The Growing of Mangoes in Florida

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The Mango (*mangifera indica*) is one of the oldest known cultivated evergreens. Its exact origin is uncertain, but it is believed it has been cultivated four thousand (4,000) years, as it has played a prominent part in Hindu mythology and religious observance. Few other fruits have such a historic background as the Mango. The first introduction of the Mango into the United States is believed to have been in 1833, when plants were sent from Mexico to Florida, but the planting was not a success. In 1885 some of the choice grafted trees from India were introduced, later others followed, but most of the progress has been made in the last twenty-five (25) years.

In the Philippines, Hawaii and the West Indian possessions the Mango is one of the most highly prized fruits. It is of such great importance that it is called the "Apple of the Tropics."

Within the last few years the commercial possibilities of the Mango have commanded the attention of horticulturists and growers in Florida. A few growers in the southern part of the state are successfully growing and commercializing on some of the better varieties.

The Mango as a tree is a large rapid growing evergreen with a spreading symmetrical top and handsome dark green foliage, and is considered one of the finest ornamental and shade trees for territories to which it is adapted. On rich soils seedlings often reach an immense size. The budded or grafted varieties do not grow so large. The leaves are lanceolate eight to twelve inches in length, ridged, deep green, with slender petioles one to four inches long.

**SOILS AND CLIMATE SUITABLE FOR MANGOES**

Mangoes can be grown successfully on a wide range of soils, but prefer a deep rich sandy loam, well drained. Hammock and the better grades of pineland soils are good.

Mangoes are grown commercially in Florida from Charlotte County south on the West Coast and Palm Beach south on the East Coast. The largest plantings are found around Fort Myers in Lee County and Miami in Dade County. A few trees are grown north of these points. The Mango is very sensitive to cold weather, therefore, its commercial culture is restricted to the most tropical parts of Florida. Young trees will not stand a temperature below thirty-one degrees F., while large mature trees will stand four degrees lower.

In selecting a site for the Mango grove, in addition to protection from cold, good soil and sufficient drainage, good air drainage and wind protection is of important consideration. Avoid air pock-
ets or valleys where the cold air might settle. Australian pines should be planted surrounding every ten-acre block as a windbreak. These trees are nitrogen gatherers and take very little substance from the soil.

The Mango is inclined to be vigorous; it quickly responds to good care and attention and is more resistant to neglect and adverse conditions than most fruit trees. It is especially resistant to drouth. Some of the best crops are produced in extreme dry seasons. Due to its peculiar blooming habits, it does not set heavy crops during a wet spring, especially if it rains during its blooming period. While the mango grows best in humid, tropical regions, subject to heavy rains through the year, it is not successfully cultivated for its fruit under these conditions. It requires the stimulus of a dry season during its blooming period to fruit abundantly.

**VARIETIES**

Mangoes should be divided into two classes: First the seedling races; second, varieties propagated by budding and grafting. The seedling races are poly-embryonic, they come true from seed, reproducing the racial characteristics with remarkable constancy. When one of these is propagated by budding or grafting it becomes a true horticultural variety. Some of the well known seedling races in Florida are: The Apple, the Turpentine and No. 11. These races are used for stock in budding the better commercial varieties—they also have a small economic value as a fruit.

Of the varieties which have been tested in Florida by the United States Department of Agriculture and by individuals, the following seem most promising:

**Mulgoba:** Introduced in the United States 1889 from Poona, India. Fruit weighs about a pound. Deep apricot in color, overspread with scarlet around base and exposed side; very agreeable aroma; very juicy and free from fiber; excellent dessert quality. The tree is irregular in its fruiting habits and is not considered a profitable commercial variety. Fruiting season is July and August.

**Haden:** Originated at Coconut Grove, Florida, as a seedling of the Mulgoba. First propagated in 1910. The fruit is not so fine as that of the Mulgoba but the tree is more thrifty, fruits at an early age and bears regularly. The fruit is unique in having a beautiful crimson blush, unmatched by any other known mango. It is of medium size, compact, roundish oval in shape and a good shipper. Fruits July and August. This is the leading commercial variety and is being planted far more extensively than all other varieties combined.

**Borsha:** Sent out by the United States Department of Agriculture about 1921 to individuals to try out. This new variety is attracting much attention at this time—it seems to have wonderful possibilities. It is of the West Indian type. Color of fruit between the Haden and Mulgoba, fine quality, less fiber; medium size. The tree is thrifty, a prolific bearer, a good shipper and seems to be resistant to blight. Fruits two to four weeks later than the Haden.

**Cambodiana:** Originated Miami, Florida, as a seedling from seed introduced from Cochin China by the United States Department of Agriculture.
Department of Agriculture in 1902. Fruit is medium in size, yellow-green to deep yellow in color, skin thin and tender. The dessert quality of the fruit is good. The fruit is early in ripening, a prolific bearer, ranks next to Haden in flavor.

_Amini_: Introduced in the United States in 1901 by the U. S. Department of Agriculture from India. Fruit is small, deep yellow in color, with a dull scarlet around base, good quality, bears fairly well. Fruiting season June and July.

_Carabao_: Known as the Philippine Mango, which is probably a seedling strain; comes fairly true from seed; fruit is of medium size, long pointed, greenish-yellow when ripe, of good quality and has little fiber. Fruits in June.

_Sandersha_: Introduced in 1901 by the U. S. Department of Agriculture from India. The fruit is very large, often weighing over two pounds. It is attractive in appearance, but too coarse in flavor and texture. It is excellent for canning and other culinary purposes. The tree is a good bearer and later maturing, fruiting in September and October.

_Brooks_: Originated in Florida as a seedling of the _Sandersha_. It is smaller and of better quality than the parent variety. It yields better and is late maturing.

_Cecil_: The fruit is of medium size, deep yellow when ripe, excellent quality and flavor. The tree is prolific and fruit holds on well after other varieties are gone.

Experience indicates the advisability of selecting the Haden for commercial planting, with a few additional plantings of other promising varieties to serve in extending the shipping season. The Mango is self-fertile and is not dependent on cross-pollination to set fruit, therefore, the interplanting of varieties is not essential.

**PROPAGATION**

The seedling races are propagated principally by seeds; the better varieties by budding and grafting. Great care and skill are required to successfully bud and graft the Mango, more so than in the propagating of Citrus and other fruits.

The recent most successful and skillful method of Mango propagation is by the tongue or whip graft method. The seedlings for stock are grown in nursery form in pots or boxes. The seeds are planted in July; the seedlings are grafted in September, and are ready to be planted in grove form by December and January. This graft is made by bending the young seedling slightly with the left hand, and with a thin sharp budding knife in the right hand make an angling cut in and downward. Only cut the stock about half way through, then cut a thin slice of bark on the outside of the tongue. A notch should then be cut in the scion to fit the tongue made in the stock after inserting the scion; this should then be securely wrapped with budding cloth or rubber tissue. When the graft takes, the top of the stock can be cut off at the union. Terminal shoots well developed are preferred as scions. A skillful nurseryman loses a very small percentage by this method.

Shield budding is simple but difficult to get the buds to live, unless the stock and buds are in the right condition. April
and May are considered the best months to bud in Florida. The seedlings are ready to bud when about one-half inch in diameter and starting a new flush of growth. Bud wood should be selected from the wood just back of the latest terminal growth and should be round, smooth and the branch from which it is cut should be dormant or nearly so. Cut the leaves from the base of the buds, two to four weeks before the budwood is secured, leaving the leaf stem or petiole attached to the branch.

The buds should be an inch to an inch and a half long, cut smoothly with a sharp thin bladed knife. An inverted “T” cut is made in the stock, and the bud is gently inserted and tied in place with waxed tape. Three or four weeks later the top should be partly cut off and broken over about six inches above the bud. When the bud has grown several inches, the seedling top should be cut off as close to the bud as possible.

Chip budding is successfully used on old stock. This is accomplished by cutting a chip out of the stock, then cutting a bud the size of the chip, inserting and wrapping with waxed tape.

The simplest, but slowest, method of propagation is that of inarching or grafting by approach. The seedlings for stock are grown in boxes or pots, the graft is made in the summer when the trees are making a good growth and the seedlings are eight to ten months old. In making the inarch, the boxed seedling is firmly supported close to a tree branch of the same diameter; a thin portion of the bark, about three inches long, is shaved from one side of the seedling a few inches from its base. A similar portion is removed about a foot from the end of the branch, and the cut surfaces bound firmly together with waxed tape and painted over with liquid grafting wax to exclude the air. The union should be completed in a few weeks and the plant can be removed in six to eight weeks.

Other methods of propagation are sprig budding, ring budding and crown grafting.

PLANTING

The Mango in Florida is planted from early spring to the beginning of the summer rainy season. However, if seasons are good they can be planted during December and January successfully. The field is usually prepared in beds thirty to forty feet apart, leaving a deep water furrow for drainage. The Mango trees are planted in the center of the bed. The trees are usually planted thirty by thirty feet apart; in heavier soil thirty to forty feet each way is preferable. Some growers prefer the trees double planted one way, similar to the hedge row system; this increases the volume of fruit during the early years and in later years acts as a windbreak and is a protection to each other.

The method of planting is practically the same as that used for citrus and other fruit trees. The roots should never be allowed to dry out, keep moist while planting.

The earth should be firmly worked and packed down about the roots, watered thoroughly and the soil around the tree covered with a mulch of grass or weeds; this keeps the surface soil moist and cool. Should there be danger from frost or
cold, the young trees may be mounded with clean dry soil thrown up so as to cover the trunk a foot or more above the bud. This should be removed as soon as danger of frost is past.

CULTIVATION

Very little cultivation is required of the Mango. It seems to do well with no cultivation; however, clean cultivation during the dry season, combined with the growing of cover crops during the rainy season, has given good results where the cover crops are plowed or disced under to add humus to the soil. Growers in Lee County are planting their groves to Crotalaria during May and June, and discing down in November. Perhaps the best system of soil management is the permanent mulching plan; by this method the soil is covered the year round with a mulch of grass, weeds or legumes, such as Crotalaria, Beggarweed and Velvet Beans; this system works fine on the light, dry and shallow rocky soils of Florida.

FERTILIZATION

The first year after planting, the young tree should receive two applications of a pound each of a commercial fertilizer analyzing about five per cent ammonia, eight per cent phosphoric acid and four per cent to five per cent potash; the formula containing nitrate of soda, sulphate of ammonia, guano, raw or steam bone meal, acid phosphate and sulphate of potash. The same formulas that are used on citrus may be used on Mangos. The first application should be made in early spring, the second early in the summer. The amount should be doubled the second year and gradually increased until the trees reach full bearing age. Large bearing trees should be given three or four applications annually, of from seven to twelve pounds each application, depending upon the size and bearing capacity of the tree. The percentage of ammonia should be decreased and the potash content increased to eight or ten per cent in the late summer application. No fertilizer should be given bearing trees during the winter months, or in the spring until after the blooming period and the fruit is set.

Moderate amounts of barn-yard manure are beneficial for the young growing tree, also for bearing trees that seem backward. Heavy applications of manure are not advisable. The growing of leguminous cover crops will decrease the fertilizer costs.

PRUNING

The Mango tree ordinarily requires very little pruning, as it naturally assumes a desirable symmetrical spreading form. The trees should be headed back at planting time and three to five branches well distributed about the trunk should be left to form the new top. Pruning on older trees will consist mostly of cutting out all dead and diseased wood and heading back of weak spindly growth. The tree should be encouraged to assume a spreading low headed symmetrical form.

INSECT PESTS AND DISEASE WITH METHODS OF CONTROL

When the Mango is in bloom, it is sometimes attacked by a beetle known as the Blossom Anomola. They attack por-
tions of the blossom spike and sometimes cut or griddle it. This beetle has not caused any great injury to Mangoes in Florida where control measures were taken. They can be controlled by adding two pounds of arsenate of lead to fifty gallons of the Bordeaux mixture when spraying in the bloom for blight.

*Red Spiders* often attack the Mango during the dry winter months between the latter part of November and first of March. Lime sulphur solution at the rate on one to sixty or seventy or dusting with sulphur dust will control them.

*Red Banded Thrips* are occasionally injurious to young growth by piercing the lower surface of the foliage with their sharp mouth parts and rasping out the leaf tissue within, leaving a minute brown spot where the chlorophyll contents of the leaf had been removed. These spots may become very abundant, depending upon infestation. This species has not been observed attacking fruit. They can be controlled by spraying with forty percent of nicotine sulphate at rate of one part to 900 parts water.

*Scales*—The Mango is attacked by the following scale insects: Mango Shield Scale, Florida Red Scale, Mango Scale, Florida Wax Scale. They are controlled by spraying with oil emulsions.

*Anthracnose* is a fungus disease which frequently attacks the fruit, leaves and young growth. The blossom blight form of the disease is very serious at blooming time, especially during warm, humid or rainy weather. It often causes the loss of the entire crop. Spraying with Bordeaux mixture or dusting with Copper Lime is a great aid in controlling this disease and prevents the fruit from spotting. It is recommended that Mango trees be dusted at least twice a week during the blooming period with copper lime dust. This is very good insurance and is proven to be of great value in aiding the tree to set fruit. If the dried up tips of the blossom spike could be clipped off following the blooming period, the breeding ground for fungus spores which causes “tear staining” and spotting would be eliminated to a large degree. Good Mango crops cannot be expected when rainy and humid weather prevails while the trees are in bloom. Sometimes a second bloom occurs when the first bloom fails to set fruit, because of unfavorable weather conditions.

**HARVESTING**

Some of the better commercial varieties of Mangoes will bear fruit in four years from date of planting. This is especially true of the Haden. The trees will gradually increase in production from year to year. Haden trees twelve to fourteen years of age under normal seasonal conditions will have ten to twelve bushels of fine fruit. Most varieties ripen in June, July and August; should they be late blooming, they will fruit a month or two later. The Borsha, Sandersha and Brooks fruit late, occasionally in September and October.

The fruit is picked for shipping when full grown and mature. It should not be permitted to soften on the tree. It is advisable to use standard orange clippers, leaving a short piece of stem adhering to the fruit, in order to prevent the exuda-
tion of milky juice. Great care should be exercised in the handling of this fruit.

MARKETING

After grading, the firm perfect specimens are packed for shipping to distant markets, the soft and inferior grades are used for local consumption. The package most commercially used is the tomato crate containing six baskets, each basket holding six average sized fruits, making three dozen to the crate. Each fruit is wrapped in tissue paper, and a small quantity of excelsior is often used as packing between the fruits in the basket. This fruit is shipped to the Eastern and Middle Western markets of the United States and reaches its destination in perfect condition. A patented modified orange crate, with a center compartment for ice and Pony Refrigerator, is being used to some extent. Some growers have developed a profitable parcel post business, using a strong cardboard carton, holding about a dozen fruit.

Many Mango groves have been unprofitable on account of low yield, caused by the selection of shy-bearing varieties, unskilled grove management and neglect. The prices netted by growers for fruit of the better varieties have been excellent. There is a great demand for high grade fruit in the markets of the United States. The fruit is gaining great popularity, and consumption increasing each year.

The growing of Mangoes on large commercial scales is still somewhat in the experimental stage of development, but it is believed that the well-cared for groves of the better budded varieties, planted in favorable locations, will prove to be a most profitable investment.

Mr. C. I. Brooks, Miami: I asked permission of the President to say a few words with reference to the Papayas down in the Miami section. They have been grown by us for a great many years, but I think it is safe to say that during the last three or four years we have made more progress in the development of better Papayas in every way, both as to eating qualities and the plant itself than has been made in the previous twenty years. So much progress has been made, in fact, that we feel warranted in saying to you that we feel the Papaya is the second star on the horizon. The first was the one Mr. Reasoner spoke of—the Avocado. So many people had been eating the Papaya for years, and said they did not care much about them, that we do not blame most everybody if they say the same thing the first time they taste of the average Papaya. But varieties and species have been so developed and so improved that those that Mr. Stambaugh will tell you about we can safely say are as fine as the finest cantaloupe you ever tasted.

At Miami, where we have raised so many, we have not only sold a great many, but have given them away to the tourists, so we have had an opportunity to get a reaction as to what will be the ultimate market in the northern states, when the Papaya is finally developed to
the extent to which it will be. We can say to you, therefore, without any fear of contradiction, that inside of five years (I think that is "outside" perhaps) we shall be shipping Papayas to the furthest extent of this country without refrigeration. That may seem strange to you, in view of the Papayas you have seen—the thin-meated ones, and not very good, but the new Papayas that are being developed can be shipped anywhere in this country, and under refrigeration to Europe.

Remember that with that large, big meaty variety about which Mr. Stambaugh will tell you, after the Papaya is fully ripe, and ready to eat, you can put it in your refrigerator and eat a little each day, if you want to, for as much as ten days or two weeks. It will absolutely not become stale, or bad in any way; it will be just as fine the last day as the first. So, wanting you to get a little of that vision in a general way, I take pleasure in introducing Mr. Stambaugh, and in introducing him I want to say that in the opinion of those of us who have known of his development work we believe he has done more than all the rest of the developers and workers on Papayas put together. Of course, if you were to ask us if we had reached the end of the Papaya development, we would tell you we are only at the beginning, and Mr. Stambaugh, probably, if he were to come back to you in a year, he would find in many respects that we have been wrong. At the same time, the Horticultural Society wants to keep up to the latest development, even though we know that a year from now we are going to have to tell you something different, but in the sections up in this part of the country, it is going to be to your interest, some time during the year, if you can, to get good seed. When a Papaya is good, the seeds will reproduce a like quality so we want you to get the idea of trying to get good seed wherever you can get them, and then plant and try them out yourself.

I want to introduce to you Mr. Scott U. Stambaugh.