familiar plants and signs of horticultural enthusiasm. As for the familiar plants, I found them on all sides; in fact there were practically none that were not common in Southern California. But it was a more difficult matter to locate an intelligent and enthusiastic horticulturist. During a month's stay, I only found two—one an amateur, and one a professional, the proprietor of the only nursery. I have seen since I left India. It only required a walk through the residence section of the city to show me that my ideas regarding oriental gardens would have to undergo considerable alteration, and I confess I was somewhat disappointed in the small size, the lack of choice plants, and the uncared for appearance which characterized practically every garden that I saw. As a typical case might be taken the garden in front of our hotel, which was laid on a terrace fronting on the Tigris. It was about 40 by 50 feet in size, and nearly one half the ground space was occupied by broad stone walks, which dissected the garden into eight small plots of ground about 8 by 10 feet. In each of these was at least one orange tree, and in some cases two or three, there being no regard for uniformity in the plantings. Under these trees were grown violets, chrysanthemums, roses, cannas, carnations, stocks and marigolds, scattered here and there according to the fancy of the Arab gardener, all showing a lack of care and attention that would be countenanced just about two minutes in Pasadena. Yet the gardener's sole duty was to tend to these few small plots of ground.

But, of course, there is a vast difference among gardens here as well as everywhere else, and upon inquiring as the best garden in Baghdad, I was told: "Go and see Seyd Salman Abbatshi." Finding that the lived up the river some four or five miles, in a suburb called Moazeum, we hired donkeys for the trip and started out early one morning through the North Gate and across the broad plain which surrounds Baghdad, until we again came under the shade of the date palms which fringe the river. After an hour's riding, we came to a large date plantation, with oranges planted beneath the palms, and a general air of good cultivation which distinguished it from others. Believing that this was the place we sought but not being quite certain of it, our guide inquired of an Arab who was sitting in front of his house. "Prince, can you tell me the way to the garden of Seyd Salman Abbatshi, may peace be upon you?" We were right, the plantation we were approaching was the one, and when we arrived at the entrance we were met by the Seyd himself. He took us inside his flower garden, the largest I had ever seen, and was by far the best cared-for. Of roses there was an abundance, the bushes being as vigorous and healthy as I have ever seen them in California, it made me think of California, in fact, to see our old favorites, La France and Maman Cochet, which

Commercial Prospects of the Ahuacate

By F. W. Popenoe, Altadena, Cal.

RIGHT IN THE BEGINNING I want to say that it is greatly to be regretted that this fruit has become established in California under a misleading and meaningless name. I refer to the term "Alligator Pear," which certainly has no excuse for existence, and invariably gives those who are unfamiliar with the fruit a wrong impression of it. The name "avocado," however, can be said to be scarcely less objectionable. The correct name is "ahuacate." But "ahuacate" is at once a beautiful word, almost expressive of the flavor of the fruit itself; it leaves the mouth with a pleasant slide, imprints a happy picture on the mind, and tickles the appetite with pleasant anticipation.

In tropical America the ahuacate is not placed in the same category as other fruits, but is considered as a staple food product, of equal importance with rice or beans, as a part of the daily diet..

It is this unique feature of the ahuacate—its food value—that has made firm the belief that it is destined to play an important part in the future of California horticulture. The pessimist is always ready to point to certain fruits, which though well adapted to this climate, have never become of commercial importance, and voice his opinion to the effect that a quarter of a century will see the ahuacate in a like position. But in doing this he forgets the nature of the product which he is attempting to malign. It is not on its value as a dessert fruit that we can base our belief as to a future important ahuacate industry, but as a food product which can do much toward the solution of the distressing problem of high cost of living.

An acre of land can produce, let us say, a quarter of a ton of beef, or other animal food, per year. It can produce one ton, or possibly two tons, of food in wheat, or corn, or rice. It can produce five, or ten, or possibly twenty tons of an incomplete food ration in the form of apples, or grapes, or bananas. And there may be from one to two tons of very rich food in the form of nuts—notably pecans—from an acre of ground. But with ahuacates there would seem to be a possible yield of food of very high nutritive value in tonnage equal to apples with their low nutritive value.

This ahuacate business is new. It has to be worked out. But is there not great potential value in the few facts we have? If men can produce many tons of food of best value from an acre of land in trees that can only yield a fraction of a ton in the form of animal food, is it not pretty certain that they are going to plant trees?

The problem of food supply is an all-important one, and in reckoning with it we can surely afford to give the ahuacate a large amount of consideration.

The ahuacate has now progressed beyond the point where its adaptability to California is questioned. Five years ago if you had mentioned the ahuacate as a horticultural possibility for California, nine-tenths of the men whom you were addressing would have turned away with the remark that the ahuacate was all right, but California would never grow it. They simply had not seen any of the numerous seedlings in bearing in the southern part of the state, and did not know that many of them had been producing regularly and abundantly for years. Every year a number of young trees come into bearing in different localities, and today we have sufficient facts at our command to prove that the ahuacate is entirely successful in a large area. Just what can be expected of it in the hot interior valleys such as the Imperial and the San Joaquin, cannot be stated as yet, as no adequate trial has been made of the tree in these regions. There are bearing trees at Redlands and San Fernando, and with these to act as a stimulus planting is being extended much farther into the interior, with the hope that success will result. And while definite knowledge must come from actual demonstration, it seems likely that it will be possible to grow certain types in the San Joaquin and Sacramento valleys at least. It must be constantly borne in mind that the success of the ahuacate in the interior valleys will depend on obtaining varieties which are suited to the conditions which obtain in such regions. It stands to reason that an ahuacate from Honolulu or Mazatlan would not have the same chance of success in the San Joaquin valley as one from an elevation of six thousand feet in Mexico, where the winters are quite cold and the summers hot and dry. There are several ahuacate regions in Mexico whose climatic conditions almost parallel those of some parts of the San Joaquin valley.

In regard to the coastal regions from Santa Barbara to San Diego there is not a vestige of doubt remaining. The ahuacate has been too thoroughly tested in this region to leave any room for doubt as to its adaptability, and with this to rely upon, planting is going on with confidence.

Although the general public is not yet familiar with this fruit, it is evident that southern Californians have been very much alive to its possibilities during the past two years by the fact that fully one hundred thousand seedlings have been grown at various points south of the Tehachapi. Many of these are being budded this season. The difficulties of propagation, which were considerable during the first few years, have now been practically overcome, and the production of budded trees can go on at a fairly rapid rate. Already several small acreages of budded trees have been set out, and the coming year will see a total planting of two hundred acres, at a conservative estimate. Innumerable trees will go into small home gardens and back yards, for the value and interest of an ahuacate in the dooryard are appealing to almost everyone.

The subject of varieties and types is probably the most important which must be considered in connection with the development of the industry and the extension of the region in which the fruit can be successfully grown. Little is known of the different types which are grown in other countries and their relation to each other, since this subject has received almost no systematic attention. It is possible broadly to divide the seedlings which have fruited in California into two classes, based on characteristics of growth, foliage and fruit. By far the largest number have come from northern Mexico, especially from Monterey and other sections of the state of Nuevo Leon. The type from this region is small, pyriform or oval fruit, purple in color and thin skinned, coming into bearing at three or four years from the planting of the seed, and ordinarily very productive. It is so distinct from other ahuacates that botanists have formed a separate species for it, and called it Persia trimyfolia. The Mexicans as a rule seem to consider it superior in flavor to other types, but it has several characteristics which disqualify it for commercial purposes and it is consequently attracting little attention from the nurserymen.

The second type has become quite generally known as the Guatemalan, for the reason that it is most common in Guatemala and was first brought to notice in that country. The same type appears to occur in southern Mexico, however, and many examples of it which are growing in this state have come from there. The principal characteristic which distinguishes it from the Mexican type is the woody skin of the fruit, which is sometimes a quarter of an inch thick and could properly be called a shell. The foliage lacks the anise-like fragrance possessed by the Mexican type. The fruits are normally larger than those of the Mexican type and seedlings do not usually come into bearing until seven or eight years old.

Seven years ago G. N. Collins of the Bureau of Plant Industry called attention to this type and asserted that it was the most promising type from a commercial point of view. At that time it was not generally known that the type was growing in California, but experience with it in this state more than bears out Mr. Collins' assertion. The thick woody skin permits the fruit to be shipped to distant markets without undue care in packing and with loss in transit reduced to a minimum. It possesses another advantage over the type grown in Florida in that the seed is nearly always tight in the cavity, and cannot roll around and bruise the flesh.

The type grown in Florida, sometimes known as the West Indian-South American, has also been planted in California, but too recently to permit definite statements in regard to its adaptability to be made. It has proved to be more tender than either the Mexican or Guatemalan types, either of which will stand several degrees of frost, but in favored localities it suffered no injury during the cold weather of the past winter. The oldest trees in this state should come into bearing within a year or two.

Many seedlings from Hawaiian fruits have been grown in California, but coming from a warm and humid region they have not been very successful, and only one or two of them are known to have produced fruit.

The varieties now propagated and offered by the trade are mainly of local origin. The difficulty and expense connected with obtaining budwood from Mexico and other foreign countries has prevented any large quantity of trees being propagated from them, but a good start has been made in obtaining the choicest varieties Mexico has to offer, and budded trees which are now established here will soon supply enough budwood to permit their extensive dissemination. Of the local varieties, several are first class in every particular and would almost seem to fulfill the commercial requirements as we understand them at the present time. The propagation of most of them has only been begun during the past two years, and no large quantity of stock is yet available, but another season will see quite a change in this respect.

One of the very best in the Meserve, originated at Long Beach. This variety seems to possess every characteristic needed to make an ideal commercial fruit. It is spherical in form, about one pound in weight, the skin thick and woody, the seed small and tight in its cavity, and the flavor and quality of the best. Another excellent variety is the Taft, originated on the property of C. P. Taft at Orange. This is very similar to the Meserve except in form, and of equally good quality. Being pyriform instead of spherical it would perhaps require a little more care in packing. The Murrieta, originated in Los Angeles, falls in the same class as the two preceding. It is almost spherical, about a pound in weight, and of excellent quality. To the enterprise of John Murrieta, with whom this variety originated, we owe the existence of many of our best local varieties, since it was through his efforts that seeds were obtained from Atlixco, in the state of Puebla, Mexico, one of the very best ahuacate districts in the republic, about ten years ago. These seeds were grown by several of Mr. Murrieta's friends in and about Los Angeles, and several of the trees are excellent.

One of the largest is the Solano, originated at Hollywood. Specimens frequently weigh as much as 26 ounces. The Dickinson, originated in Los Angeles, is rather small but very productive and of good quality. The seed from which the parent tree was grown was brought from Guatemala City in 1879.

All of the above are of the Guatemalan type, and ripen during spring and early summer. They comprise the most promising varieties which have originated locally, but are not all that have been propagated. A complete list of the varieties of this type would have to include Miller, Walker, Ferry, Rhoad and one or two others which have not been given much attention.

Among the varieties of the thin-skinned Mexican type we have several which are very desirable for home use, and perhaps for market also, during the season when the larger forms are not available, since the Mexican type ripens in the fall. The Chappelow, described in the 1905 Yearbook of the Department of Agriculture, was the first variety orignating in this state to receive any attention. It has been propagated quite widely, and budded trees are now bearing in southern Florida. It is a long, slender fruit, attractively colored, and of excellent quality. The Harman is oval or broadly pyriform, weighing 8 or 10 ounces, of good quality, but with a rather large seed, loose in its cavity. It has proved to be exceptionally hardy, however. Fowler, Canter, Blake and Mattern are others of this type which have been propagated to a very limited extent.

The ahuacate has been most successfully propagated by the method known as shield budding, the operation itself being much the same as with citrus trees. During the first two or three years in which budding was attempted by California nurserymen many difficulties were experienced and failures frequently met, but sufficient experience has now been gained to enable the work to be done with assurance of success. Under glass, grafting has been quite successfully practiced, but budding seems to be the more desirable method.