Ruehle. I am also planting some of the DuPuis No. 2 variety, which shows promise as a good quality fruit which may be earlier than Simmonds. It has not been sufficiently tested yet to warrant planting on other than a large-scale experimental basis. I must admit that I am planting one more variety that I cannot recommend. That is Trapp. This obsolete standby of a generation ago has a single qualification besides being of fine eating quality: its flowers are of the B type opening, and all the other summer varieties are A's. I hesitate to plant a solid block of a single flower opening type, so I am mixing a few Trapps with them. If a better B variety, large or small, for the summer months appears I am prepared to topwork all the Trapps to it.

Except for Trapp I believe most of the newer groves in South Florida consist of the varieties I have named. There is more interest in development of new varieties now than there has been for some time, and we may expect several on our present list to be supplanted by better ones before long. It will be interesting to compare this list with a similar one ten years hence. By that time I hope that at least we will have found a replacement for Lula.

A DECADE OF BANANA INTRODUCTIONS

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During the past ten or more years the writer has introduced into Florida a number of banana varieties he believes to be new to this area. Many of these Musa are of Polynesian origin and the novelty appeal of these, as well as some of the other introductions, has resulted in a favorable response from the dooryard grower. It appears they may in time become widespread. This paper will describe these imported varieties and take up their performance under South Florida growing conditions. In discussing the introductions three arbitrary classifications or divisions will be used. The first will be the Hawaiian group to be followed by the plantains and lastly the miscellaneous or those that do not fit into either of the first two categories.

The Hawaiian Group—These Polynesian bananas are of more than passing interest for they possess considerable variation in both form and size. The frequency with which mutations have occurred has probably resulted in the usual and interesting freak forms which exist today. Pope (5) states “According to a manuscript written in 1870, by G. P. Kalokuokamaile, of Napoopoo, Hawaii, fully 70 varieties of bananas were known to the old Hawaiians of the Kona (Island of Hawaii) district, and large areas of the Kona woods were covered with banana plants at one time.” In numerous instances varieties formerly thought to have died out have since been accidentally rediscovered in Hawaii’s remote and relatively inaccessible mountainous areas. Higgins (3) writes “Most of the Hawaiian bananas may be classed in three general groups. These are the Iholena, the Maoli and the Popoulu.” The varieties in these classifications are thought to have existed in the islands prior to Captain Cook’s discovery of Hawaii in 1788. Fortunately many of these interesting Pacific Island bananas appear to be well adapted for growing in South Florida.

‘Huamoa’ or ‘Moa’—A member of the Popoulu group that was introduced in 1960. ‘Huamoa,’ translated from the Hawaiian means “chicken egg,” a term referring to its nearly ball-shaped fruit. Brash (1) reports the fruit reaching 7 inches long by 13½ inches in circumference, as large as the average solo papaya (Carica papaya). It has been found well adapted to Southern Florida where it makes a medium height plant, with a tapering trunk which stands up fairly well in wind without propping. Pope (5) describes the fruit as follows: “Oblong, nearly as great in diameter as in length, about 3½ by 5 inches, very plump at both base and apex; skin golden yellow, very thin; pulp, firm, pinkish yellow; seedless, core, distinct; flavor, sweet and delicious. It may be eaten raw or cooked.” The fruit, if left to mature and ripen on the plant, has a pronounced tendency to split and should therefore be harvested far enough
The short, plump 'Huamoa' variety is reported to attain a 4 inch diameter in Hawaii.

—Photo by Wm. F. Whitman

in advance to avoid this. The size of the stalks vary greatly, at times consisting of only one hand with two or three enormous fruit and on other occasions a fully packed bunch with relatively smaller fingers.

New growth, in a number of instances, has been observed to emerge from young plants in a damaged condition with holes eaten in the unfurling leaves. This is thought to be the work of a cabbage butterfly type caterpillar (Pieris
'Aeae,' an unstable mutation producing all degrees of variegation from pure white to solid green.

—Photo by Wm. F. Whitman

protopodice) that so far has confined its attacks to this single variety. Shepherd (7) wrote referring to the 'Huamoa,' "I put them very close to the plantains, botanically although the girth and bluntness of the fruit is so remarkable."

'Aeae' or 'Koa'e'—This is a highly attractive variegated member of the Maoli group with white striped foliage, trunk and fruit. On the Hawaiian Island of Oahu it is grown as an ornamental where it seldom reaches fruiting size due to what is thought to be an unidentified disease or soil parasite. On the Kona Coast of Hawaii, in the coffee planting districts, it reaches near perfection growing on loose volcanic ash soils. Upon occasion the writer observed the fruit being offered for sale as a cooking banana in Honolulu supermarkets.

In Southern Florida the 'Aeae' has met with only varying success that has prevented its widespread use as an ornamental landscaping
plant. On well drained acid sandy soils with adequate water and fertilizer the writer experienced no difficulty in consistently growing this tall variety to heights reaching 25 feet both inside 63% shade saran cloth enclosures as well as in full sunlight. Under these conditions the 'Aeae' produces heavy, full bunches that frequently require propping up. The longitudinally white striped fruit reaches a length of 7 inches or more. Its outer surface contour has pronounced lengthwise angles that disappear as maturity is approached and it becomes nearly round with blunt, full ends. A thick skin covers the yellow-orange pulp.

The writer has found the 'Aeae' to be an unstable mutation that produces not only variegated suckers but all degrees of mixtures from totally green to pure white. The completely white suckers, lacking chlorophyll, fail to survive while the 100% green form is without the variegated's ornamental appeal. Because of this, care should be exercised in selecting suckers for propagating purposes. While the author brought the 'Aeae' over from Hawaii in about 1954 it is possible that prior introductions existed in Florida at that time.

'Haahaa' or 'Haa'—This dwarf Polynesian member of the Iholena group was introduced in 1960. A low growing variety, it resembles the 'Cavendish' in size with a 6½ foot to 7 foot trunk thus making it well adapted to Southern Florida where wind can be a limiting factor. The medium size, plump in the middle, tapering towards the ends, angular fruit stands out nearly perpendicular to the axis of the bunch. An unusual feature of the banana is that its long-stemmed, moderate size, light green bunches turn yellow a number of days prior to ripening, thus affording an additional ornamental attraction. The pink fleshed fruit can be eaten raw or cooked and when fried is similar in taste to apple fritters. The 'Haahaa' is easy to grow and propping up is usually not required.

'Ulaula'—Brash (1) in reporting on this banana states "The 'Ulaula' is a member of the Iholena family and is identical with the others in the group as to color of fruit, appearance and taste. The only difference is the coloring of the trunk which is reddish like the 'Cuban Red' banana. The mature leaves are bronze on the underside while the young leaves as they unfurl are a very pronounced reddish bronze on both sides. The tree is tall and requires plenty of sunshine, freedom from wind and good fertilization. The bunches are not too big, about 35 pounds, but the plant is beautiful. It is an unknown type found growing in the very end of Punaluu Valley, Oahu (Hawaii). The late Bishop Museum botanist, Miss Neal, named the plant 'Ulaula' which means red."

The 'Ulaula' was introduced into Florida in 1960. While it has fruited here it has not been too successful because of its height and susceptibility to wind damage. It should be grown only in favorably protected locations and be propped up upon fruiting.

'Fehi,' 'Fe'i' or 'Borabora'—Because the 'fehi' is associated with the Polynesians, the writer has included it with the Hawaiian group. However MacDaniels (4) writes "The fe'i might have been brought in by natives in early times, as well as after the discovery of the islands by Cook; but all the evidence considered, the fe'i was apparently introduced into Hawaii by the white man in recent times."

Specimens of the 'fehi' fruiting in Hawaii were observed by the writer with 17 feet of bare trunk from the ground to where the leaves commenced. The stout fruit stalk never bends, causing even mature bananas to point skyward in spite of bunches that can weigh over fifty pounds. The thick-skinned, orange to copper colored ripe fruit can vary considerably in size and shape according to the variety. The orange-yellow colored pulp of the fruit turns to a grayish-yellow when cooked. The author was informed by natives during a year spent in Tahiti, that eating the fresh, unprepared fruit could induce vomiting while the tasty boiled or baked 'fehi' colored the urine a greenish chartreuse color; a fact soon born out by personal experience and much apprehension the first time it occurred.

The 'fehi' was introduced into Florida by the writer prior to 1954 and attempts to fruit it in direct sunlight failed. The plants never attained bearing size in spite of suckering freely. At first, it was thought a soil-born organism prevented normal growth taking place in Florida. This assumption was later disproved when 'fehi' growing in the same location made good development and set fruit after being enclosed in a 20 foot high experimental structure covered with 63% shade saran cloth. The 'fehi' can be identified by its dark purple colored base and the purple red sap or juice that exudes when the trunk is cut.

'Maia Hapai'—In describing this variety
The fruit of the 'Haahaa,' dwarf Hawaiian variety, turns yellow a week or more before ripening.

—Photo by Wm. F. Whitman
'Fehi,' colorful copper colored Polynesian cooking banana. A thick stem enables the axis of the fruit to point vertically upwards.

--Photo by Wm. F. Whitman
Dr. Adrian Brash of Honolulu. Many of the Hawaiian bananas growing in South Florida today came originally from his collection.

—Photo by Wm. F. Whitman
"Dwarf Puerto Rican' plantain fruiting in Dade County.

—Photo by Wm. F. Whitman
Higgins (3) states “This is one of the most curious forms in the islands (Hawaii) for it ripens its fruit within the stem.” In Hawaiian “maia” means “banana” and “hapai” is pregnant so the translation would be “Pregnant Banana.” What is believed to be this freak form was introduced into Florida in 1966. At the time of writing the yet immature plants, which have displayed a marked tendency to sucker, have not born.

The Plantains—With South Florida’s large Spanish-speaking population the plantain should have good possibilities as a dooryard plant whose fruit would supplement those which are imported and sold in the local markets. A limiting factor could be the tendency for fruit maturing during the winter months to be undersized and of poor quality. Simmonds (8) states “The Plantains, in general, are moderately vigorous bananas that are resistant both to Panama disease and Leaf spot; they are very susceptible to attack by borers, however, and it is not uncommon to reap no fruit at all from infested plants.” At the Sub-Tropical Experiment Station heptachlor has been found to control the banana root borer (Cosmopolites sordidus). Red Spider Mites (Tetranychus neocaledonicus, Andre) have been observed to attack plantains, especially during dry weather. Spraying with sulphur or one of the newer mitecides gives good control.

‘Dwarf Puerto Rican’—This low-growing, heavy-bearing variety that was introduced from the West Indies over fifteen years ago is thought to be the most successful plantain currently grown in Florida. Whitman and Biebel (9)
'Williams'—An Australian 'Cavendish' mutation reported to make larger and heavier bunches than its 'Dwarf Cavendish' parent.

—Photo by Wm. F. Whitman
A freak form of Cavendish producing two or more fruiting stems from a single trunk.

Report Popenoe as commenting on the various clones under observation at the Sub-Tropical Experiment Station and stating “The ‘Dwarf Puerto Rican’ plantain fruits better than the ‘Maiden’ plantain or the ‘French’ plantain.” Because it arrived here as an unidentified plantain it acquired its present Florida name by combining two known facts, its source and its size. The correct varietal name is unknown to the author. Normally the plant does not require staking and it can produce bunches with individual fruit weighing up to a pound.

‘Maiden’—This variety has been widely grown in the Bahamas where it is quite successful when planted in pot-holes. Under these conditions it produces large bunches of quality fruit that is smaller and of a slightly finer texture and flavor than the ‘Dwarf Puerto Rican’
plantain. In Florida its performance has been disappointing for it is easily damaged by wind, needs propping up and is a less vigorous grower than the preceding variety. It was introduced from the Bahamas nearly fifteen years ago.

‘Nkonjwa Nshansa’—An East African plantain sport having the same fruit characters as the ‘Moongil’ according to Shephard (6). He goes on to state “It probably differs from ‘Moongil’ only in having its pseudostems heavily suffused with anthocyanin.” Under South Florida conditions it normally makes one hand of very large fruit, roughly a foot in length at floral emergence and increasing to 18 inches or more at maturity. This horn plantain type has no male axis, only a blunt-ended stump showing where this normally would be. It is a tall variety and frequently requires staking. The introduction came from the Banana Board Breeding Research Scheme, Jamaica in 1962.

Miscellaneous—This group will be covered briefly, taking up only those points considered of general interest. The dates listed are those of introduction into Florida.

‘Williams’ (1956)—An Australian ‘Cavendish’ mutation introduced to Hawaii in 1954 by the late Dr. J. H. Beaumont. Simmonds (8) lists this as a synonym for ‘Giant Cavendish.’ Hamilton (2) states “The bunches are usually larger and heavier than Chinese (Dwarf Cavendish) and will require propping to prevent the stem from breaking.” In Florida the fruit is thought to have less tendency towards Cigar-end rot. This may be explained by Simmonds (8) statement ‘It is probably significant that the ‘Dwarf Cavendish,’ which has a more per-
sistent perianth than the taller members of the Cavendish group, is particularly liable to infection.”

‘Double Cavendish’ (1956)—A freak form introduced from Hawaii, producing two or more stalks of fruit from one trunk. Being an unstable mutation, its suckers tend to revert back to the normal single-bunch fruiting forms. Prior to shooting the inflorescence, the excessive number of leaves gives it the appearance of Bunchy-top virus. In Florida up to five stalks have emerged from the top of a single trunk but, as far as is known, the strain is non-existent here today, having reverted back to the normal type.

‘Tisang Radja,’ ‘Pisang Raja’ or ‘Peesang Radja’ (1959)—A thin-skinned, orange fleshed desert banana of the Far East where it is held in high esteem. Under Florida conditions it grows fairly well but can become tall, especially under partial shade. A prior successful importation of this variety had been made by J. J. Ochse before 1959.

‘Lady Finger,’ ‘Sucier,’ ‘Datil’ etc. (1962)—A tall slim-trunked banana producing thin skinned, white fleshed fruit about 4 inches long. Although the flavor is rich and sweet the plants suffer wind damage because of their height. Probably this variety has been previously introduced and may have been allowed to die out. Reports of the existence of ‘Lady Finger’ checked into by the writer turned out to be the ‘Apple’ banana.

‘Lacatan’ (1966)—A strain of ‘Lacatan’ introduced into Hawaii from the Philippines and later brought to Florida by the writer. Presently the plant has a half grown stalk of fruit which is reported to be very sweet.

‘Ice Cream’ (1956)—A banana that looks, grows and tastes like our ‘Orinoco,’ only its immature fruit usually has a bluish white silvery sheen. Introduced from Hawaii where its origin appears to be unknown.

LITERATURE CITED

A SUCCESSFUL METHOD FOR PROPAGATING SAPODILLA TREES

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INTRODUCTION

For many years sapodilla (Manilkara zapotilla (Jacq.) Gilly) trees were known mainly as the source of chicle, the elastic gum which is made from the latex of the bark and which was the main ingredient of chewing-gum. Today manufacturers prefer synthetic ingredients, the supply of which is more dependable, and sapodilla trees are grown in southern Florida and many tropical areas for their fruit and as ornamentals. The sapodilla is a highly savory fruit and lends itself to many dessert uses.

The availability of grafted trees of superior fruiting varieties has always been limited. One reason has been the lack of a practical method of propagation which requires a minimum of labor and time, and is adapted to profitable nursery practices.

This paper describes new methods of handling stocks and scions by which a nurseryman can produce a large number of grafted plants quickly and reliably.

PROCEDURE

Germinating the seed.—Seeds for rootstocks are obtained preferably from vigorous sapodilla trees and if possible from large fruit which contain larger than average seeds. Although