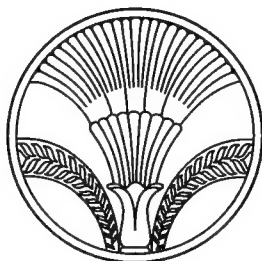


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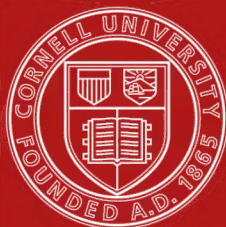
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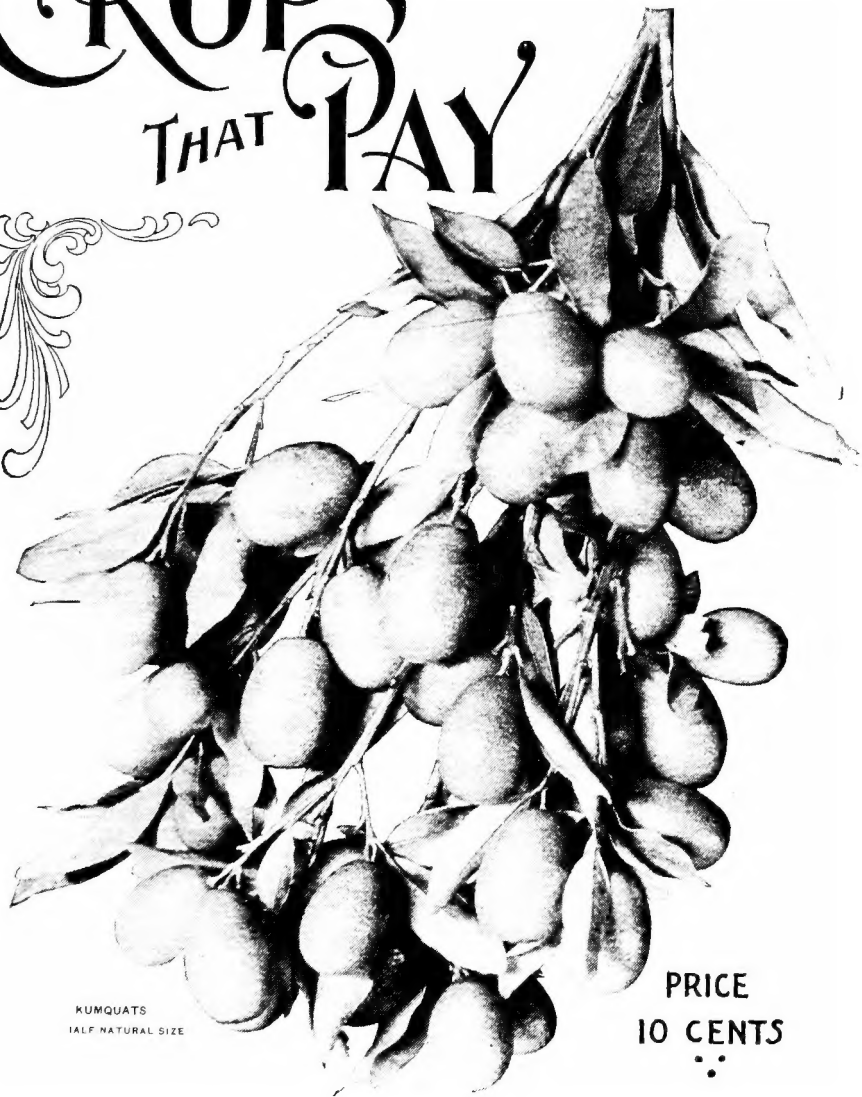
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CROPS THAT PAY



KUMQUATS
HALF NATURAL SIZE

PRICE
10 CENTS
••

By H. ARTHUR DYGERT.

DREXEL BUILDING, PHILADELPHIA, U.S.A.

Announcement

Should the reader's interest in "CROPS that PAY" lead him to seek more detailed information than is herein given, the author will be pleased to correspond with him and answer all inquiries relating to the growing of *pecans*, *figs*, *mangoes*, *avocados* and *kumquats*.

Correspondence is especially requested from professional and business men and women, who, with the means and inclination to engage in horticultural pursuits, cannot do so without interfering too much with their usual occupations. It is believed that there are many among them who would welcome an opportunity to make moderate investments in a commercial plantation of these profitable crops under conditions assuring the returns shown in the following pages.

But no matter what may be the interest that prompts correspondence, all communications will receive the best attention of

THE AUTHOR.

CROPS THAT PAY

PECANS, FIGS, MANGOES, AVOCADOS, KUMQUATS

What they are; where and how they grow; what profit they give; history, commercial value and trade statistics; methods of cultivation and preparation for market; and evidence that their culture affords a safe, permanent and very profitable investment.

TWENTY-SEVEN HALF-TONE ILLUSTRATIONS

BY

H. ARTHUR DYGERT

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THE PECAN

(*Hicoria pecan*, Britton; *Carya olivaeformis*, Nuttall.)

*"The younger people making holiday
With bag and sack and basket, great and small,
Went nutting."* —Tennyson's Enoch Arden.

When followers of Bienville, in 1740, explored the lower valley of the Father of Waters, they found the Natchez Indians using a meal which their squaws prepared by grinding the dried meats of a nut. This was "the pecan," which, according to Bancroft, "with the mulberry and two kinds of wild plums, furnished the natives with articles of food." From the hickory-nut, close kin to the pecan, the Virginia Indians, by pounding the kernels, obtained an oily liquor which they called "powcohicora," whence came the generic name, *Hicoria*, including eight or ten species, among them the pecan. Hickory-nuts, and all nuts having hard shells requiring a stone or hammer to crack them, were called "pâcan" by the Indians; and the French settlers of the Mississippi Basin appropriated this word for the name of one species, the *pacane*, or in English, pecan, which they found growing wild in abundance throughout Louisiana.

Hicoria pecan is a native of the United States and thrives best in the rich, deep, alluvial lands bordering rivers and creeks of the lower Mississippi Valley. A line drawn from Rock Island, Illinois, to the Tennessee River, near Chattanooga, marks, approximately, the northeastern boundary of the area in which it is found growing wild. Throughout the region southwest of this line in Iowa, Illinois, Indiana, Kentucky, Tennessee, Alabama, Mississippi, Indian Territory, Arkansas, Louisiana and Texas, it is generally distributed, finding there the most favorable conditions for perfect development in fertile river bottoms, and, in the last two States, exceeding all other trees in size and value.

Sargent's "Silva of North America" describes the pecan as "a tree 100 to 170 feet in height with a tall, massive trunk occasionally six feet in diameter above its enlarged, buttressed base, and stout, stately, spreading branches which form in the forest a narrow, symmetrical and inversely pyramidal, or, when they find room to spread, a broad, round-topped head. The bark of the trunk is an inch to an inch and a half in thickness, light-brown tinged with red and deeply and irregularly divided into narrow, forked ridges, broken on the surface into thick, appressed scales. * * * The leaves are from 12 to 20 inches in length and are composed of from 9 to 17 leaflets."

As a shade tree the pecan has strong claims. With its tall, shapely trunk, and well-balanced, ample head, and bold, handsome, pinnated foliage, it has all the qualities necessary for a fine, graceful park tree, and by right deserves a place in every considerable plantation.

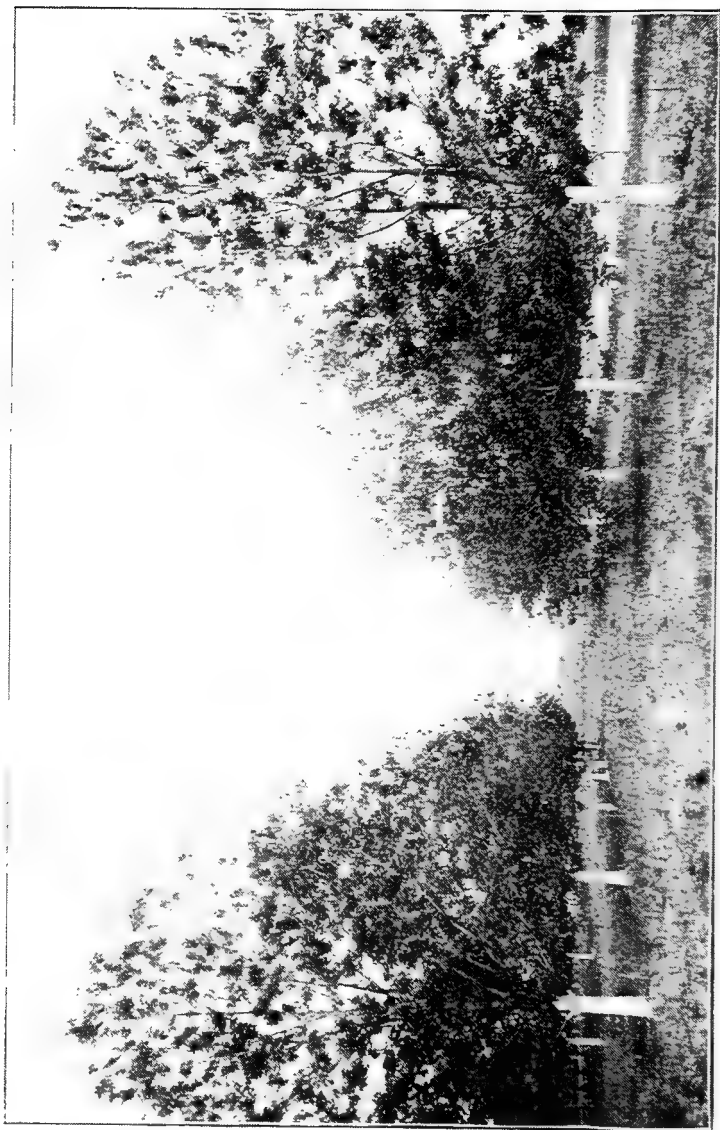


PECANS IN FOREST.

BY PERMISSION FIELD COLUMBIAN MUSEUM

PHOTO BY C. F. MILLSPAUGH, CURATOR

Like other nut trees, the pecan has male and female flowers on the same tree. The pistillate blossoms, which develop into nuts, appear on the new growth of each season, while the male, or staminate flowers, in the form of slender, pendulous catkins, or tassels, are borne on wood formed the previous year.



ORCHARD OF CULTIVATED PECANS

THE PECAN.

Pecan wood is close-grained, heavy and hard. In color it is light reddish brown, with lighter brown sapwood. The layers of annual growth are clearly defined. It makes excellent fuel on account of the brilliancy with which it burns and the ardent heat it gives. Charcoal made of it is heavy, compact and long-lived. It is frequently used in the manufacture of wagons, farm implements, tool handles, etc.

But, for its much-prized nuts, the pecan easily surpasses in value any other tree of American nativity. These vary greatly in size, shape, thickness of shell, weight and quality. Their commercial importance is increasing yearly. At present practically the entire pecan crop is the product of wild trees, less than five per cent., it is estimated, being from cultivated groves. Texas, Louisiana and Mississippi, in the order named, produce the largest quantity. Louisiana claims to give the biggest and best nuts, and to have originated the most valuable of those very large, thin-shelled varieties which it is the ambition of every nut-grower to reproduce, or excel, on cultivated trees of his own.

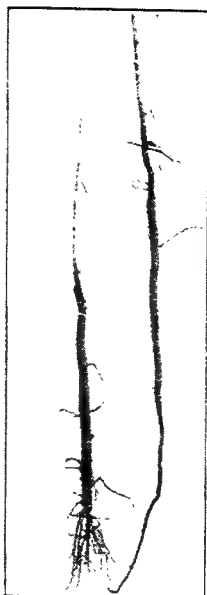
From the earliest times in the South the gathering and shipping of wild pecans has been found profitable; but only in recent years have efforts of skilled horticulturists been directed to pecan culture as an established business, with the result that the size and quality of the nuts have been greatly improved and the exceeding profitability of the new industry clearly demonstrated. As a consequence pecans are being planted, more and more, not only in those States which are rightly considered the natural home of the tree, but in other parts, especially in Georgia and Florida, where much capital has already been invested in commercial groves. However, it is only in certain favored portions of those six States nearest the Gulf that natural conditions are such as to insure the largest returns from an investment in pecans.

While Louisiana was still a French possession and a territory of vast and unknown extent, F. André-Michaux wrote in his "History of the Forest Trees of North America":

"These nuts have a most excellent flavor. They are an article of small commerce between Upper and Lower Louisiana. From New Orleans they are exported to the West Indies, and more often, to the large cities of the United States. Not only are they preferable to all those which I have, up to this time, found in North America, but I believe them to possess a flavor more delicate than any we have in Europe. Moreover, one sometimes finds varieties of the pecan which, although wild, bear nuts whose kernels are much larger than are those of any of our nut-trees, which have not been cultivated. I think, therefore, that on account of its fruit, this tree merits the attention of Europeans. By means of careful cultivation it is certain that very good nuts would be obtained; and especially is this true when one considers that our nut-trees in a wild state produce nuts greatly inferior to those of the pecan."

Earlier mention of the pecan is found in a narrative of travel in Louisiana by Charlevoix and Le Page de Pratz, "History of Louisiana," Vol. II., page 26:—

"There are still other pecans whose fruit is a species of small nut, which one at first glance would take for the hazel-nut, since they are of the same shape and color and have shells as thin; but whatever shape and size, considered as nuts, they are more delicate in flavor than our nuts, less oily, and of such excellent taste that the French make pralines of them equal to those of the almond."



PECAN TAP-ROOTS*



MALE FLOWERS OF PECAN†

The author of "Nut Culture in the United States," issued by the U. S. Department of Agriculture, Division of Pomology, with the characteristic conservativeness of departmental writing, says:—

"Of the eight or nine species of the genus *Hicoria*, but four are worthy of the special attention of the nut grower as trees likely to produce marketable fruit in profitable quantities. First among these is the *H. pecan*. Pomologically, this is scarcely less important than the Persian (English) walnut or almond at the present time. With an area of adaptation in the United States considerably larger than is found for either of the others, and with a susceptibility to improvement by selection, in size of nut, thinness of shell and delicacy of flavor that are very encouraging to those who have attempted this work, the pecan is probably destined to become the leading nut of the American market. If its cultivation is pushed with the usual skill and energy of American enterprise, there is reason to believe that it will not be many years before the pecan will become, not only an abundant nut in our markets, but also an important article of export."

Since the Government published the quoted work on nut culture, six years ago, our Southern friends have devoted much skill, energy and enterprise to the pecan cause. As a result larger nuts with thinner shells and finer flavor have been produced; new ideas in budding and grafting from fine varieties to reproduce desired forms

*Two years old. The one at right entire; the one at left, cut at one year, shows growth of lateral roots.

†From Photograph by H. H. Hume, Fla Ag'l Experiment Station.

have been discovered; and improved cultural methods adopted. And this good work is to be continued with the encouragement of the National Nut Growers' Association, lately organized, which means that nut culture in the South, heretofore sadly neglected, will receive the attention and support it so richly merits.



PECAN FOUR YEARS OLD

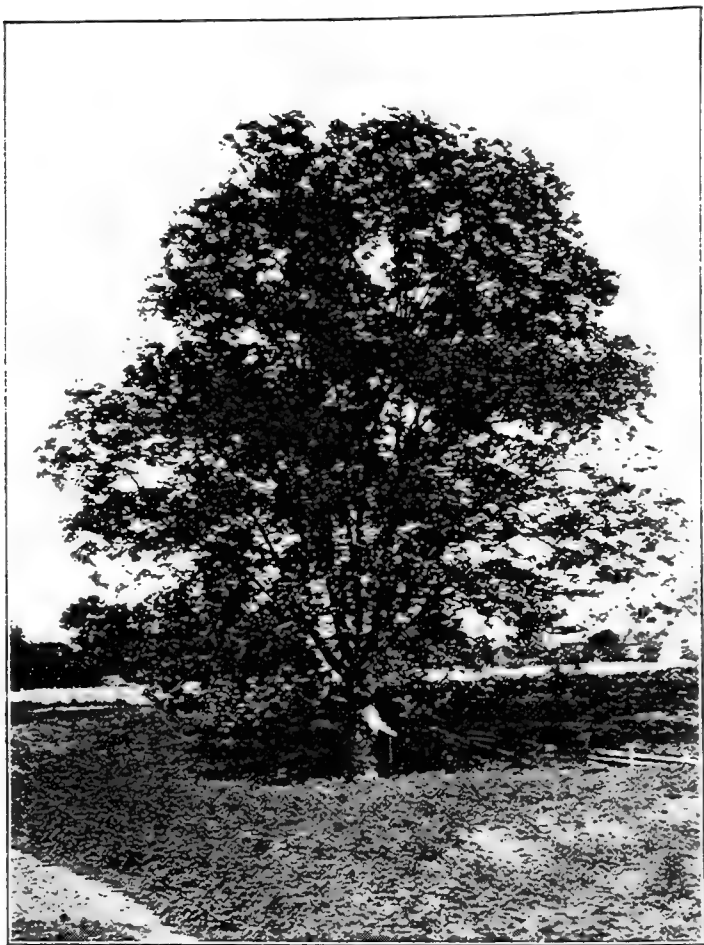
Many people in the Northern States do not know what a pecan is. Those who do, however, are apt to call it the best of nuts, even when they have never tasted one of those big, plump, grove-grown fruits, so superior in every way to the common, wild pecan. Like the early French explorers and writers we naturally compare the pecan with the almond, walnut and chestnut, increasing quantities of which are annually imported into the United States. These European nuts are very good, in their way, but nut eaters who know the pecan at its best, unhesitatingly declare it a better nut than either of the others; in short, the best nut in the world.

Pecan gathering in the South is a yearly event of importance. In Louisiana and Texas the nutting is on a grand scale; it means more than "the younger people making holiday." The pecan crop of these two States, alone, amounts to millions of pounds, and the small army of men, women and children which invades the forest "with bag and sack and basket, great and small," in quest of Nature's bounty, find remunerative employment during the season. There is great competition between rival "nutters." To get the nuts the trees are shaken, or their branches beaten with long poles. Such as remain in the husks after dropping are tossed into a heap and threshed to loosen them from their four-parted coverings, many of



BEARING PECAN FIVE YEARS OLD

PLANTED IN COTTON FIELD



FULL-GROWN PECAN

BY PERMISSION FIELD COLUMBIAN MUSEUM

PHOTO BY C. F. MILLSPAUGH, CURATOR

the larger and thinner-shelled ones being broken during this operation. To make this work more easy and to quickly secure the valuable harvest, it has long been a practice of the improvident and reckless nutter to fell the largest trees. In a few hours his ruthless axe has destroyed the growth of centuries. Then, too, pecan trees



BY PERMISSION LOUISIANA A&L EXPERIMENT STATION
OF PENNSYLVANIA A&L EXPERIMENT STATION

PECAN NURSERY

are often cut for timber and fuel. Cords of good firewood can be taken from each stately shaft which rises fifty feet, straight as an arrow, before branching into its magnificent leafy dome. Many a forest monarch has been laid low to feed the kitchen fires of Texas pioneers. Other pecan trees, thousands of them, are removed when land is cleared to receive cultivated crops. So destruction of the natural growth goes on from year to year, and the effect of it is seen, more and more, in a steadily diminishing supply of the nuts and in advancing prices. The product of many cultivated trees, not yet planted, will be required to make good the shortage in the supply of pecans, due to these several destructive causes. From the forest, where the nuts are generally free for the picking, countless wagon-loads are traileed to the nearest market town and sold to dealers. These pack them in sacks and barrels and ship to the commission men or nut houses in New Orleans, or some northern city, whence they are distributed through wholesale and confectioners' supply stores to fancy bakers and candy makers, grocers and the various other retail stores interested in their sale.

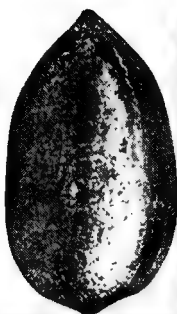
But the progress of the pecan from forest to table is interrupted at one stage of the journey. Large shipments may contain nuts of many sizes; and the dull, gray-brown shells are most likely streaked with black where the lining of the husk has stuck to them. The trade demands uniformity in size, and smooth, clean shells. To the grader and polisher, therefore, go the unsightly nuts for a course of improving treatment to better their appearance. There are "factories" which make a specialty of this work, and the grading, cleaning and polishing are done by machinery, automatically, and at no very great cost. In a revolving cylinder, or "rumbler," containing sawdust, chips of leather or other slightly abrasive material, the nuts are slowly turned, over and over, until the rubbing they receive has quite cleaned and polished them. This operation completed they are removed from the cylinder and dumped onto a sieve set at the right angle to let them pass gradually downwards and through its three or four sections. The smallest nuts drop through first, then each larger size in turn, as the openings of the sieve permit. Boxes are placed underneath the sieve to catch the graded and polished nuts which are now ready to pack, but not, in some instances, before they have received a final treatment with rouge to make them more attractive for the fancy trade. The largest and best nuts, however, are seldom polished, their size ensuring them a quick sale whenever they are offered; but it is well worth noting that pecans of this kind have never reached the market in quantities great enough to supply the demand. The polishing process is not without risk of loss through overheating the nuts while in the "rumbler." When this happens the shells become greasy and the meat liable to mould. According to a large dealer in pecans, the St. Louis graders classify various sizes as follows:—

NAMES.	NO. IN POUND.
Biggest Louisiana nuts.....	33
Jumbo	75 to 80
Large	110 " 120
Medium	120 " 140
Small	175 " 180

THE PECAN



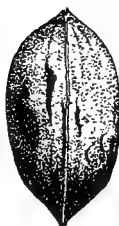
FROTTSCHER



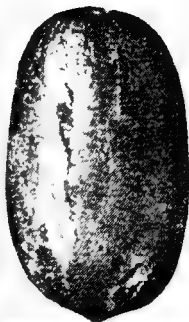
RUSSELL



VAN DEMAN



WILD NUT



PABST



STUART

FIVE FORMS OF CHOICE, THIN-SHELLED PECANS.
ALSO WILD NUT SHOWING DIFFERENCE IN SIZE

The largest pecans require only 24 to weigh a pound, and measure $2\frac{3}{8}$ inches in length. But few nuts as large as 50 to the pound are ever sent to market since there is always a demand for them far in excess of the supply, for planting. Such nuts, sold for seed, bring from a dollar to five dollars a pound, much of the business in this line being done through the mails. The cultivator of pecans aims to reproduce these large forms, and, if possible, grow still bigger ones with thinner shells and having more delicate flavor and better cracking qualities. That he is succeeding reasonably well is evidenced by the growing interest in pecan culture, and the ever increasing number who are planting groves of this tree.

While by far the greater quantity of pecans is sold in the shell, the trade in the meats is constantly growing, and, for many uses, the pecan is supplanting other nuts. Many chefs and good liveries think pecan oil better than olive oil for salads and for cooking purposes. Only the smallest nuts are ground into oil. A wider appreciation of the merits of the pecan in this respect would surely benefit growers of the nut. That the sweet and palatable pecan kernels excel other nuts in food value is interestingly shown by the following analysis taken from Bulletin No. 54 of the Maine Agricultural Experiment Station:

	Edible Portion	Edible Portion					Food value per pound*
		Water	Protein	Fat	Carbo-hydrates	Ash	
	%	%	%	%	%	%	Calories
Pecans, kernels,	100.0	2.9	10.3	70.8	14.3	1.7	3445
Walnuts, "	100.0	2.8	16.7	64.4	14.8	1.3	3305
Filberts, "	100.0	3.7	15.6	65.3	13.0	2.4	3290
Cocanuts, shredded,	100.0	3.5	6.3	57.3	31.6	1.3	3125
Almonds, kernels,	100.0	4.8	21.0	54.9	17.3	2.0	3030
Shelled peanuts,	100.0	1.6	30.5	49.2	16.2	2.5	1955

* Calculated from analysis.

The cracking of nuts by machinery has become a recognized industry during the past few years. In St. Louis, San Antonio, Kansas City, Chicago and New York there are nut-cracking plants in which considerable capital has been invested and many hands employed. Pecans are the principal nuts used. Patented machines, operated secretly, and run by electric power crack the nuts; and an air-blast winnows shells from meats. These are sorted and sold for 40 to 60 cents a pound for the whole meats to bakers and confectioners by whose skill they are incorporated into the substance of fancy cakes, or various toothsome delicacies such as pecan brittle, nut bars, pecan creams and bon-bons, caramels and chocolates. Salted pecans are beginning to rival salted almonds in popularity;



TYPES OF WILD PECANS.

PECAN BRANCH AND NUT CLUSTERS.

FORMS OF CULTIVATED PECANS.

BY PERMISSION FIELD COLUMBIAN MUSEUM
PHOTO BY C. F. MILLSPAUGH, CURATOR.

PROLIFIC
VAN DEMAN
FROTSCHER
STUART
PABST

and pecans glaceés rank among the most esteemed of dainty confections. It is said that the nut cracking establishments prefer Louisiana nuts, as they crack and work more easily than others. Broken pieces sell for considerably less than wholes, and the smallest pieces are made into oil. The shells are sold for fuel and, like the wood and bark of the tree, make an especially fine fire. As an illuminant pecan oil is too costly, but that it would serve the purpose can be shown by lighting a kernel which will be found to burn for some time with a clear, brilliant flame. Care must be used in packing the meats for shipment in order that too great pressure may not slowly but surely squeeze out the oil. And to keep any quantity of the meats on hand they must be put into cold storage or they will become rancid. As an industry the preparing of nut kernels for market is still young in this country, but the time is coming when owners of commercial pecan groves will operate their own cracking plant, pack and ship the kernels, under private brand, direct from the plantation to consumers and dealers, just as now do the more successful fruit growers. This could be easily done, and the value of the crop would be greatly enhanced.

While the pecan harvest is one of considerable value it is of secondary importance when compared with that of any one of the leading fruits grown in the United States, and almost of trifling proportions when one thinks of the enormous production of various kinds of nuts in other countries, or even in California. We have seen that André-Michaux recommended the pecan for cultivation by Europeans, but the French, Italians and Spaniards have been content, so far, to grow chestnuts, walnuts and almonds as have their ancestors for many generations. It is in the Mediterranean countries of Southern Europe that the nut harvest is of greatest importance. A bad season means loss and privation, if not want, to the thousands who depend largely on these products for their principal food. In 1896, according to official reports, Italy had 404,000 hectares (998,324 acres) of chestnut plantations. U. S. Consul A. M. Thackara tells us in his report to the State Department, October 2, 1902, that the yearly crop of table walnuts produced in France from 1897 to 1900, inclusive, was 41,483,985 pounds, the yield for 1901 being estimated at 59,524,200. How small, comparatively, seem 3,206,850 pounds, the total production of pecans in 1899, as reported by the Twelfth U. S. Census. Europe sends us the fruit of her nut trees in annually increasing quantities, the value of which has *nearly trebled* during eight years ending June 30, 1904, as shown by the United States Bureau of Foreign Commerce:

1897, total value of nuts imported into the United States...	\$1,728,774
1898, " " " " " " " "	" " " " " " " " ... 2,216,064
1899, " " " " " " " "	" " " " " " " " ... 2,727,542
1900, " " " " " " " "	" " " " " " " " ... 2,978,834
1901, " " " " " " " "	" " " " " " " " ... 3,268,855
1902, " " " " " " " "	" " " " " " " " ... 4,044,341
1903, " " " " " " " "	" " " " " " " " ... 4,866,398
1904, " " " " " " " "	" " " " " " " " ... 5,471,166

California, with climate unsuited to the pecan, produces an ever

increasing quantity of walnuts and almonds, 10,668,065 pounds of the former and 7,142,710 pounds of the latter in 1899, according to the Census Reports; and this entire product finds a ready market at good prices in spite of the rapidly growing imports, as shown above.

But the pecan States of the South, where less capital and energy than have been expended by California on her nut groves would yield far better returns, with the added satisfaction of producing a nut superior in every way to either walnut or almond, have almost wholly failed to take advantage of their opportunities in respect to this most profitable branch of horticulture, which, when fully developed, will go far toward bringing permanent prosperity to the Southern planter.

Again referring to the Twelfth Census we find that pecan trees were reported from 28 States. The following table gives the total product for United States and the number of pounds of nuts as reported from 14 States, in order of production:

STATES.	POUNDS.	PER CENT. OF ENTIRE CROP.
Texas.. .. .	1,810,670	56.4
Louisiana.. . . .	637,470	19.9
Mississippi.. . . .	242,300	7.5
Arkansas.. . . .	86,050	
Missouri.. . . .	75,170	
Kentucky.. . . .	63,390	
Alabama.. . . .	60,670	
Kansas.. . . .	47,530	
Florida.. . . .	46,800	
Illinois.. . . .	41,380	
Georgia.. . . .	27,440	
Indiana.. . . .	16,650	
Indian Territory.. . . .	14,680	
South Carolina.. . . .	13,020	
	<hr/>	
	3,183,220	99.2
From 14 other States.. . . .	23,630	.8

Total, United States 3,206,850

From the foregoing it will be seen that 14 States produced 99.2 per cent. of the total and that 14 other States produced 8 per cent.; Texas, Louisiana and Mississippi, the States of greatest production, yielded 83.8 per cent. of the whole; Texas gave more than one-half of the entire crop, and Louisiana nearly one-fifth.

Texas has been long considered the "Pecan State," but does not that honor really belong to Louisiana which, with an area one-sixth that of the former, yields nearly one-third the quantity of nuts, a production per square mile more than double that of the larger State? Comparative production of the two States is as follows:

STATE.	SQ. MILES.	POUNDS.	POUNDS. PER SQ. MILE.
Texas..	262,290	1,810,670	6.9
Louisiana.	45,420	637,470	14.0

If, therefore, the pecan crop of Texas, as compared with that of Louisiana, were proportionate to her size, the product of Texas would be 10,448,065 pounds instead of 1,810,670 pounds, as reported; and it is reasonably certain that if the larger quantity were produced of fine, large nuts it would find a ready market at remunerative prices and the demand still be unsupplied.

Such figures are interesting to one who thinks of locating a pecan grove and are quite likely to influence his decision. The alluvial soil of Louisiana undoubtedly presents ideal conditions for pecan growing. This land is the richest on the continent, unsurpassed in natural yield, as productive as the far-famed Valley of the Nile, and never requires fertilizing. Yet it can be truly asserted that in either of the Gulf States, including Georgia, especially in the southern part, wherever rich, deep, moist, alluvial soil is found, the pecan will thrive well. And it is probable that the lighter soil of northern and central Florida, with liberal use of the right kind of fertilizers, will give results just as good. In both Georgia and Florida, where more skill, energy and capital are devoted to fruit growing, far more, indeed, than in other parts of the South, interest in pecan culture amounts to genuine enthusiasm. Best of all, this interest is based on evidence of success already achieved in the business by those who have been engaged in it long enough to learn its possibilities. Many commercial groves are being made and, in Florida, not a few of the abandoned orange orchards which were destroyed by the freeze in 1895, have been set with pecans in the firm belief that within a few years they will become more profitable to their owners than were ever oranges in the same State.

But the intending planter of pecans for profit will have other questions to decide besides that of location. What to plant and how to plant it? How to cultivate? When will trees begin to bear? What will be the yield? The profit per acre? How to make best use of the land before trees begin to bear? These are a few of the inquiries that are sure to arise. Much information on these subjects is given in replies received to 100 circular letters of inquiry sent to 19 States during the preparation of this article. More than half was distributed in Florida, Georgia, Mississippi, Louisiana and Texas, where pecan culture is further advanced than elsewhere.

These letters were addressed to leading horticulturists and nursery men, seed houses, nut dealers and commission men interested in the pecan trade; graders and polishers of pecans in northern cities; owners of pecan trees and pecan groves; expert budders and grafters of pecans who have spent years in actual field work; and others whose study of the subject and whose personal experience give weight to their statements. All replies, excepting such as are on points strictly cultural, tabulated and condensed to show averages and percentages are herewith given. They have been accepted by the writer whose own interest in and investigation of the pecan date back fifteen years, as a safe and reliable guide and as conservative and perfectly fair bases for estimates of yield, income and profit:—

1. Which would you select for planting, seeds or budded trees?

Reply: 23 per cent. would plant seeds. 77 per cent. favored

budded, or grafted, trees. With preferences as indicated, a few suggested the advantage of using both seeds and budded trees.

2. If you think best to use budded trees, at what age from the bud, should they be planted?

Reply: At one year from budding, 51 per cent.; at two years, 35 per cent.; at three years, 14 per cent.

3. If you prefer to plant seeds instead of budded trees, name 5 choice varieties of large, thin-shelled pecans, such as you would recommend for planting?

*Reply: 36 votes were given, as follows: Columbian, 33 per cent.; Van Deman, 22 per cent.; Stuart, 19 per cent.; Frotscher, 14 per cent., and Centennial, 12 per cent. These are decidedly the favorites. 25 other varieties were named in the replies. "Pride of the Coast" and "Rome" are synonymous with Columbian, and votes for both of these were credited to Columbian, the name most frequently used to designate this variety.

4. What distance apart would you recommend for planting pecans?

Reply: From 9 trees to the acre, or 70 feet apart, to 108 to the acre, or 20 feet apart, depending on methods of culture and richness of soil; fewer if the soil is very rich. Some advocates of the greater number believed in thinning out by cutting down part of the trees when the branches interlock; and others recommended "heading in" the trees so as to control the size of top and the spread of branch, and, in this way, retain permanently any desired number. But for permanent planting, without pruning, a majority of all the replies gave 35 feet apart, or 35 trees to the acre as the best number on average land, and 50 feet apart, or 17 trees to the acre on rich, alluvial bottoms; while 25 feet apart, or 69 to the acre, was preferred by those who believed in "close planting," with the intention of thinning out one-half, or even three-fourths of the number first set whenever crowding should make it necessary to do so.

5. Is the pecan injured by cutting its tap root in transplanting?

Reply: 80 per cent. of the replies, emphatically, no; 20 per cent., yes, but most of these so qualified their replies as to practically admit that the injury, if any, would not affect growth of the tree. Many of those who said no, claimed that better results would come from proper cutting of the tap root.

6. At what age from the seed will a budded or grafted pecan bear its first crop, provided it be planted in the best soil and receive the right care, fertilizing, etc.?

Reply: 6 years and 10 months* was the average of all the replies. Remarks were voluminous on this subject. Several instances were given of budded trees bearing a few nuts at three or four years; quite a number gave five years as the age of first fruiting; and many said that cultivated trees, under favorable conditions, would bear their first crop at six years. Practically all admitted that budded trees will bear two or three years earlier than seedlings.

* At the National Nut-Growers' Convention held in St. Louis in 1904, the following nuts, in the order named, were those voted for by a majority of the members of the Association as most worthy of cultivation for their superior qualities: Stuart, Van Deman, Frotscher, Schley, Pabst, Georgia, Curtis and Russell.

7. How many pounds of nuts will such a tree yield in the first, second, third, fourth and fifth years after beginning to bear?

Reply: During the first 5 years each tree will give 153.09 pounds, as follows: First year, 4.07 pounds; second year, 10.76 pounds; third year, 20.09 pounds; fourth year, 43.4 pounds; fifth year, 74.77 pounds. These are averages, taking all replies.

8. What is the present price of budded trees one year old?

Reply: \$1.02 for small quantities.

9. What is the present price of choice, named varieties for planting?

Reply: \$1.20 per pound.

10. What is the price of the average wild Texas pecan?

Reply: 7.2 cents per pound.

11. What is the price of best thin-shelled nuts now on the market for dessert, confectioners' and bakers' purposes?

Reply: 24.4 cents per pound for best wild product, selected large nuts; practically no cultivated nuts offered except for seed.

12. Has the pecan tree any serious enemies or diseases that skilful care cannot conquer?

Reply: The reply to this question was invariably "No," indicating that, unlike the pear, peach, apple and other orchard trees, the pecan is remarkably free from insect pests and liable to no attacks that timely precaution cannot prevent.

13. What would you suggest as the best crop to grow in order to prepare the land for planting pecans, and to continue to cultivate between the rows to bring an income while waiting for the trees to mature?

Reply: Depends on location, character of soil and facilities for transportation. 28 per cent. of the replies named cotton as the best crop for the purpose; 23 per cent. favored cowpeas, and 18 per cent., corn. 19 other crops were named, peanuts, melons, early vegetables, small fruit and tobacco being preferred. 69 per cent. of all replies, however, must be considered a decisive majority in favor of cotton, cowpeas and corn in the order named.

14. From your personal experience in the business, or from what you have learned through study of the subject, is the growing of pecans for profit a safe and profitable investment, provided the right location, kinds of nuts or trees for planting, management, etc., are available?

Reply: Nearly all replies to this question were made in a single word, YES! The others are here given in full:

"Certainly."

"I am sure it is."

"Very profitable."

"My impression, it is."

"Yes, I think highly so."

"It is, most positively so."

"I regard it as especially so."

"From my own experience, it is."

"Nothing to equal it that I know."

"I know of nothing that promises more."

"I consider it a very profitable business."

"Yes, in proper location and on cheap land."

"It is the safest, most certain, most profitable."

"I think it offers the best investment I know of."

"We doubt it, except on land that is of no other use."

"Yes, I have thousands of trees and twenty years' experience."

"Yes, for a long time, low rate of interest. Grows better with age."

"I should say yes, as the demand is great and is increasing every year."

"It is the safest and most profitable branch of horticulture in the South."

"I should say yes, provided the requisite conditions as named are followed."

"Very profitable. A better legacy to leave your children than a big bank account."

"Yes, sir. I have a 20-acre grove just coming into bearing that paid 4 per cent. on \$6,000."

"We are of the opinion that a pecan grove, properly located, cultivated, and the product properly marketed, would be a paying investment."

"I believe an orchard of good quality grafted pecans, well cared for, would be a very fine investment. I think it offers the best I know of."

"I have studied the subject carefully and am fully satisfied that pecan growing is a good investment. Grafted trees will pay 10 per cent. on \$1,000 per acre at 10 years from planting."

"I have been in the pecan business for 16 years and have between 400 and 500 budded trees. From my personal experience in the business, pecan growing is safe and profitable as an investment for capital."

"It will not pay to raise the small nut and sell it in competition with the wild product; but with a grove located in the right place and with good management and the right kind of nuts for planting, I consider the growing of pecans a profitable business and a safe one in which to invest capital."

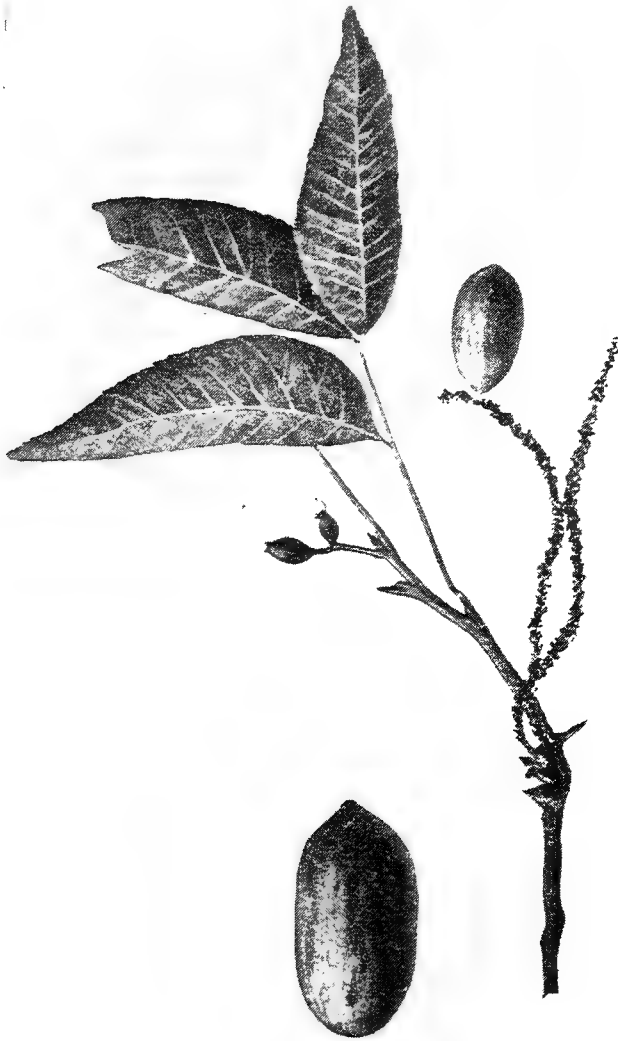
"The growing of choice varieties of large, soft-shell, productive pecans is bound to prove profitable in the South. Why? We have the climate and the soil to produce the choicest nuts and we have the world for a market. One of the most profitable trees in this vicinity has given its owner a net income of over \$100. per annum for many years. Last year's product was sold for \$175. An acre of bearing trees of this variety, as well as some other choice, productive sorts, would certainly be worth \$5,000 to-day."

Every reply to this question, exactly as received, has been given in the foregoing quotations. It is suggested that such unanimity is remarkable. There is only one dissenter, and he has a "doubt."

Is pecan growing profitable?

The first record we have of a transaction in pecans is that of William Prince, nursery man, Flushing, N. Y., who, in 1772, planted nuts which had probably been carried to New York by fur traders from the Mississippi Valley. Mr. Prince succeeded in raising 10 plants, eight of which, according to Brendel, he sold in England for 10 guineas each. No one has ever expressed a doubt that the operation was profitable for the vendor. The sale of "plants"—budded and grafted trees and seedlings—will always be a very paying part of the pecan business. So, too, will the sale of choice varieties, or forms, as they are more properly called, of the large, thin-shelled nuts for planting. The owner of the up-to-date commercial pecan grove of the near future will market his product, not necessarily in the shell, through commission houses, nut dealers or wholesale stores, but as prepared kernels in packages direct to the manufacturer or consumer. He may even become a manufacturer and produce those simpler and more popular nut candies and salted pecans for which there is an ever increasing demand, and thus add greatly to his income.

From the averages given in the foregoing replies, omitting fractions, it is evident that a budded pecan, under favorable conditions, will begin to bear profitably at the age of 7 years from the

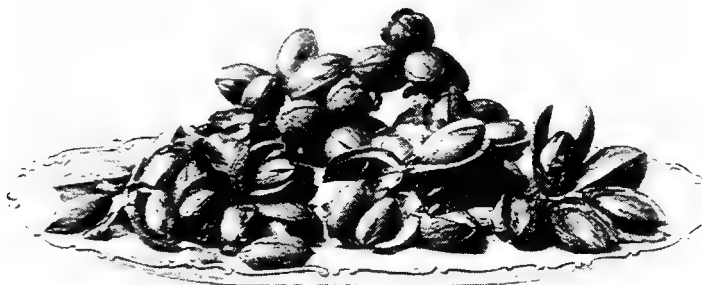


CULTIVATED PECAN

WILD PECAN

TWIG OF WILD PECAN

seed; that the first crop will be 4 pounds; the second, 10; the third, 20; the fourth, 43; the fifth, 74; and the sixth, 100 pounds. Trees may be set 50 feet apart, giving 17 to the acre; 35 feet apart, giving 35 to the acre; or even closer if on poor land where fertilizers must be used. The planting distance will be determined by the character of the soil and plans for interculture while the trees are small. In the alluvial river bottoms of Louisiana and other Gulf States, where the pecan finds all conditions exactly suited to its best growth, trees should not be planted less than 50 feet apart and the space between rows cultivated in cotton, or other field crops, until the trees shade the ground too much. Planting in excess of this would prove a serious obstacle to interculture and greatly shorten the time in which it might be carried on. But what is of more importance, indeed of vital importance, too close planting will surely prevent the trees from forming fine, spreading heads and so yielding the much larger quan-



PECANS IN HUSKS

tity of nuts which trees permitted to develop naturally are certain to give. Recent expressions of practical growers are decidedly opposed to close planting with the thought of "heading in" the tops; and the most successful planters favor permanent planting with abundant space for perfect development. Nevertheless, if as many as 35 trees to the acre were set at first on light, sandy soil, and it should be found necessary, after a time, to cut out part of them to prevent crowding and the consequent injury to the trees, those left would undoubtedly be benefited by having more room in which to expand, both above and below ground. The question of reducing the number of trees in an orchard is purely one for the skilled horticulturist to decide. It requires more courage to cut down large, bearing pecan trees than is possessed by the average grower. Yet, under certain conditions, the axe should be vigorously used, for the gain in growth and yield of the remaining trees will amply reward the owner for his seeming sacrifice.

The question of profit obtainable in pecan growing is of much interest to those who are being attracted to this business. The reports just quoted show that 24 cents is the average price for which the largest, wild nuts are sold. These are good nuts, some of them, but not for a moment to be compared with the finest of the thin-

CROPS THAT PAY.

shell kinds now approved by growers of cultivated pecans. Nuts such as would be produced in an orchard properly located, made and managed, will probably never sell for so little as 12½ cents a pound in the shell, or 30 cents a pound in kernels, the latter price being 30 per cent. less than the average price paid for pecan meats by the best retailers and manufacturers of confectionery, bakers, etc. But taking these prices as bases for an estimate, assuming that 17 trees, only, are set to the acre, giving a yield ten per cent. larger than the average reported, because having adequate space for root and branch expansion and consequently making more rapid growth; and allowing that three pounds of nuts in shell are required to make two pounds of kernels, the following estimate of yield, and income per tree and acre is submitted as conservative and sure of realization:

17 Trees to Acre (50 feet apart)	Nuts in shells, 12½ cts.			Nuts in kernels, 30 cts.		
	Pounds trees	Income tree	Income acre	Pounds tree	Income tree	Income acre
7th year, 1st crop	\$ 4.4	\$.55	\$ 9.35	\$ 2.93	\$.88	\$ 14.96
8th " 2d "	11	1.37	23.29	7.33	2.20	37.40
9th " 3d "	22	2.75	46.75	14.66	4.40	74.80
10th " 4th "	47.3	5.91	100.47	31.53	9.46	160.82
11th " 5th "	81.4	10.17	172.89	54.26	16.28	276.76
12th " 6th "	110	13.75	233.75	73.33	22.00	374.00
			586.50			938.74

While such a showing of profit should satisfy almost anyone, it would be easily possible for the pecan grower on a large scale to considerably exceed the highest estimate given. The energy and executive ability needful to make and maintain an orchard of say a thousand acres of pecans, could undertake, with the certainty of success, the manufacture and sale of its entire product in some of the popular but simple forms of confectionery, and, where fruit suitable for the purpose could be had, nitted marmalades and preserves would prove marketable delicacies of the most profitable kind. The combination of pecan growing and the lines suggested is perfectly feasible and should be seriously taken into account by those in position to do so.

Such results as those shown in the above tables are likely to make the northern farmer discontented with the comparatively paltry returns from his acres which, according to statistics of the Department of Agriculture, averaged in 1904, for corn, \$11.79; for wheat, \$11.58, and for oats, \$10.05. In the South the planter fared better with \$21.05 an acre for his cotton. But every Gulf State plantation might easily increase its revenue by planting pecans. The best cotton land is best for pecans, and the cultivation necessary for the southern staple is also best for the nut trees. Moreover, the planter who owns a few large, old pecans which bear undesirable nuts may remodel his trees and make them yield desired varieties. This operation calls for the removal of the larger branches and the budding or grafting of the new shoots. An unprofitable tree, thus

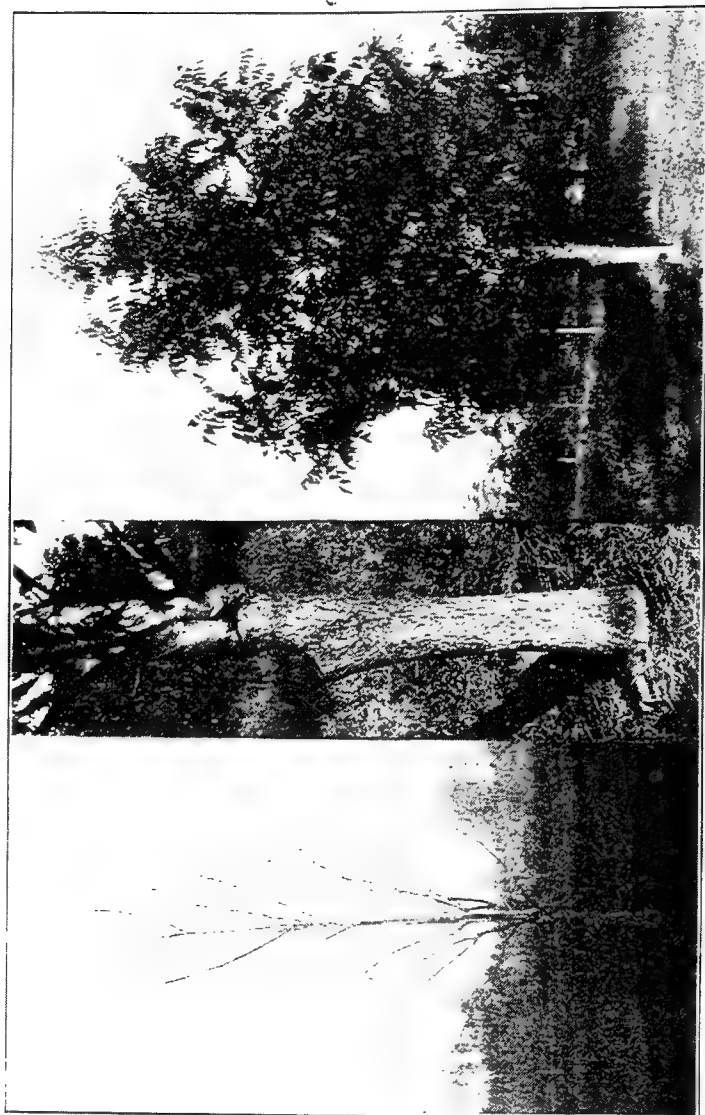
worked, will give nuts of the highest market value.

It will be urged as a reason for not planting pecans that years must pass before the time of the first harvest. That is true; but, after planting, the land on which the grove has been started increases in value each year as the growing trees approach the bearing age. Nor is it necessary to wait more than a single year for returns for, according to the character of the soil and facilities for transportation, other crops may be grown on the same land during the development period. And if such crops be selected with good judgment and rightly managed they will pay the cost of establishing the grove, and leave a substantial surplus.

Once established a pecan grove is a fixture, a heritage which will bring an unfailling income to successive generations. Subject to only trifling attacks from few insects or diseases, and these yielding readily to skilful treatment, the mature tree is practically indestructible. Splintered by lightning or felled by the axe of the nut gatherer who seeks in this manner to facilitate his work, new shoots quickly spring up from blasted trunk or stump, forming in time another tree. Several correspondents quoted in these pages have facetiously remarked that they "never knew a pecan to die a natural death." One reports the counting of "six hundred rings just to show what a Texas tree can do." All agree that the yield of nuts increases for 40 or 50 years, when the tree is thought to be full-grown, and that it lives for an indefinite period, probably for several hundred years, continuing to bear its valuable harvest of nuts. As indicating the size attained by some of the old pecans, it is recorded that a single tree has given 1,200 pounds in nuts in one year! Think of the value of that tree had its fruit been Frotscher, Van Deman, Stuart, or other of the highly prized forms, the average price of which is \$1.20 a pound!

The argument in favor of planting pecans may be thus summed up:

1. The pecan is a nut of unexcelled qualities. By many considered the best of nuts. Choice forms are
 - (a) Large in size; 24 to the pound; $2\frac{3}{8}$ inches in length.
 - (b) Thin-shelled; may be crushed in the hand.
 - (c) Full-meated; delicate in flavor.
 - (d) Highest in food value.
2. Demand constantly increasing. Price advancing. Supply diminishing, due to the inexcusable practice of cutting down large trees to more readily gather the nuts; and also to clearing forest land to make way for farm crops.
3. Crop increases for 50 years and continues for an indefinite period thereafter. Left to themselves nuts fall to ground; picked up; barreled and shipped. No expensive handling as with fruit, or as with some other nuts which require long drying, bleaching, etc., to prepare them for market.
4. Not perishable. May be stored for better prices, or sent to any part of the world without danger of spoiling in transit.
5. Owner of grove may sell product in shells, in meats direct



WINTER

SUMMER

FROM PHOTO BY H. M. HUME, FLA. AG'G. EXPERIMENT STATION

VAN DEMAN PECAN TREE

SEVEN YEAR TRUNK BEARING TWO YEAR TOP, SHOWING UNION OF TOP AND TRUNK.

to consumer, or he may manufacture the meats into simpler forms of confections and so enhance value of crop.

6. Good profits will come from sale of nursery stock—fine budded or grafted trees, or seedlings—and largest nuts for seed.

7. The pecan is a tree of unsurpassed value. Excellent for timber and fuel. Most valuable for its fruit. Graceful in form; of enormous proportions. Lives for centuries.

8. Costs little to establish and maintain grove of fine trees. Crops grown on same land will yield good returns while trees are maturing.

9. Important cultural points are well understood. Fine varieties are reproduced at will and with absolute certainty by budding and grafting. Field is new. First to enter sure to win rich reward.

10. Evidence from those long engaged in the industry establishes the fact that under favorable conditions the growing of pecans is a safe, permanent and very profitable business in which to invest capital; in short, the most profitable branch of horticulture in the South.

The commercial future of the pecan is full of promise. Grown nowhere in the Old World, nor in the southern half of the New, it is strictly an American product. With the fulfilment of its probable destiny, now near at hand, the pecan will have become "the leading nut on the American market."* None can then doubt its superiority, nor question its right to conquer new markets. Cherishing an ambition so reasonable as that suggested by this idea, and firm in the belief that what is good enough for Americans cannot be thought without merit abroad, the progressive cultivator foresees the time when the fruitage of his pecan trees

"Winds and our flag of stripe and star
Shall bear to coasts that lie afar,
Where men shall wonder at the view,
And ask in what fair groves they grew."

But that day is distant when the product of Southern pecan groves will be compelled to seek foreign shores for the market denied at home; and pecan growers may plant and till and patiently await the harvest with the gratifying assurance that the world is theirs to supply with this best of nuts which, like many another of life's good things, is exclusively American in origin.

*From "Nut Culture in the U. S." See page 7.

THE FIG *

(*Ficus Carica.*)

"And they shall sit, every man under his own vine and under his fig tree."—*Micah iv. 4.*

The great antiquity of the fig tree is unquestionable. The Bible contains the earliest references to it and many passages of Scripture mention it; the first notice being in Genesis, where Adam and Eve are described as sewing fig leaves together to make themselves aprons. In Deuteronomy the fig is mentioned as one of the valued products of Palestine. The spies who were sent out from the wilderness brought back clusters of grapes, pomegranates and figs. Mount Olive was famed for its fig trees in ancient times, and they are still found there. The old phrase for possession of a country was that every man should "sit under his own vine and under his fig tree." Throughout the Bible the fig tree and the vine are spoken of as the sign of prosperity. They typify peace and plenty; and the failure of the fig harvest is noted as a portent of affliction. The importance of the fig among staple articles of food in New Testament times is shown by the fact that in case of fire on the Sabbath day only three necessities of life were to be rescued, viz., a basket of loaves, a cake of figs and a jar of wine. Dried and pressed into square or round cakes and allowed to harden, the fruit was thus easily transported, forming ideal rations for soldiers. This method of treating figs was known in Egypt from very early times. Two hundred fig cakes formed part of Abigail's present to King David. To this day, in the East, dried fig cakes, strung upon cords, make an important article of commerce from Persia to India. The medicinal use of figs was known to classical and Arabic writers; Pliny has much to say of their value in this respect, and we find Isaiah prescribing a poultice of fig cake as a cure for Hezekiah's boils.

From the time of its first economic use in Eden the fig tree has been held in high esteem in all oriental countries, where it is still extensively cultivated. From its original home in Persia, Arabia and Asia Minor it has accompanied man in all his wanderings throughout the warmer parts of the earth, becoming, wherever introduced, one of the most highly prized fruits for its healthfulness and delicious flavor. Grown for home consumption everywhere, the fig is a staple article of diet in many parts of those countries bordering on the Mediterranean.

* Besides a brief account of the introduction of the Smyrna fig into California, this chapter has been written with special reference to the Fig in the South, where its culture in commercial orchards offers profitable use for capital in the development of one of the most promising of the many neglected industries in the Gulf States.



BY PERMISSION TEXAS AG'L. EXPERIMENT STATION

FIG ORCHARD IN THE SOUTH

A failure of the crop in any locality would be a serious calamity. In the Smyrna district of Asia Minor, in Greece, Italy, Algiers, Spain and Portugal the business of drying figs for export is one of great importance. The total yearly shipments from these countries considerably exceed 100,000,000 pounds. Much of the inferior fruit, such as is not suitable to dry and sell in packages, is disposed of for distillation and the adulteration of coffee. An excellent brandy is said to be made from figs.

In France, as far north as Paris, the fig is successfully grown, but only for consumption fresh, although the trees require much care on account of the severe winters in that latitude. In the south of England, however, are many large and very old trees growing in the open unprotected, yielding regular and abundant crops which are sold fresh at high prices in the London market. English gardeners make excellent incomes from potted figs, grown under cover, finding ready sale for the fresh fruit at very remunerative prices.

All figs may be roughly grouped as edible and inedible. The wild fig, or caprifig, as it is called, is rarely edible; but it is the ancestor of a numerous and noble race of edible figs which are classified as Smyrna figs and Domesticated figs. Of the latter more than 400 species have been described.

The cultivation of the Smyrna fig is practically confined to Asia Minor, Syria, Greece, Northern Africa and California, where it has very recently been introduced. It takes its name from Smyrna, city of Asia Minor, where these figs are packed in largest quantity and whence they are exported to all parts of the world. This is the edible fig of commerce, familiar to all in its dried form.

Domesticated figs include all kinds except the Smyrna and the caprifig. They are, with probably few exceptions, all seedlings grown from the seed of the Smyrna fig. For consumption fresh or for canning or preserving, many of the domesticated figs are fully as good as the Smyrna, but the latter is the best fig for drying, superior to all others in its delicious flavor when dried. The many varieties of figs grown in our Gulf States belong to the domesticated class, having been introduced by the early French settlers in Louisiana, just as the Mission and other domesticated figs of the Pacific Slope were brought to that region by the Spanish missionaries.

The fig, as we know it, is a sac-like, fleshy receptacle, open at the end opposite the stem, and bearing flowers on its inner surface. These are the only flowers produced by the fig tree, and to see them it is necessary to cut open the fruit. The opening, or "eye," is sometimes as large as a pea; often it is nearly closed, but enlarges somewhat as the fruit approaches maturity.

The different varieties of figs are distinguished by marked differences in the nature and arrangement of the flowers. Of the flowers there are four kinds:

1. Male, or staminate flowers, pollen-producing.
2. Female, or pistillate, perfecting seed only when pollinated.
3. Gall flowers, or imperfect female flowers, which have no function other than to serve as a breeding place for the "fig-wasp" (*Blastophaga grossorum*).

4. Mule flowers, also imperfect female flowers, which can neither perfect seed, shelter the Blastophaga, nor perform any other function.

The caprifig, or wild fig, bears all the kinds of flowers except mule flowers. It is the only fig having male flowers; it alone has gall flowers. Its stamens furnish the pollen absolutely essential in fecundating the Smyrna fig; and its gall flowers afford a breeding place for the Blastophaga, the sole agency by which the pollen can be transferred out of the caprifig and into the Smyrna fig. The process of pollination by means of the fig-wasp is called *caprification*.

The Smyrna fig has only female flowers. Were it not for the caprifig with its pollen producing flowers, and the Blastophaga, which is bred in it for the exclusive purpose of carrying that pollen to the pistillate blossoms of the Smyrna fig, the latter would be absolutely worthless. It would mature neither fruit nor seed.

Domesticated figs, comprising the hundreds of varieties so widely distributed throughout Italy, France, Spain, Portugal, the South of England and the Pacific Slope and Gulf States of the United States, and which supply the naturally edible fig, so long utilized by man, do not require caprification like the Smyrna fig; they mature their fruit regularly without pollination.

The interdependence of the Smyrna fig and the caprifig upon the instinctive act of the Blastophaga affords one of the most interesting examples of the wonderful way Nature accomplishes her ends.

According to a high authority, the Semitic name for fig means "the tree near which another tree is planted, or joined." This definition is not self-explanatory, but will be readily understood when the wonderful and very interesting method is described by which figs are pollinated through the instrumentality of a minute insect whose sole mission in life is to accomplish this act. Flowers of opposite sex are often borne on different parts of the same plant, or tree, often on different plants or trees; and the important part played by insects in transferring the dust-like particles of pollen from the male or staminate blossoms to the female or pistillate ones, and thus fecundating the latter, which otherwise would never mature fruit or seed, is well known, but it is doubtful whether in the whole range of natural economy there is such a remarkable illustration of this as in the case of the fig.

Caprification is described as follows by Prof. Hugh N. Starnes of the Georgia Experiment Station:

"In the base or false ovary of the gall flowers, which are merely degenerate pistillates, the egg of the Blastophaga grossorum or 'Fig wasp'—a minute insect—is deposited and develops to maturity. The wingless males emerge first and, with their powerful mandibles, cut into the flowers containing the female wasps, partially release them and impregnate them. The gravid females shortly complete the liberating process, and, being winged, at once seek to escape for the instinctive purpose of laying their eggs. They emerge from the eye of the caprifig after squeezing through the mass of pollen-covered anthers protecting the exit, and seek other fruit in which to lay their eggs. Naturally they would enter the nearest caprifig in the proper stage of development. But meanwhile if the caprifig containing the colony has been plucked from its stem and suspended in the branches of an adjacent Smyrna tree, the female, on emerging, forces her way in a fruit of the latter class, losing her wings in the process, and at once begins a frantic scramble around the interior, searching for the anticipated gall flowers in which to deposit her eggs. Failing, necessarily, to find them, and incapable of

again taking flight, she finally curls up and dies, heartbroken, but not until she and her companions have between them pollinated every female flower in the cavity with the plentiful store of pollen conveyed from the caprifig—thereby insuring the development of the fruit."

Thus the presence of the caprifig is essential to the successful cultivation of the Smyrna fig. The caprifig produces three fruit crops each year. The Blastophagas which over-winter in and emerge from the first crop find their entrance into the cavity of the Smyrna fig timed to a nicety and just when the pistillate flowers there are in the right state to receive the pollen with which the bodies of the visitors are covered. In the Smyrna district and elsewhere fig growers at the proper season cut figs from neighboring caprifig trees and hang them in the branches of the Smyrna trees, whose fruit the deceived Blastophagas at once enter and fructify. Hence the Semitic



BY PERMISSION

CAPRIFIGATION

U. S. DEPT. AG'L.

HOWARD, YEARBOOK FOR 1900, DIVISION ENTOMOLOGY

name "fig," which means "the tree near which another tree is planted or joined," referring to the act of caprifigation, as described. It is estimated that about 400 females breed in a single caprifig and that from 50 to 100 figs per tree are needed to pollinate the crop.

Seed of caprificated Smyrna figs, even when dried, will grow and produce new varieties. From this source it is reasonably certain came all of the many varieties of our Southern fig.

THE FIG IN CALIFORNIA.

When those latter-day crusaders, the Franciscan padres, carrying the standard of the cross, followed the conquering arms of Spain northwards from Mexico into our southwestern States and California, they everywhere established missions which became centers of government over a mixed population of Spaniards, Mexicans, half-breeds and Indian converts. The zealous mission fathers were good farmers, too, so they at once proceeded to teach their docile dependents the gentle art of husbandry by planting in the vicinity of every mission seeds and plants brought from old Spain. Among these were invariably the vine, the olive and the fig, all of which thrived in the new home where were found climate congenial and soil suited to their best development. The oldest fig in this country, called the "Mission," was thus introduced.

Many years later, when the power of the padres was gone forever, and when the feverish search of men for golden wealth in the mines had somewhat abated, it first dawned on the minds of the thoughtful few to exploit that greater and certain source of riches in the soil by growing those wonderful fruits, the goodness of which, more than anything else, has made California known throughout the world. The fig came in for its share of attention at this time; but after twenty years, unsatisfactory results with the domesticated fig, prior to 1880, growers became convinced that the varieties then being cultivated could not possibly produce a product which would compare in quality or commercial value with the Smyrna fig of commerce. Smyrna figs sold at wholesale in New York at from 10 to 20 cents a pound, while the California product would not bring more than 75 cents for a 10-pound box, and when the Smyrna fig arrived it was difficult to sell the others at any price. No argument is so strong with the consignor of fruit as the account sales, and California fig shippers soon reached the point where they must quit business or grow the Smyrna fig itself in California. Now the Smyrna fig, dried, is a better article than any other dried fig; no one questions this fact. But for canning, preserving or eating fresh, the Smyrna is no better than other good figs. Smyrna figs can not ripen nor produce seeds without caprification, therefore, wherever they are grown, the necessary caprifig and equally necessary Blastophaga or "fig-wasp" must be at hand. Other figs do not require caprification, and are not botanically fit to respond to pollination; they ripen perfectly, but never perfect seeds. And, since it has been demonstrated that it is the seeds of the caprificated fig which impart a rich, nutty, aromatic flavor and give it a marked superiority to other dried figs, it follows that for drying the Smyrna fig must remain without a rival.

The introduction of the Smyrna fig into California is a horticultural romance. The first attempt was in 1880, when the proprietor of the San Francisco Bulletin, Mr. G. P. Rixford, with the aid of the United States Consul at Smyrna and an American merchant there, imported about 14,000 cuttings of what were supposed to be the best varieties of Smyrna fig trees. These were widely distributed, but when the trees began to bear the fruit always dropped off on or before reaching the size of a marble. The generally accepted ex-

planation was that the Smyrna fig growers, fearing American competition, had sent worthless varieties.

Six years later Mr. F. Roeding, a San Francisco banker and nursery proprietor, sent his foreman to Smyrna to buy cuttings. He was suspected and watched by the people there and many obstacles put in his way, but he finally succeeded in securing several thousand Smyrna fig cuttings, and some caprifig cuttings as well. These arrived safely and were planted near Fresno in 1888, 1889 and 1891, making about 60 acres in all.

At this time there was a decided difference in opinion among investigators on the subject of caprifigation. A publication of the Department of Agriculture, issued in 1891, had this to say: "Now that caprifigation, or artificial fertilization, of the fig through the agency of insects has been fully investigated by the Italian Government and proved to be a myth, it is plain that we have only to seek the right varieties for drying to make the business a success, and no doubt we already have some of these." Nevertheless, the importation of the wild, or caprifig, cuttings at this time was the most important step which had yet been taken towards the solution of the problem. This importation was due to the tardy recognition of the fact that the peculiar flavor of the Smyrna fig is directly caused by the many ripe seeds it contains and that these ripe seeds are the result of caprifigation.

In 1890 there were caprifigs in bearing and Smyrna figs ready to be fertilized, but no *Blastophagas* were available to serve as pollen carriers, so at the Roeding orchard, artificial fertilization was resorted to with the result that four Smyrna figs were produced that year. To accomplish this a quill was used to draw the pollen out of the caprifigs and introduce it into the young Smyrna figs. The year following, by means of a specially formed glass tube, the second artificial fertilizing gave a crop of just 150 fruits in the same orchard. And then, we are told that Mr. Roeding, who must have found something encouraging in the blowpipe method, at once planted 20 acres more in 1892, making 80 acres in all. The quality of the artificially caprifigated figs was good and the success of the process proven. In the meantime Dr. Gustav Eisen, probably the best authority on fig culture among scientific men, had conclusively established the importance of *Blastophaga* fertilization. From now on it was merely a matter of importing the minute insect with the big name, inducing it to breed in California caprifigs, and undertake on a large scale, its wonderful service on behalf of Smyrna fig growers there. This state of affairs led to the co-operation of Prof. H. E. Van Deman, then Pomologist, and Prof. C. V. Riley, then Entomologist of the Department of Agriculture, in the importation of cuttings of various kinds of wild and cultivated figs from Turkey and elsewhere, for experimental planting in this country; and the practical work of introducing the *Blastophaga* by the department was begun.

For almost ten years the record was one of discouraging failure. Nothing had been accomplished. Orchards of Smyrna fig trees in California; *Blastophagas* still in Asia. At last, in 1899, a consignment of caprifigs (the fruit) containing *Blastophagas* was

received by the department and sent at once to Mr. Roeding. All the caprifigs were cut open and placed under a caprifig tree, which had been closely covered with thin cloth. Although this experiment was expected to turn out bad, like the others, the results were surprisingly successful. The liberated Blastophagas left the imported caprifigs and sought shelter within the fruits of the tented tree, laid their eggs there, over-wintered, and next year the colony had become established with the gratifying result that the Roeding orchard in 1900 bore from twelve to fifteen tons of good Smyrna figs.

In this manner was established the important Smyrna fig industry in California, the extent of which is best appreciated when one is told that the shipments of California dried figs at the present time approximate 600 carloads of 10 tons each, or 12,000,000 pounds yearly.

THE FIG IN THE SOUTH.

The fig tree is common in many localities in the Southern States. Its rich, luxuriant foliage of broad, deeply-lobed, rough leaves, makes it an attractive object in the landscape, one that is sure to catch the eye of the visitor from the North. It adorns the lawns and gardens of the rich and is seen beside the negroes' cabins. Wherever the soil is adapted to its growth it thrives without care, often in spite of neglect, bearing abundant and regular harvests of delicious fruit, than which there is no more agreeable, wholesome and nutritious food. From Texas to Florida in those States which border on the Gulf of Mexico it flourishes; and up the Atlantic Coast, as far as Philadelphia, some of the hardier varieties which will stand considerable frost without harm, may be safely grown if given moderate winter protection.

The fig tree is easily propagated, usually from cuttings. It grows rapidly. Precocious cuttings will sometimes set fruit the same season they are planted and give a small crop the second year. From the third year on it is a prolific bearer and lives to a good old age. Trees 30 to 40 years old are still vigorous. From the attacks of insect enemies and from disease it is singularly free. It requires little cultivation after the second year and need never be pruned. The bush, or shrub, form of growth is preferred in the South, while in California the central stem is trained to become the supporting trunk of a spreading top—the true tree form. The shrub form ensures the quickest product of fruit in a minimum time and, in the South, has certain cultural advantages, as well.

Figs are mostly used for home consumption. Besides being served fresh with sugar and cream as dessert, they can be stewed and made into puddings and pies. Canned or preserved or made into marmalade containing pecan kernels or the meats of other nuts, they become an acceptable delicacy for the table throughout the year. Figs make good pickles by adding spices and vinegar. "Skinless figs, spiced figs, brandied figs," names from a dealer's list, are self explanatory. Other uses for figs in the household are known to all good cooks throughout the South. A serious writer, speaking of home uses for figs, says: "Their value as food for pigs and chickens should not be forgotten. Both are very fond of them,

and in many places the waste figs form an important item of their midsummer diet. In fact no cheaper food can be grown for them." This, at least, is valuable evidence of the cheapness of fig production; and the pigs and chickens are surely no worse because they are fond of such delicacies. But the foreign fig growers can teach the Southern orchardist, for here is what is done with the refuse of the fig market in Mediterranean countries: "All inferior fruit from places where first class figs cannot be produced, finds its way to the Austrian 'chicory coffee' makers, or to the French distilleries, in which latter places figs are converted into fine champagne, wine, cognac and vinegar. The liquor known as annisette is made in Spain from figs, also the ardent spirit aguardiente." It is even rumored that a certain brand of Vienna coffee, famous for its fine flavor, owes its reputation entirely to an admixture of roasted figs. Here is a sug-



BY PERMISSION TEXAS

FIGS IN BOXES

AG'L EXPERIMENT STA.

gestion for some wideawake coffee concern—fig coffee! But this is a matter for industrial enterprise rather than for the fig grower.

French and English gardeners, with much care, and no little cost to over-winter their trees, have long been able to supply the markets of Paris and London with fresh figs at good profit. Should our gardeners near large cities go in for fig culture, they would at first find but small demand for the fresh product. Few Northern people know any other figs than dried figs. Of these we import yearly 11,000,000 pounds besides consuming as many pounds more

produced in California. But fresh figs are practically unknown in the North. Rarely are they seen, even in the best fruit stores of our largest cities. There are two reasons for this: Ripe figs are not good shippers. They are very soft and delicate. Only the most careful packing and prompt use of the varieties now generally grown will prevent the fruit from souring, or worse, after about 36 hours. An enterprising Texas grower shipped a consignment of fresh figs to Chicago. The commission firm wired back, "Fruit arrived in good condition. What are they?" Before a reply could be returned the figs spoiled. If another reason were wanting it is found in the fact that the unaccustomed palate must be educated to like fresh figs, just as most folks must learn to like such good things as fresh tomatoes, olives and pomelos. But the liking is not hard to acquire, and when acquired it endures as one of the palate's strong cravings, and with good reason, for the ripe fig served with sugar and cream is one of the most delicious desserts, with a flavor so delicate and agreeable that few fruits can compare with it.

The case is different in the South. Few, indeed, are the Southerners in those localities where fresh figs may be had who are not fond of them; and as for the Southern darkey, it would be as easy to find one without an ever-present, unappeasable hankering for figs as it would to discover one with a natural loathing for watermelon on the Fourth of July, or 'possum and sweet potatoes at Christmas. Yet in the face of this condition Southern local markets seldom afford the Southern housekeeper an opportunity to buy enough for household use to can or preserve, although the fig may be grown with the greatest ease nearly everywhere in any of the Southern States.

Of fig orchards in the South there are almost none, certainly none on a commercial scale at all comparable with commercial orchards of other fruits. In California figs are grown chiefly for drying; but in the South, on account of the humidity in the air, it is not practicable to dry the fruit. Nor has evaporating proven more successful there than open air drying. In some other direction, then, must the grower of figs in the South seek a market for the product of his trees, a product that is obtained more easily and at less cost than peaches or apples can be grown. The solution of this problem lies in the operation of canneries. By this means all fruit which may not be satisfactorily sold fresh can be saved from decay at small cost and become a source of great profit. The taste for canned figs does not have to be acquired; every one likes them from the first acquaintance. This fact has led a few canning establishments on the Gulf Coast of Mississippi and in Louisiana, whose chief business is the canning of oysters, shrimps and vegetables, to put up a small, but yearly increasing quantity of figs, canned or preserved, for which there is always ready sale at good prices.

How ridiculously small is the quantity may be seen by a comparison. During the last census year 1,142,327,265 pounds of vegetables were canned in the United States, valued at \$56,668,313. Tomatoes, of which there were 626,438,753 pounds, valued at \$13,666,560, heads the list, with corn, peas, beans, pumpkins, sweet potatoes, succotash and okra following in the order named. Of canned fruits

during the same year, there was a total of 293,637,273 pounds, worth \$11,311,062, of which peaches led, with 104,353,640 pounds, valued at \$4,283,165.

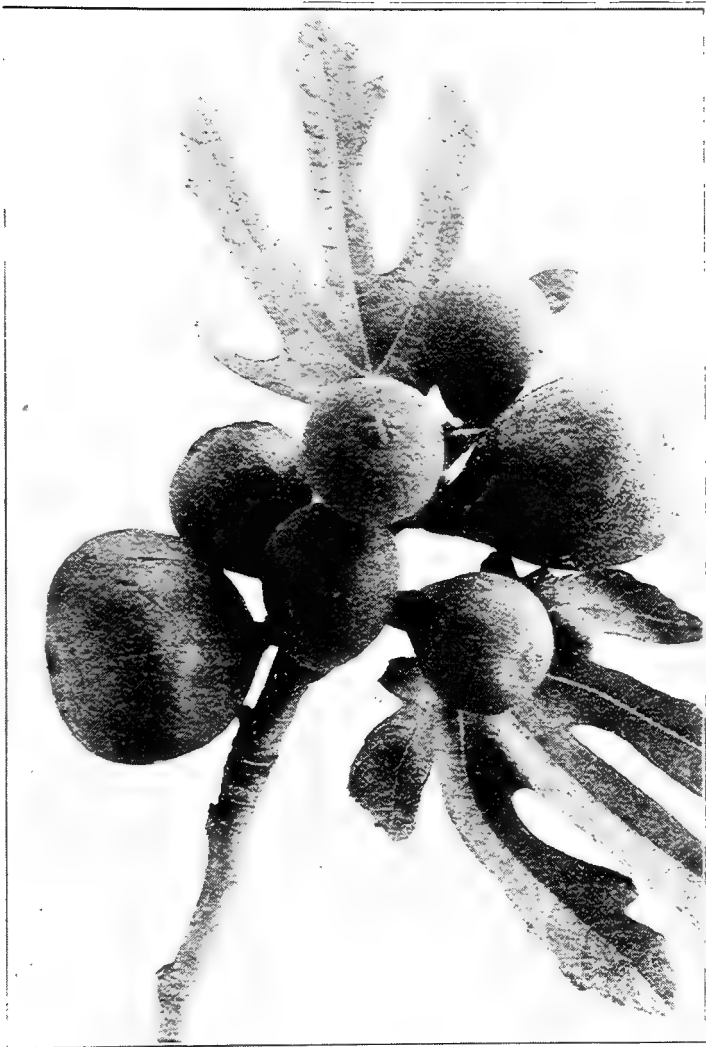
The output of canned figs averages 250,000 pounds a year, and during the same twelve months we consume 25,000,000 pounds of dried figs!

Put a business proposition in the form of a question: If the consumption of canned tomatoes yearly amounts to 626,000,000 pounds, and the consumption of canned peaches yearly to 104,000,000 pounds, why should not at least 100 times more than the comparatively insignificant one-quarter of a million pounds of canned figs find willing buyers in our always widening home market? If the reply to this question should be another inquiry: Why haven't clever business men gone into this seemingly attractive proposition? the answer would be: Why has the South clung to cotton growing to the exclusion of diversified farming with its greater safety and assurance of profit and neglected those special crops of kinds so well suited to her climate and soil? That the South *has* long neglected her splendid opportunities is known to all; and that the growing of figs for canning is one of the most important of these neglected opportunities is admitted by all who have given the subject serious study. But why should the farmer plant fig trees without someone waiting to buy his fruit? Why should the man with means build a cannery to can fruit that may never be grown? Useless each without the other. And so it has come to pass that few figs are grown and few canned where there should be millions of pounds put up and sold, as will surely be the case when this undeveloped resource of the South shall be properly exploited.

The successful grower of figs in the South must establish his orchard where soil and climate are favorable to the best growth of his trees; he must plant those varieties which have been proven best for canning and eating fresh; be near good local markets and within easy reach of canneries where he can cheaply deliver the bulk of his product.

A publication of the Department of Agriculture says: "In Louisiana figs do especially well, requiring no care or cultivation, and fruiting abundantly. In the pine lands of Mississippi, Alabama, Georgia, Florida and South Carolina they require more attention in the way of fertilizing to produce the best results. In Southern Texas, too, they succeed admirably." All varieties do not require the same kind of soil, but most do best on well-drained, very rich land. Any good land capable of growing a bale of cotton to the acre is well suited to the fig.

The planting of fig trees among other orchard trees is recommended. They might be planted along with peach, or pear trees with good results. An ideal combination for the orchardist, or syndicate, on a large scale, would be a combined pecan and fig orchard, with cotton between the rows. The best cotton land is best suited to both kinds of trees. The pecan has a long tap root which goes deep into the ground, while the root system of the fig tree lies always near the surface. The fig trees should be planted between the pecans in one direction only, and parallel with the lines of tillage.



FRUITING BRANCH OF FIG TREE

When one year old trees are planted the first crop of figs will come in the second year; when cuttings are planted, in the third year. With cotton for interculture, giving annual crops, needing the kind of cultivation most beneficial to the growing pecan trees, and fig trees beginning to bear paying crops in the third year, such an orchard would be profitable from the very start—very profitable, indeed, if capably administered in connection with a canning factory controlled by the same management. There is a number of marketable forms in which figs and pecans are prepared, separately and combined and there exists no good business reason why the grower of these crops on a large scale should not be manufacturer, too, put up the entire product of his own orchard, and gain thereby much additional profit. Of course, in an orchard of this kind the growing of cotton would have to be discontinued when the pecans begin to bear; and the fig trees would have to be thinned out and eventually all removed, but this would be only after many years, when the pecan trees become so large as to require all the ground.

The planting distance of fig trees varies greatly, depending on kind of soil and variety grown. From 50 trees to the acre to 200, or more, are approved by growers; the larger number being recommended for light soil. Planted 30 feet apart, there would be 50 trees to the acre, permitting unhampered interculture; or the same number could be planted on an acre among pecan trees with the intention of thinning out the fig trees at the proper time.

A bushel per tree for each year after the second is a common way to estimate the yield of figs. That is 1 bushel in the third year, 2 bushels in the fourth, and so on with the maximum yield in the 10th or 12th year. The well informed assert that the first ten crops, from third to twelfth year, inclusive, should average 150 pounds per tree each year, and this is really a very conservative estimate when all conditions favor the best results. There are old trees which bear from 500 to 1,000 pounds each.

A well known canning company has made a standing offer of five cents a pound for all the fresh figs it can get, although the general practice of canners has been to buy on the market and pay considerably more than this price when figs were not plentiful. From an unquestioned authority comes this statement: "Five cents a pound is low and affords big profits when preserved. Any canning factory will pay this—bone fide."

Allowances should always be made when estimating for the guidance of investors. In view of the facts, as above, a statement of profit obtainable from fig growing would be thought reasonable if based on planting 100 trees to the acre, yielding an average of 150 pounds per tree, at 5 cents a pound. But at the risk of erring on the safe side the following table of yield and income is based on 50 trees to the acre, an average of only 94.5 pounds per tree, and 4 cents a pound for the product:

THE FIG

41

Year.	Pounds—tree.	Income—tree.	Income—acre.
3	10	\$ 40	\$ 20
4	20	80	40
5	40	1 60	80
6	80	3 20	160
7	95	3 80	190
8	115	4 60	230
9	135	5 40	270
10	150	6 00	300
11	150	6 00	300
12	150	6 00	300
Averages.... 94.5 at \$.04=		\$3 78	\$189

That this is a safe estimate, even for a small orchard, whose owner must depend wholly on selling his fruit to the local cannery, is a conclusion warranted by the expressions collected by the writer through much correspondence and not a few personal interviews with growers, canners and dealers in several States. By planting more trees to the acre there should be a proportionate increase of income; and by selling part of the product in local markets, whenever better prices can be had by so doing, the profit should be still further enhanced. But these advantages, and more, would accrue to the proprietor of a large commercial orchard should he also operate his own canning plant. Such a combination would make an ideal enterprise, one which, if managed with wisdom and energy, would surely realize profits greatly exceeding those in the above estimate.

There is scarcely a limit to the quantity of good canned figs which might be sold not only at home, but for export. The present price for the few canned goods on the market is much too high to encourage general use, and dealers agree that the lowering of the price would bring greatly increased sales. The figs can be grown at small cost, canning is not expensive, and the product would find ready sale at good profit; therefore, all conditions favor the success of the industry. The history of the introduction of the Smyrna fig into California, and the remarkable success which immediately followed, shows what persistent and well-directed effort can accomplish. But no such obstacles will be met in our Southern States, where the drying of figs is not practicable on account of the moist climate. It is in the growing of figs for consumption fresh, but especially for canning, that the South offers one of the richest fields for capital and enterprise along the lines suggested in this chapter.

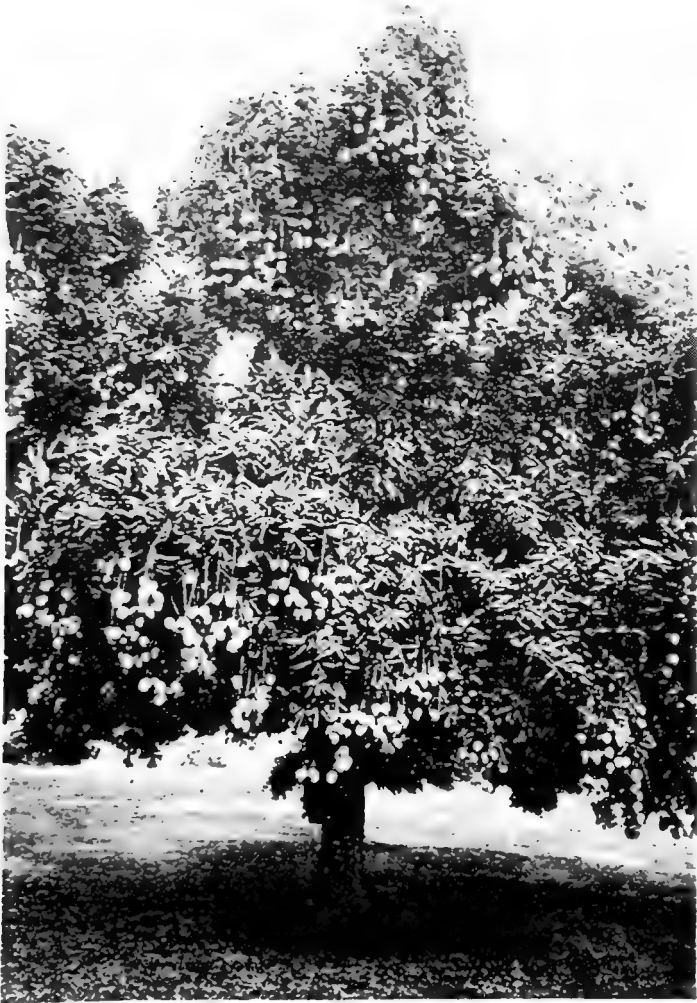
THE MANGO

(*Magnifera Indica.*)

The mango, justly regarded as one of the most interesting and useful trees of the warmer parts of the globe, is a native of Southern Asia, especially of India, where it has been known from a remote epoch and where it is still extensively cultivated. In the new world the mango first appeared in Brazil, whence it was soon brought to Central America, Mexico and the West Indies, reaching Jamaica in 1782. "In 1782 Capt. Marshall, of Lord Rodney's squadron, captured a French vessel bound from the island of Mauritius to Santo Domingo, that had on board many valuable plants, among which was the mango, said to have been in the form of grafted stock. These were planted in the botanic gardens of Mr. Hinton East at Gordon Town, Jamaica. Two kinds—one labeled No. 11 and the other No. 32—have since been known by these designations, No. 11 being one of the most popular varieties in Jamaica at the present time." Nearly 100 years later, or in 1877, the first mango trees were grown in Florida at Point Pinellas from seed brought from Jamaica. These early plantings were successful. The trees grew fast, came into bearing very young and their fruit brought high prices. As a result, the mango was planted quite extensively in central Florida, then the scene of the State's most substantial development. But experience soon taught growers that profitable culture of this newcomer from the tropics, and some other kinds of fruit equally sensitive to frost, could only be safely undertaken in the southern part of the State, especially in Dade County. There, in the vicinity of Miami, and southward, in that small, but climatically favored region, the only part of the United States where certain kinds of the more delicate sub-tropical fruits can be grown to perfection, mango culture has passed the experimental stage and the new industry is destined to soon become one of the best paying branches of fruit growing.

But what is the mango? How does it taste? How does it grow?

The high esteem in which this fruit is held throughout the tropics is admitted by all travelled Europeans and Americans. Wherever really good mangoes are produced they outrank in popularity both the orange and the banana. Two hundred and thirty million inhabitants of India consider it the best fruit in the world; and many outside of India who have tasted the very best kinds agree with this verdict. On the other hand there are not a few who think differently. This difference of opinion is easily explained, since mangoes may be sharply classified as good mangoes and mangoes that are "not good." The former have been produced through centuries of selection and cultivation of the best varieties in India, where the mango first attained its best estate. These varieties are propagated only by budding, grafting and inarching, methods which are well understood and now practised in mango culture in



ONLY PART OF TREE SHOWN.

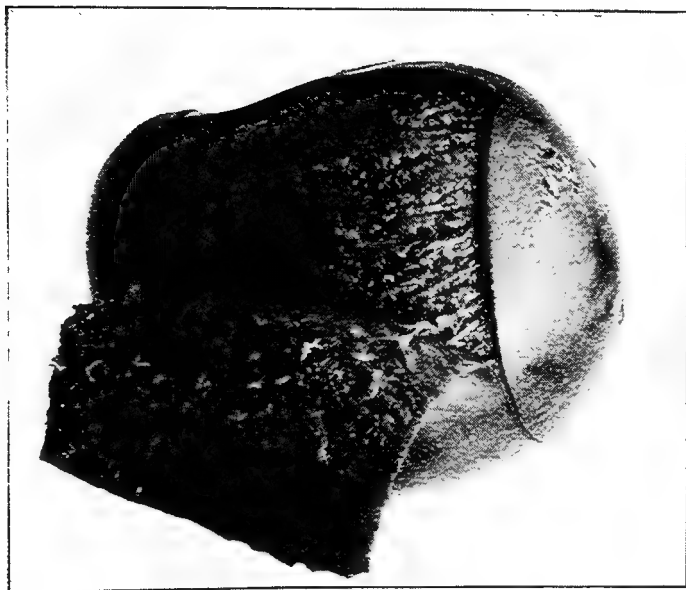
ESTIMATED YIELD 5000 FRUITS

JAMAICA MANGO TREE

Florida. The extent of mango culture in India is shown by the number of varieties, of which 500 have been listed there. Of these 100 are characterized as "good." The inferior sorts are the common, or jungle, mangoes and are seedling descendants of the native or wild trees of India. Such have been aptly described as "a mixture of tow and turpentine," because of the mass of tough fibres which is attached to the seeds and distributed in greater or less abundance throughout the resin-flavored pulp. Now tow is not good "eating," nor is turpentine good drink; therefore it would seem that the objection of some folk to the common, or turpentine, mango is but reasonable and what might be expected, although the mango lover unhesitatingly pronounces it better than no mango at all. This inferior mango comes honestly enough by its turpentine flavor, for a near relative of *Magnifera Indica* is the very tree which yields turpentine; but why the fibre, or "tow" is one of those things which passes human understanding. In its physical characteristics the common mango differs more widely from one of the better varieties than does a clingstone peach from a freestone. The eating of such a mango calls for the exercise of rare skill, coolness and good judgment, especially if the act be performed in public, so elusive and uncontrollable is the fibrous, pulp-enveloped seed when one tries to eat the fruit out of hand. It is not recorded that anyone ever succeeded in doing this to his own satisfaction without the comforting knowledge that an immediate bath and a convenient dentist awaited him—the former to remove all external traces of the deed, the latter to extract the fibre from between the eater's teeth. How different is the really good mango, a luscious "Mulgoba," or an indescribable "Alphonse," as the best two varieties are named. A writer of imagination says: "Compare the untidy act of sucking the rich and spicy pulp from its mass of slippery, oozy fibre in a seedling or jungle mango with that of dipping with a spoon from the 'half shell' of a firm, beautifully colored peel of a 'Mulgoba,' its smooth, delicately blended, aromatic, custard-like pulp as the modest feminine does the sparkling ices from a golden sauce dish." Surely the characterization of a good mango is in that sentence. An official account of the "Mulgoba" mango in the Yearbook of the Department of Agriculture for 1901 will serve to describe the better varieties generally. It reads: "Fibre scanty, fine and tender; flesh rich, apricot yellow, very tender, melting and juicy, sweet, rich, fragrant; quality very good. The Mulgoba surpasses in flavor and quality the seedlings previously grown, but its most distinctly marked features of superiority are the tenderness of flesh and absence of the objectionable fibre and strong turpentine flavor common to most of the seedlings grown in this country." It is the absence of "tow and turpentine," and the presence of the indescribable flavor that distinguishes good mangoes from others.

The mango tree and its fruit are subjects about which travellers in the East have written interestingly.

Elphinstone, the famous historian of India, says, "The mango is the best fruit of India, at once rich and delicate, and all other fruits are dull and insipid beside its intensity of taste. There is something in it that is nothing less than voluptuous."



BY PERMISSION

MANGO PARTLY PEELLED

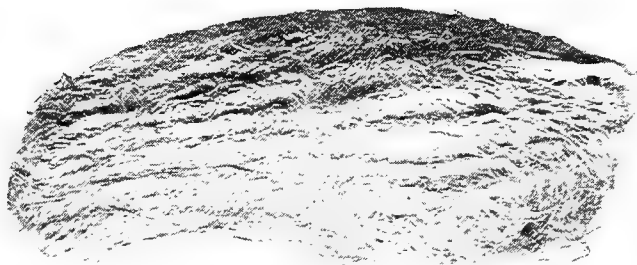
U. S. DEPT. AG'Y.

COLLINS, BUL. 26, BUREAU PLANT INDUSTRY.

Mr. Kirk Monroe, the author, on a trip around the world in 1903, wrote home:

"Everywhere from Tuticorn to the high foothills of the Himalaya, and from Bombay to Calcutta, the mango tree, stately, wide-branched and luxuriant, lining the dusty roads or shading the mud-walled, palm-thatched, native hovels, is an ever-present feature of the landscape, and in its season, which is the same as in South Florida, viz., from May until August, all native India finds in the mango a welcome addition to its scanty menu. At the same time, save in a few widely scattered localities, and notably in the vicinity of Bombay, the mango must grow as it can without the least assistance in the way of cultivation or fertilizer from the proprietors of the soil. As a result, the ordinary mango of India is as much a thing of 'tow and turpentine' as is the same fruit without intelligent supervision in the West Indies or South Florida. Only in the vicinity of Bombay did I find mangoes receiving a certain amount of intelligent treatment, and even there so little is done that one regards with amazement the results achieved. Selection, propagation by the clumsy and antiquated method of inarching, irrigation during the dry season, and in a few cases a scanty supply of stable manure, applied once a year. That is all; but the result is the production of more

than twenty varieties of the finest fruit in the world, absolutely free of turpentine and tow, full-meated, luscious, exquisitely flavored, of great size, having small seeds, and of exterior coloring as richly varied and attractive as that of the American apples. The Bombay mango has thus become *the mango* of India, and it is shipped to all parts so far as transportation facilities will allow. Of the better Bombay varieties the 'Alphonse,' in native vernacular the 'Abooz,' is easily the best; but we already have it, as well as the Mulgoba, in South Florida. If we can obtain and domesticate the Cowassje, the Pirie, and the Bottle varieties, as well, we shall be thoroughly equipped for supplying our own market with as good mangoes as can be grown."



BY PERMISSION

MANGO SEED

U. S. DEPT. AG'L.

COLLINS, BUL. 28, BUREAU PLANT INDUSTRY.

Mr. Monroe's Florida home is near Coconut Grove, south of Miami, where his grove of citrus and tropical trees has been for years the show place of that section.

A government expert on tropical and subtropical fruits writing in Bulletin No. 1, issued by the Division of Pomology, U. S. Department of Agriculture, says, "Next to the finest varieties of pineapples, and perhaps also the mangosteen, there is no more delicious fruit in the world than the mango."

Mr. O. F. Cook, Botanist in charge of Investigations in Tropical Agriculture, writes in the U. S. Yearbook for 1901: "The better varieties of mangoes stand in the highest rank of tropical fruits."

Woodrow, writing of the "Alphonse," the most noted of mangoes, says: "It is universally admitted to be the best of all mangoes. In flavor its fruit is indescribable; it seems to be a subtle blending of all agreeable flavors."

Such distinguished testimony as the foregoing in favor of the mango should convince anyone that this new fruit from the tropics is worthy of at least a fair trial on its merits. The quantity of good mangoes produced in Florida so far, has been very small. Indeed, prior to 1899 there were no budded or grafted trees in the

State, only seedlings of the common, or turpentine mangoes having been grown up to that time. The high grade fruit has practically all been consumed in the localities where it was produced, so that really none but the poorer varieties have found their way to a few northern cities in the sample lots occasionally shipped from Florida. The result of selling these inferior kinds has, no doubt, been to create an unfavorable impression among those persons who tasted the fruit, which only the introduction of the better varieties will eventually dispel. An interesting illustration of the favorable reception which awaits the improved mangoes now being grown, was reported to the writer in a recent letter from Mr. M. S. Burbank, of Florida, an expert mango propagator: "I think this mango (the Mulgoba) will be liked by most people when first tasted. A friend of mine who grows mangoes, had a lot of Mulgobas sent to him in North Carolina last summer. Twelve persons were present when we opened the box, and all but one one of them pronounced the fruit the most delicious they had ever eaten."

The mango has a firm foothold in England, and the demand there for it is increasing yearly, the only present source of supply being far away India. This, at least, demonstrates the shipping qualities of this fruit, and incidentally indicates that the market for the mango in the United States is likely to be a good one in the near future for all the mangoes that can be produced in the extreme south of Florida, to which its culture is necessarily limited for climatic reasons.

In view of the facts, we may readily accept this statement by Lyster H. Dewey, Acting Botanist in the Office of Botanical Investigations and Experiments, Bureau of Plant Industry. It occurs in the preface to the comprehensive Government publication, "The Mango in Porto Rico."

"The mango is as yet little known in the United States, having been represented in our markets only by fruit of inferior varieties. These give no suggestion of the qualities of the better sorts, and tend rather to discourage than increase the demand. If an effort similar to that which brought the banana into favor in the United States, could place an adequate supply of good mangoes before the public, there is no apparent reason why this new tropical fruit should not repeat the history of its now popular predecessor." The importation of bananas now amounts to about eight million dollars a year. Truly a promising outlook is here for Florida mango growers should this remarkable prediction be but partly realized.

The mango is an evergreen. In Florida it varies in height from 30 to 60 feet. It forms a dense dome-shaped top with a spread equal to about one-half the height of tree. The leaves are lance-shaped, about 10 inches long and two or more wide, with a smooth and shining surface. The young leaves are first pink, then red before turning green. The bark is gray and smooth. Its flowers are reddish white and not particularly attractive. They are borne at the end of the branches.

The fruit may be red, green or yellow, beautifully blushed with red, sometimes dotted with little black or brown spots. A striking peculiarity is the long willowy stem. The mango is usually kidney-

shaped, but sometimes spherical, again long and narrow like a cucumber, crooked or straight. It varies from two or three inches in greatest diameter to three or four times that size, and in weight from one to four pounds, or more. The pulp is yellow.

The entire tree, wood, leaves and fruit, have a sweet, resinous smell which suggests turpentine, but after a few trials it becomes an agreeable fragrance. In India every part of the tree serves some economic purpose, while the fruit possesses medicinal value of an unusual range, if we may believe the account in Watt's Dictionary of the Economic Plants of India. A summary of its uses would make a long list. Here are a few:

The wood of the mango is white and soft and of little value in manufacturing; but it is highly prized for burning with sandal wood in cremating the bodies of great personages. The bark yields tannic



BY PERMISSION

FRUITING BRANCH OF MANGO TREE.

U. S. DEPT. AG'L.

GARDNER, REPORT OF PORTO RICO AG'L. EXPERIMENT STATION, 1902.

acid used in tanning, and a resinous gum which is sold as a substitute for gum arabic. The leaves and bark yield a yellow dye; and a permanent black dye is made of mango bark with that of other trees. Mixed with lime and beaten the bark produces a "fleeting" green dye which, by adding tumeric, becomes a bright rose-pink. Indian yellow, a familiar water color paint, is an indirect product of mango leaves. Until very recently the origin of this coloring matter was unknown, the process by which it was produced being a guarded secret in India.

The ripe fruit is not only a delicious dessert, but a wholesome food highly recommended for its medicinal qualities. It is considered to be "invigorating and refreshing, fattening and slightly laxative and dipurative." But the rind and fibre, as well as the unripe fruit, are acid and astringent. One of the most popular prep-

arations is made by drying the unripe fruit. In this form it is considered the best antiscorbutic, curing scurvy, it is said, when lime juice and all other remedies have been tried in vain. The unripe fruit, roasted, dissolved in water and made into sherbet with sugar, is thought to prevent sunstroke; and the pulp is rubbed on the body for the same purpose. The kernel of the seed and the blossom and bark, as well, dried and made into a powder, are a valuable astringent, and much used in treatment of dysentery and diarrhoea. Steeped in water and reduced to a paste, the kernel is a remedy for burns and inflammations of the skin. The gum-resin from the bark when mixed with lime juice or oil is used in scabies and cutaneous affections. A fluid extract of the bark is useful in hemorrhages of the lungs. A gruel made of the seeds is effective in treating asthma and the smoke of burning leaves cures throat affections. The calcined midribs of the leaves are said to remove warts from the eyelids. But perhaps the most curious use for the mango is in time of plague, or cholera, when the Hindoos make a confection of the baked pulp of the unripe fruit mixed with sugar, which they eat and also apply externally by smearing it all over the body. It is well known, however, that the ravages of the plague have not been stayed among the class likely to make use of this preventive.

Mangoes are eaten unprepared, or they may be peeled and sliced and served with wine or brandy, sugared and spiced. Young, green mangoes make excellent pickles. Mangoes stewed have been pronounced "as good as peaches." Marmalade and jelly of superior quality and attractive appearance are made from them; and a very delicious dish can be prepared by baking the unripe fruit, well piled with sugar, in a slow oven. Mangoes form one of the chief ingredients of chutneys, large quantities of which are imported into the United States and England from India.

While it is not likely we shall ever emulate the Hindoos in the many uses they find for the mango, it is certain that this new fruit will become as familiar in our homes as are any of the other fruits now in common use among us. On its merits as a fresh fruit, it deserves to be as popular as the orange or the banana, and the writer doubts not that time will see this prediction fulfilled.

The growing of mangoes in the United States is necessarily limited to Southern Florida and to the frostless belts of Southern California. Florida has made a good start, many trees have been planted and the best methods of propagation are successfully practiced. There is no thought among orchardists there of planting any but the budded, grafted or marched trees, which will always do what seedlings will not, viz., certainly bear the desired fine varieties of mangoes. Transportation is in favor of the Florida grower, and against the California competitor. When the supply shall be adequate, Florida mangoes will be largely shipped to Cuba and other of the West India islands as well as throughout the United States and to Europe. But that will be far in the future, for the demand at home will be greatly ahead of the supply for many years.

With such an encouraging outlook, the profits of the Florida mango grower may be almost counted in advance. Nor need these

be a mere matter of conjecture. In a Bulletin of the Division of Pomology on the Condition of Tropical and Semitropical Fruits in the United States in 1887, we are told that prior to 1886 all mangoes sold in Florida brought from \$2.00 to \$5.00 a hundred. The same publication relates the history of the original planting of three seeds at Point Pinellas, and as follows:

"Three seeds were planted, of which two grew. One of them fruited in its fourth year; from the sale of fruit and seeds \$9.15 was realized. The other fruited in the fifth year. In their eighth year an experienced orange grower who saw them, estimated that there were 19,000 mangoes on the two trees. Some of the fruits weighed a pound." Trees were grown from the seeds thus furnished, and, the report continues, "In all cases when the trees were well cared for they produced from 4,000 to 9,000 mangoes each, when once well in bearing. One grower sold from eleven trees in the fourth year from the seed fruit which brought him \$219. In their sixth year he shipped bushels to various places, realizing 60 cents a dozen, the fruit shipping well. Another grower received from the produce of one of his bearing trees \$66 in its sixth year." And all these mangoes were of the "tow and turpentine" varieties, grown on seedling trees. Experiences of growers generally apply only to the seedling varieties, so few have been the better kinds produced up to this time. But from reports of growers and dealers it is known that crates of about 100 mangoes have averaged at the orchard \$1.50, or one cent and a half for each fruit. The budded trees will begin to bear at four years and double their crop for two or three years thereafter, sometimes starting with several hundred fruits at the first crop. All accounts agree that the mango is not a "shy" bearer. An estimate for the intending planter of mangoes would unquestionably err on the side of conservatism should it be based on a yield of 200 fruits in the fifth year (first crop), increasing to 1,200 in the tenth year and thereafter. So, too, the price, if we assume that only one cent were received for each mango, might be thought entirely below the average for the fine varieties obtained from budded trees. Not more than 35 trees to the acre should be planted, in order to allow ample room for the old trees to spread. On these bases, the following yield and income would certainly be very conservative: 5th year, 200 fruits at 1 cent, \$2.00 per tree, or \$70 an acre; 6th year, 400 fruits at 1 cent, \$4.00 a tree, or \$140 an acre; 7th year, 600 fruits, \$6.00 a tree, or \$210 an acre; 8th year, 800 fruits, \$8.00 a tree, or \$280 an acre; 9th year, 1,000 fruits, \$10 a tree or \$350 an acre; and in the 10th year, and thereafter, 1,200 fruits, \$12 a tree, or \$420 an acre. These returns are less than are obtained from good orange, pomelo or apple orchards under most favorable conditions, and they may be accepted as below the average profits from mango orchards of the improved varieties for a great many years to come.

Extracts from letters written by mango growers in Florida, are convincing as to the prospects ahead for the new industry:

"We grow better mangoes than Cuba or the Bahamas, and our fruits will bring better prices in Key West and Havana."

"The planting of mangoes is bound to be very profitable. Our

Florida fruit is ahead of that grown in the West Indies and we would have a good market even in those islands."

"I do not like to report 'profits' for others. Some years my original Mulgoba tree has yielded me about \$100, but in no case have I sought to keep a close account. This fruit has sold to parties in the north at \$2.00 a dozen. Such mangoes in their native home, Bombay, India, will bring \$1.40 a dozen."

"In my experience and judgment the culture of mangoes will prove most profitable and I should certainly recommend the planting of orchards of this fruit."

"My opinion is that the pioneers in this line, planting budded trees, will have the greatest bonanza in sight in horticulture."

"The mango is going to be one of the most profitable of tropical fruits grown in the United States. Southern Florida and Southern California are the only sections where it can be cultivated. I am not sure of any success with it in California, but here in Florida we have large, handsome trees that bear thousands of mangoes on each tree."

"There is no fruit tree in this southern section of Florida that is so easily grown as the mango, except the avocado. They grow 'without let or hindrance,' and are not particular so long as the soil is high and dry. I have been advising the planting of mango trees in large quantities, and after nearly seven years of experience and observation, I have no cause to change my advice; but on the other hand I would emphasize it and say plant more mango trees."

Rarely do our conservative government writers so strongly endorse and recommend a new industry, as is done in the following extract taken from Bulletin No. 46, published by the Bureau of Plant Industry, U. S. Department of Agriculture:

"There is every probability that the finer varieties of Asiatic origin will soon be grown in the south more extensively than heretofore. Not only has the Department of Agriculture had its agents on the lookout for improved varieties in India and elsewhere, resulting in several consignments to the Department greenhouses of many kinds reported to be of great value, but a few private growers have also been importing some varieties which are highly praised.

"The acquisition by the United States of tropical possessions will render the cultivation of the mango of greater importance than ever. The fruit can't be imported from the Philippines, but it will be an easy matter to import the young plants of the best varieties grown there. In Porto Rico the tree grows very luxuriantly and fruit grown there can be landed in New York in five days.

"But there is a large tract of land in Southern Florida where the mango thrives to perfection, and when once the growers become acquainted with the best methods of propagation, so that only the finest kinds shall be grown, the establishment of a large and profitable industry may be expected, for it is reasonably certain that the demand for mangoes of good varieties will always keep pace with the supply."

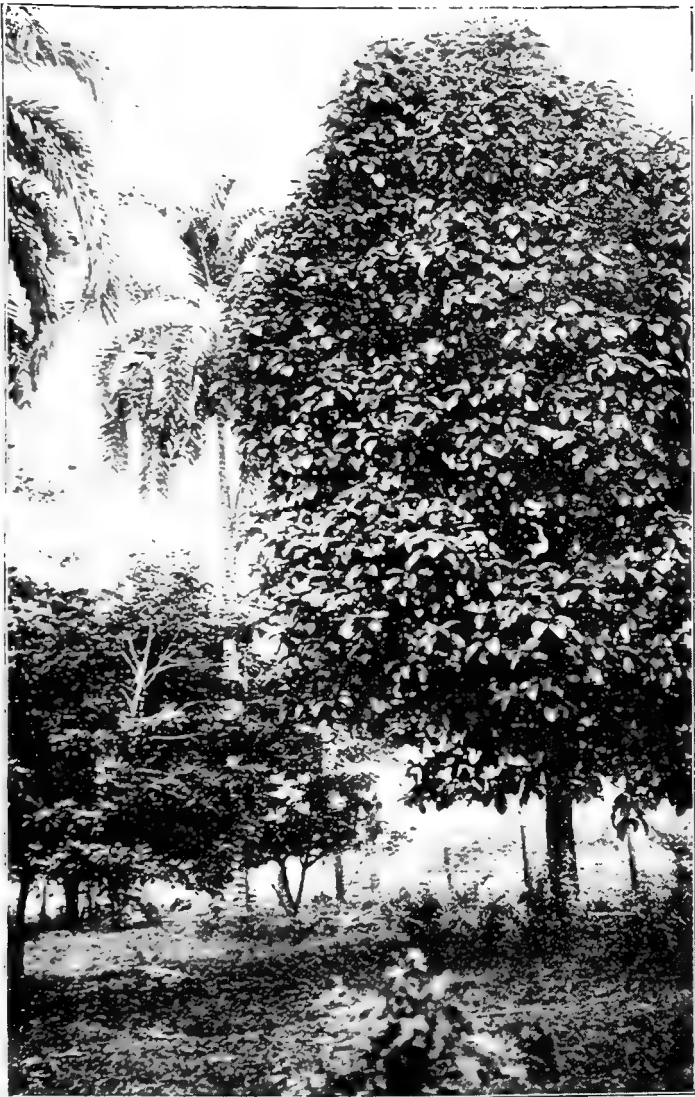
It is thought that enough has been said to convince anyone that mango growing affords one of the best opportunities for profitable orcharding. All conditions are just right to engage in this industry at this time, and those who do so under the right auspices will surely be richly rewarded.

THE AVOCADO

(*Persca gratissima.*)

One of the latest pomological debutantes brought out by the enterprising planters of Southern Florida, is sure to have a career of lasting success. This is the avocado, or alligator pear—the “aguacate” of Mexico and Central America. Any leading fruit dealer in the very few large cities where avocados have as yet been seen, will tell an inquirer that the demand for them is steadily increasing, and that prices range from 25 cents to one dollar for a single fruit, according to size, season and supply. The better hotels and restaurants have “alligator pears” on their menus in season, but at a cost practically prohibitive to moderate purses. First taken up as a novelty among the wealthy and fashionable, as was the grape fruit, the real merit of the avocado will gain for it the appreciation of the general public, just as soon as an adequate and regular supply will permit its sale at popular prices. When this time comes, avocados will be plentiful in every market and on every fruit stand throughout the land, and one of the most wholesome and nutritious of fruits will have secured deserved recognition; while those fortunate planters whose orchards supply the demand, will be enjoying the just reward of their far-sighted enterprise.

Though technically a fruit, the avocado is no more a fruit than is the tomato or the cucumber. Generally speaking a “fruit” has something sweet or acid in it, or a combination of both, with a characteristic “flavor;” but the avocado is neither sweet nor acid. The edible part of the fruit, the pulp or meat, in the good varieties is a smooth, bland, buttery substance of the consistency of cream cheese, or well-frozen ice cream, and having an agreeable nutty flavor. Words rarely convey a correct notion of the real taste of a fruit. The avocado is not a dessert fruit. Its place among fruits is unique, for it is served almost exclusively as a salad. In the tropics, where the use of the avocado is general, it is often served, unprepared, to be eaten with salt, before or after soup, or cut into small pieces and crushed in the soup, to which it adds a delicate and agreeable flavor. The northern visitor at a hotel in Havana, Mexico City, Managua or San Jose during the season of avocados is sure to find a single fruit lying at the side of his plate at dinner. The unfamiliar object is usually pear-shaped, about the size of one’s fist and weighs a pound or more; it may be green, yellow, brown or dark purple, like a ripe egg plant, or a combination of two or more of these colors, tinged with red. If the new arrival follow the example of the initiated, he halves his avocado lengthwise, removes its large seed, adds a little salt to the creamy or greenish yellow meat, which he then dips with a spoon from its leathery shell and eats as he would a Rocky Ford canteloupe at home—that is if he eats his avocado at all; for, as is the



BY PERMISSION

AVOCADO TREE.

U. S. DEPT. AG'Y.

COLLINS, BUL. 77, BUREAU PLANT INDUSTRY

case with many another of the "good" things we eat, a liking for the avocado is usually an acquired taste, calling for two or three attempts before the unaccustomed palate approves the strange flavor of the new fruit. But during a brief stay in the land of avocados the habit of eating them becomes fixed, and, when that traveler returns to the North, he never tires of dwelling on the goodness of his tropical discovery and recommending it to his friends, who invariably fail to gain from his enthusiastic description the slightest notion of what an avocado really is.

Other methods of preparing and eating the avocado are interestingly told in Bulletin No. 77, "The Avocado, a Salad Fruit from the Tropics," issued by the Bureau of Plant Industry, U. S. Department of Agriculture:

"Few salads are so easily prepared as the avocado. Usually the fruit is simply cut in half by passing a knife through the skin and flesh until it comes in contact with the seed. It will then separate into two cups, forming convenient receptacles for the seasoning, which is added a little at a time to suit the taste, and the flesh is scooped from the inside of the cup with a spoon. One-half of the fruit is usually sufficient for a person at a meal. The most common dressing is salt, pepper and vinegar. Oil is often added, but unless the oil and vinegar are beaten into a mayonnaise this would seem superfluous, as the fruit itself is very oily. Lime or lemon juice is often substituted for vinegar.

"While the novice usually considers some form of acid necessary to add piquancy, those better acquainted with the fruit frequently eat it with salt alone, and many think that even salt tends to mask the delicious nutty flavor and prefer it in its natural state without any seasoning whatever. There are a few people, probably of New England origin, who eat the fruit with sugar and vinegar, and some even profess fondness for it with a dressing of sugar and cream.

"If it be desired to more thoroughly incorporate the dressing the flesh can be removed from the skin and, after mixing the whole, can be returned to the skins for convenience in serving.

"In French countries the avocado is customarily served as an 'hors d'œuvre.' E. Roul states that an exquisite dessert is made by covering the fruit with a dressing of cherry brandy, sugar and cream beaten almost to an emulsion.

"In St. Thomas the fruit is eaten with Port or Madeira wine and lemon or orange juice.

"In Brazil the fruit is made into a sort of custard pudding.

"The following methods of preparing the fruit, as well as that for extracting the oil, were kindly furnished by Mrs. William Owen, of Sepacuite, Guatemala:

"No. 1. Divide in half and serve in the shell, as many prefer them without the addition of salt.

"No. 2. Cut the meat into cubes, mix with sufficient mayonnaise to coat it well, put in a platter, pile high in the center and sprinkle over hard boiled egg chopped fine.

"No. 3. Divide in half and carefully remove the meat. Add the yolk of a hard boiled egg and one tablespoonful of French dressing for each fruit. Press through a sieve and pile in the half shells. Garnish the tops with the white of the eggs chopped fine, a sprig of parsley and one small red pepper.

"Sandwiches. Use thin slices of bread buttered thinly; spread on a paste prepared of mashed avocado mixed with a dressing of oil, salt, tarragon vinegar and a little nutmeg.

"Avocado Oil. Divide the fruit in half and remove the seed. Place the two halves together again and lay them in a large basket. Cover with a cloth and keep in a cool, dark place until the meat turns black; then put them into a coarse cotton bag. Sew up well and put into a press. The oil is very clear and all the Ladinós say it will never become rancid. They never use it in cooking, though it has a pleasant flavor, but say it is fine for the hair.

"The following method is given in The Cooking School Magazine for October, 1904:

"Cut three ripe aguacates in halves, take out the stone or seed, and scoop the pulp from the skin. Add three tomatoes, first removing the skin and core, and half a green pepper pod cut in fine shreds. Crush and pound the whole to a smooth mixture, then drain off the liquid. To the pulp add a teaspoonful or more of onion juice, a generous teaspoonful of salt, and about a tablespoonful of lemon juice or vinegar. Mix thoroughly and serve at once. This salad may be served at breakfast, luncheon, or dinner."

An analysis of the avocado made at the Maine Agricultural Experimental Station showed that one pound of the edible portion contained the following weights:

Nutrients.	Pound.
Water811
Protein010
Fat102
Carbohydrates068
Ash009
	1.000

At the Florida Agricultural Experiment Station an analysis of the composition of the edible portion of the avocado and other foods shows that in the amount of water it contains the avocado more nearly resembles the succulent fruits and vegetables than it does bread; that in the proportion of water, protein, crude fibre and ash it is similar to such fruits as the apple, banana and pear; while in fat it suggests the olive, which is very rich in this constituent, the percentage in pickled ripe olives, pickled green olives and avocados being 25.5 per cent., 12.9 per cent. and 17.3 per cent. respectively; and that in fuel value per pound, the avocado exceeds pickled green olives, bananas, potatoes, pears and apples in the order named, although less than either coconuts, fresh chestnuts, wheat flour or pickled ripe olives. The analysis warrants the conclusion that the avocado is a considerably more valuable food than other fruits having similar proportions of water, especially when it is considered that its energy value exceeds that of pickled olives by reason of the greater proportion of fat in the former.

To the general public far more important than such scientific conclusions is the knowledge, gained by the practical experience of those who know, that an avocado and two or three slices of toast, with a cup of coffee, make a delicious and complete breakfast; and that a pound-weight of avocado in the lunch box of the laboring man would go far towards restoring his wasted energy after a morning's toil in shop or field.

The avocado tree is a native of the frostless regions of South America from the Amazon northwards, Central America and Mexico. It is now found throughout the West Indies and in some other equatorial countries, including the tropical possessions of the United States. Whence, when, where and by whom it was introduced into Florida, the limited literature on the subject does not definitely state. But it is safe to say that during many years the usual ups and downs attending the naturalization of a foreign plant were experienced in Florida by experimenters with the new tree, until the methods of propagation and cultivation are at last well understood and orchards on a small scale have been established which pay their

owners handsome incomes. The systematic and intelligent attention of the American growers has resulted in producing in Florida a better avocado than can be had in Cuba, Porto Rico, or elsewhere, whence our markets have been in part supplied; and it is an interesting fact that Florida avocados are regularly shipped to Key West and Havana, where they sell for much higher prices than the native product. In many large cities in the United States the avocado is unknown, nor will such places have a chance to test the new fruit so long as the supply is unequal to the demand in the few centers which are now able to handle all the avocados they can get.

There are some quaint descriptions of the avocado, the first of which in all probability was sent in Oviedo's report to Charles V, of Spain, in 1526:

"On the mainland are certain trees that are called pear trees (perales). They are not pear trees like those of Spain, but are held in no less esteem; rather does the fruit have many advantages over the pears of that country. These are certain large trees, with long narrow leaves similar to the laurel, but larger and more green. This tree produces certain pears, many of which weigh more than a pound, and some less; but usually a pound, a little more or less, and the color and shape is that of true pears, and the skin is somewhat thicker, but softer, and in the middle it holds a seed like a peeled chestnut; but it is very bitter, as was said farther back of the mammee, except that here it is of one piece and in the mammee of three, but it is similarly bitter and of the same form; and over this seed is a delicate membrane, and between it and the primary skin is that which is eaten, which is something of a liquid or paste that is very similar to butter and a very good food and of good flavor, and such that those that can have them guard and appreciate them; and they are wild trees in the manner that all those that have been spoken of, for the chief gardener is God, and the Indians apply no work whatever to these trees. With cheese these pears taste very well, and they are gathered early, before they are ripe, and stored; and after they are collected they mature and become in perfect condition to be eaten; but after they are ready to be eaten they spoil if they are left and allowed to pass that time."

Another account by Hughes in "History of the Indies," describes the type than known in Jamaica:

"This is a reasonable high and well-spread Tree, whose leaves are smooth, and of a pale green colour; the Fruit is of the fashion of a Fig, but very smooth on the outside, and as big in bulk as a Slipper-Pear; of a brown colour, having a stone in the middle as big as an Apricock, but round, hard and smooth; the outer paring or rinde is, as it were, a kinde of a shell, almost like an Acorn-shell, but not altogether so tough; yet the middle substance (I mean between the stone and the paring, or outer crusty rinde) is very soft and tender, almost as soft as the pulp of a Pippin not over-roasted.

"It groweth in divers places in Jamaica; and the truth is, I never saw it elsewhere; but it is possible it may be in other Islands adjacent, which are not much different in Latitude.

"I never heard it called by any other name then the Spanish Pear, or by some the Shell-Pear; and I suppose it is so called only by the English (knowing no other name for it) because it was there planted by Spaniards before our Countrymen had any being there; or else because it hath a kinde of shell or crusty out-side.

"I think it to be one of the most rare and most pleasant Fruits in that Island: it nourisheth and strengtheneth the body, corroborating the vital spirits; the pulp being taken out and macerated in some convenient thing, and eaten with a little Vinegar and Pepper, or several other ways, is very delicious meat."

Sir Daniel Morris, British Commissioner of Agriculture for the West Indies, writes in his book. "The Colony of British Honduras; its Resources and Prospects":



BY PERMISSION

FRUITING BRANCH OF AVOCADO.
ROUSE, BULL. 61, BUREAU PLANT INDUSTRY.

U. S. DEPT. AG'Y.

"The avocado or alligator pear (*Persea gratissima*) is a well-known vegetable rather than a fruit, which might be extensively cultivated both for home use as well as for exportation. There are two well-marked varieties—the green and the purple, the latter, from its larger size and finer flavor, being generally preferred in the West India Islands. The edible portion of the fruit is the firm pulp, enclosing the single large seed, which possesses a buttery or marrow-like taste and hence called 'subaltern's butter.' The popular names of this fruit are supposed to have been derived from the Mexican term 'ahuacatl;' the Spaniards corrupted this to avocado, which means an advocate; and the English still further to 'alligator pear.' A quantity of very superior oil, useful for illuminating and other purposes, may be obtained from the pulp by expression."

In the Yearbook of the U. S. Department of Agriculture for 1901, Mr. O. F. Cook, Botanist in Charge of Plant Investigations, Bureau of Plant Industry, writes of the avocado in Porto Rico, as follows:

"The alligator pear, also called butter pear, aguacate and avocate, is a tropical fruit now relatively little known, but with every prospect of a gradually increasing popularity. It is a pear only in shape, and might better be compared to the olive, because it serves as a salad or a relish rather than a fruit in the ordinary sense, and frequently becomes a favorite even with those who do not like it at first. The flesh has a delicate buttery consistency, and is eaten with vinegar, salt and other condiments, or is used as an ingredient of other salad compounds. The promise of agricultural and commercial importance for this fruit lies in the fact that it already has a distinct, if limited, place in the markets for larger cities at from 30 to 60 cents apiece, prices which might be halved or quartered, and still leave good profits for both grower and dealer. Moreover at these prices the supply of first-class fruit seems to be unequal to the demand."

M. S. Burbank, of Florida, a recognized authority on the avocado and a successful propagator, wrote in a recent letter:

"The avocado is by no means a new fruit. We find it mentioned as long ago as the early part of the 16th century, although only during the last few years has it been cultivated. On account of its great food value, and the many ways the fruit may be used, the avocado promises to become one of the most important orchard products. To-day it is the highest priced fruit in northern markets. The fruit from seedling trees varies the same as with other fruits, except that all avocados are good, the difference being that some are better than others. We are, of course, propagating only the best, particularly the late varieties, so that we can put fruit on the market when other fruits are scarce, thereby securing far better prices. In my opinion the prices in the north are now too high, but this will be regulated when more fruit is produced and its use becomes popular. We want everyone in the country to have a taste of the avocado—some will need a second taste, it is so entirely different from any other fruit; but nearly all become passionately fond of it after a time.

"The avocado thrives here in South Florida and makes a large handsome tree with abundant foliage of dark green.

"The fruit ships well and arrives in market in good condition."

The following extracts from "The Homeseeker," Miami, Florida, give enthusiastic endorsement of the avocado and the business of growing this fruit. The editor, E. V. Blackman, is familiar with the orchard interests of Southern Florida and well qualified to speak with authority on this subject:—

"A tropical fruit that is meeting with an increased demand every year is the avocado, or alligator pear, grown in Southern Florida. Among the great variety of fruits produced here in Dade County, take it on the whole, there is none that equals the avocado. Our avocados are far superior in quality and flavor to those of Cuba and bring a much better price in Key West than those grown in Cuba, although Key West is but a few hours' sail from that Island where the avocado is abundant.

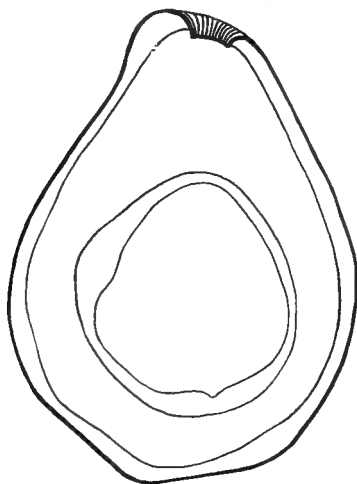
"Throughout the northern States the avocado is almost a stranger. New York City is becoming a most excellent market for the fruit. It only has to be known to be loved and appreciated. I am firmly of the opinion that the avocado is the coming fruit, and eventually the demand will be greater than for any class of tropical or semi-tropical fruit.

"The avocado is found on all the older places throughout the Biscayne Bay country, and on all the places more recently settled thousands of trees are coming into bearing. The avocado is one of the staple crops of this section, and one that pays the farmer more clear money to the acre than any other fruit crop known."

During the preparation of this chapter, correspondence with growers and others familiar with present conditions, has resulted in the collection of some interesting and valuable data. Without exception the practical men of greatest experience in Florida horticulture, who have answered the writer's questions in the circular letter addressed to them, are emphatic in their expressions that large returns await the successful grower of avocados. Some of the replies are here quoted. They show the prevailing opinion held by all who are best acquainted with the facts:

"The culture of this fruit is a profitable business. It certainly pays me. I advise planting commercial orchards of the avocado."

"I think the culture of the avocado could be made very profitable."



BY PERMISSION

U. S. DEPT.

LONGITUDINAL SECTION OF AVOCADO.

"Yes, very profitable; but more rests with the man than with the orchard."

"I am sure the time will come when it will be very profitable to produce the best varieties of this fruit, but it is a question how rapidly the demand will grow."

"Yes, extremely profitable. Methods of propagation now well understood; market waiting."

"I recommend the planting of avocado orchards. In the right place and well managed they will be scarcely excelled in profit by any other product, unless it be mangoes."

"It is certainly profitable, and the demand for the fruit promises to increase, as people learn about it."

"I certainly am of the opinion and this is based on the prices received for this fruit, prolific bearing, healthfulness of the tree, that growing the avocado will be extremely profitable, far surpassing that of citrus fruit growing. I can conscientiously recommend the planting of large commercial orchards."

In Florida, the choice of a location for a commercial orchard of avocados is necessarily restricted to the southern counties. Soil and climate suitable for the mango are equally adapted to successfully growing the avocado. In the Yearbook of the Department of Agriculture for 1901, on page 391, referring to the mango, the planting of this fruit is recommended in eastern Florida, south of latitude 27°, and on the Keys, as well as in the frostless belts of California. The same applies to the avocado.

Only budded or grafted trees should be planted, and these, to become profitable, should be given the best treatment and sufficient fertilizing. The methods of cultivation of both mango and avocado are not yet so generally known as are those suited to success in growing some of the other crops of this section, therefore the planter of avocados on a large scale, unless himself a practical grower, should be guided by the experience of one who has already made a success of this particular kind of planting.

The cost of land, clearing, cultivation three years, fertilizer, etc., would not materially vary from the cost of making a citrus orchard in the same locality and cultivating it for the same number of years; but the avocado trees will begin to bear earlier than the citrus, which is of course an advantage in favor of the former. Roughly estimated, the cost of bringing an acre of avocado orchard to the bearing age is from \$250 to \$300.

The budded avocado tree (and no others should be planted) will begin to bear in the fourth year, and give a profitable crop in the fifth under favorable conditions. The yield of fruits per tree in a series of years, may be estimated as follows: 40, 80, 120, 160, 200, 240, 240, 240 in eight successive crops from the fifth to the twelfth years, inclusive. The quantity of fruit depends largely on the care given the trees and the free use of fertilizer. A single limb of a large avocado tree at Coconut Grove, Florida, broken off by the weight of its fruit, bore 100; and trees at eight years have been known to yield several hundred. The above estimate is conservative and low enough to allow for the smaller crops in the off years.

The price received for the fruit varies considerably, being governed by the size and the season. Avocados which ripen late in the season always command a much higher price. Northern dealers sometimes keep choice fruits in cold storage until after the season, when they readily sell for a dollar each. The high price, however, does not mean correspondingly high profit, for dealers declare that the refrigerated fruit does not keep perfectly, and their loss is considerable on this account.

Shipped to the north generally in crates, which contain a varying number according to the size, but averaging 72 fruits, avocados



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YOUNG AVOCADO TREE.

ROLFS, BUL. 81, BUREAU PLANT INDUSTRY

are sold for the shipper's account at prices ranging from \$4.50 to \$12.00 a crate. Really fine fruit sometimes reaches market badly packed and much damaged, resulting in very low prices. The selling price for good fruit and bad fruit as it runs, averages \$6.50, from which must be deducted 10% commission for selling, and eighty cents a crate for freight and cartage, leaving the shipper \$5.05, net, or 7 cents for each fruit. It is certain that no grower of choice avocados of the late varieties, who grades his fruit carefully and packs it right, has ever received anything like so low a price as this. Avocados, of the late crop of 1905, were sold in Miami and Palm Beach at \$6.00 a dozen—not crate. Any company or individ-

ual operating a commercial orchard on a large scale would be in position to market the product much more profitably than could the small grower, who must generally take what he can get. In view of the facts, as stated, it will seem very conservative indeed to take five cents as the average price the grower will receive. The margin between this price and the higher price the fruit will probably always bring, is sufficient to offset any of the "unforeseen contingencies" that may arise to affect the plans and calculations of the most careful grower.

The planting distance for avocados varies greatly, some varieties growing much larger than others. As many as 100 budded trees may be set at first, but with the certainty of having to thin them out later when the growth of the tops causes their branches to approach too closely. Some of the larger kinds should not be planted less than 35 feet apart, giving 35 trees to the acre; and this distance is recommended when interculture is intended. Without leaving space between for the cultivation of other crops to any extent, double this number of trees of the smaller kinds might be set on each acre. But whatever may be the number decided on by the planter, the estimate of his profit from each tree would not be materially affected. Assuming, as already said, that the yield per tree would be 40, 80, 120, 160, 200 and 240 fruits, commencing in the fifth year, the returns per tree, at five cents for each fruit, would be \$2.00, \$4.00, \$6.00, \$8.00, \$10.00 and \$12.00 in a series of years from the fifth to the tenth, inclusive. If only 35 trees were set to the acre, the income would be \$70.00, \$140.00, \$210.00, \$280.00, \$350.00 and \$420.00 per acre from the fifth to the tenth years inclusive, and this is certainly a very conservative estimate, although large enough to induce prompt planting of many avocado orchards.

*KUMQUAT

(*Citrus Japonica*.)

The kumquat is the smallest citrus fruit; the tree on which it grows is the smallest citrus tree. It is the baby of that gold-standard fruit family to which belong the lemon, the lime, the orange and the pomelo. Although worthy of the highest respect because of its family connections, the kumquat has stronger claims to consideration. Being a late comer in these parts, its acquaintance is still limited to a favored few who, having been properly introduced, "love it for itself, alone." The pomelo taste takes kindly to the kumquat; and those who are "passionately fond" of the former are sure to soon become at least reasonably fond of the little relative.

The fruit is either oval or round. When oval is about an inch in diameter and $1\frac{1}{2}$ inches long; when round, about one inch in diameter. The trees which produce these two shapes are of different varieties, but the difference seems to be observable in nothing but the shape of fruit. The color of the kumquat is a deep orange-yellow. Its delicate rind is sweet and spicy; the pulp very tender and agreeably acid. Eaten out of hand, rind and pulp are bitten through and the fruit eaten whole. The combination of spicy sweet and agreeable acid is delicious and refreshing. Excellent preserves are made of the fruit or it can be crystallized in sugar.

Brought into the United States from Japan, as its botanical name, *Citrus Japonica*, indicates, the kumquat is a native of China, where, as in Japan, it is highly appreciated and extensively cultivated. In Japan it is called *kinkan*, which means "Gold Orange;" kumquat is Chinese for the same meaning.

The tree is really a dwarf orange. It may even be grown in pots and tubs, when it becomes, with its white flowers, glossy, green leaves and beautiful golden fruit, a unique and extremely handsome ornament for house or lawn. The diminutive trees begin to bear almost as soon as their tiny twigs will support the weight of the little golden balls, and continue to flower and fruit freely every year. Fortunate, indeed, is the "new fruit," which possesses all these qualities that bespeak for it public favor. Such an introduction will soon spread afar the excellencies of the kumquat as deserving recognition of its merits and gain for it a large and loyal constituency among the lovers of good fruit.

Well cared for, under favorable conditions in the orchard, the kumquat grows to a height of ten or twelve feet, forming a compact, symmetrical and handsome head. Its small size makes the tree peculiarly adapted to interculture among other trees that eventually require much more space in which to expand their branches. In time these will completely overshadow the more lowly kumquat, which, as the orchardist says, has served as a "filler" during the early years of its slower growing, but much bigger, neighbors. But, if the

*For picture of fruiting branch of Kumquat see first page of cover.

kumquat be used advantageously in secondary planting, one should not infer that this tree is not deserving of the planter's best attention as a money maker. Whether intentional or not, the Chinese name "Gold Orange" is significant as a pleasing allusion to the value of the kumquat for its rich and abundant harvest of fruit; for one of the most remarkable things about the kumquat is its agreeable habit of bearing in the greatest profusion those delicious little balls of gold which are so readily exchanged for coins of gold in the northern mid-winter markets. It is indeed prolific beyond the wont of the other trees in its own family, a family which is noted for the quantity as well as quality of its fruit product.

The kumquat is an early bearer too. A few fruits are almost sure to appear on the new wood of the tree in the same year it is planted; while in the third year a yield of 20 to 30 dozens may be expected. After that the yearly increase will be constant and give a product of 150 to 200 dozens, at least, in the tenth year.

The fruit is generally packed in quart boxes and shipped in crates of 32 quarts. As the kumquat, on account of its handsome appearance, is much used for table decoration, it is the practice of shippers to send a supply of the leaves packed in with the fruit. The guileless packer is nothing loth to do this, for foliage fills up amazingly when skilful and willing hands do the packing, and kumquat leaves are cheaper to grow than kumquat fruit.

Shippers report that during the season of 1905 kumquats brought an average of \$8.50 a crate of 32 quarts. Now a quart of kumquats contains an average of forty-five fruits, which makes an average of seven cents a dozen paid to the shipper. The value of a kumquat tree in its third year on this basis, assuming that the yield of the tree is 25 dozens, would be \$1.75, and in the tenth year, should the same prices be obtained, the value of the tree yielding 175 dozens, would be \$12.25. Kumquat growers, who have realized as much as this, would, it is safe to say, be glad to take much less for a series of years, and then consider themselves better paid than many other kinds of fruit culture could possibly pay them.

For the purposes of a conservative estimate, five cents a dozen for the fruit and a yield of 20, 40, 60, 80, 100, 120, 140, 160, 160, 160 dozens in the third and intervening years to the twelfth, can be accepted, and this should allow amply for the expenses of the orchard. Figured on this basis the income per tree would be, for the corresponding years, \$1.00, \$2.00, \$3.00, \$4.00, \$5.00, \$6.00, \$7.00 and \$8.00—the last in the 10th year, and as much thereafter for many years. From 100 to 200 trees may be set to the acre.

The grower who can market his product in the form of preserves will add greatly to his profit.

The future of the kumquat is bright and the planter of citrus fruits will do well to diversify his orchard products by liberally planting the "Gold Orange."



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