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Proc. Fla. State Hort. Soc. 99:217-219. 1986.

TROPICAL FRUIT CROPS IN FLORIDA—A RAPIDLY CHANGING SITUATION

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Abstract. **During the past few years there has been a remarkable increase of interest in tropical fruit production in Florida. While production of established crops like avocado, banana, Barbados cherry, lime, mango, papaya and plantain has remained nearly static, plantings of many other crops have increased. The greatest production increase has been in atemoya, carambola, guava, longan, lychee, mamey sapote, passion fruit, pineapple and sugar apple. Other fruits being propagated for planting are black sapote, canistel, jackfruit and white sapote. Fruits with potential for the future include akee, ambarella, jaboticaba, Indian jujube, monstera, pitaya, purple mombin, Spanish lime, star apple, tamarind and wampee. Information on cultivars, production practices and marketing is needed for most of these crops. The high interest in new crops has led to consideration of some fruits which are not likely to succeed in Florida because of poor adaptation to the climate. These include babaco, feijoa, kiwi, naranjilla, pepino dulce and tree tomato. The reasons for their poor adaptation are discussed.**

Southern Florida is well known for its diversity of tropical fruits, the result of an active program of plant introduction and research over a long time (1, 2, 3, 4, 5, 6). Changes in importance of the various fruits have occurred gradually through the years as they were affected by changing consumer tastes, foreign competition and climatic events such as freezes.

Remarkably rapid changes have occurred during recent years, however, resulting in the establishment of commercial plantations of many fruits which had previously been cultivated only as home garden plants in Florida. The most important reasons for these changes appear to be an influx of ethnic groups from the American and Asian tropics, an increased demand from affluent consumers in developed countries for new, unusual fruits and the increasing desire and ability of producers in tropical regions to satisfy that demand.

Commercial fruits are defined here as those which are grown in Florida and sold locally or in distant markets. Many of these crops have been growing in the state as dooryard plants for a long time, but they are not well known to the North American public. In that sense they are "new crops". The tropical fruits grown commercially or having potential for commercial production in Florida are listed in Tables 1 and 2, with their common and scientific names and the estimated area of production.

The objective of this paper is to describe the present status of tropical fruit production in Florida and to discuss possibilities for the near future.

Well-Known Fruits with Static Production

Avocado, lime and mango have been the most important tropical fruits in Florida for a long time, but almost

Table 1. Tropical fruits produced commercially in Florida.

Common name	Scientific name	Origin	Estimated acres of production
Atemoya	*Annona* hybrids	USA, Israel, etc.	30
Avocado	*Persea americana*	Trop. America	12,500
Banana, plantain	*Musa* hybrids	Trop. Asia	350
Barbados cherry	*Malpighia glabra*	Trop. America	25
Carambola	*Averrhoa carambola*	SE Asia	150
Guava	*Psidium guajava*	Trop. America	50
Lime	*Citrus* x 'Tahiti'	USA	7,000
Longan	*Euphoria longana*	SE Asia	60
Lychee	*Litchi chinensis*	China	200
Mamey sapote	*Calocarpum sapota*	Trop. America	300
Mango	*Mangifera indica*	Trop. Asia	2,900
Papaya	*Carica papaya*	Trop. America	350
Passion Fruit	*Passiflora edulis*	S. America	35
Pineapple	*Ananas comosus*	S. America	250
Sapodilla	*Manilkara zapota*	Trop. America	30
Sugar apple	*Annona squamosa*	Trop. America	60

Table 2. New tropical fruit crops with potential for commercial production in Florida[z].

Common name	Scientific name	Origin
Akee	*Blighia sapida*	Africa
Ambarella	*Spondias cytherea*	So. Pacific
Black sapote	*Diospyros digyna*	Trop. America
Canistel	*Pouteria campechiana*	Trop. America
Indian jujube	*Zizyphus mauritiana*	Trop. Asia
Jaboticaba	*Myrciaria cauliflora*	S. America
Jackfruit	*Artocarpus heterophyllus*	Trop. Asia
Monstera (ceriman)	*Monstera deliciosa*	Mexico
Pitaya	*Cereus* spp.	Trop. America
Purple mombin	*Spondias purpurea*	Trop. America
Spanish lime (mamoncillo)	*Melicoccus bijugatus*	Trop. America
Star apple (caimito)	*Chrysophyllum cainito*	Trop. America
Tamarind	*Tamarindus indica*	Africa
Wampee	*Clausena lansium*	China
White sapote	*Casimiroa edulis*	Trop. America

[z]Currently produced in home gardens.

Florida Agricultural Experiment Station Journal Series No. 7670.

no new groves have been planted recently. Competition in the United States market from the great volume of fruit produced in California discourages new plantings of avocado in Florida. No new lime groves are being planted because prices have been low for some time, partly as a result of competition from fruit from Mexico. Mango planting is at a standstill as well because of competition from fruit produced in Mexico, Haiti and other countries of the tropics.

Production problems discourage expansion of papaya plantings. Papaya ringspot, a viral disease, is a serious limiting factor to production even when growers plant the 'Cariflora', a new cultivar tolerant to the disease. Papaya fruit fly causes major damage to fruit in most years. The situation is similar with the sapodilla. There is a demand for the fruit among Latin American and Asian ethnic groups, but infestation by the Caribbean fruit fly ruins the fruit and discourages growers from planting new groves.

Banana, plantain and Barbados cherry have been grown and marketed in southern Florida for a long time. The fact that few new plantings are being made suggests a limited demand for the fruit and that local production may not be economically competitive with production and importation from the tropics.

It is not likely that the crops in this category will be increasing in the near future unless major changes occur in competition from other areas or advances are made in control of diseases or pests which limit production.

Fruits, With Increasing Importance

Greatest expansion has occurred in planting of carambola and longan, encouraged by great demand for the fruit and good prices. Increases have occurred also in planting of atemoya, lychee, mamey sapote, passion fruit and sugar apple. One company has established a large plantation of pineapple with the objective of producing high-quality fresh fruit for the U.S. market. Other growers are expressing interest in additional planting of pineapple.

Insects and diseases cause major problems in atemoya, sugar apple and guava production. Irregular bearing causes problems in marketing of longan and lychee. Fruit production of passion fruit is limited by self-incompatibility and lack of sufficient pollinating insects. Time of flowering of pineapples is more difficult to control in the Florida climate than in tropical areas, making timing of fruit production less dependable.

In spite of the problems it seems certain that planting of these fruits will continue in the near future. The most difficult question for growers to answer is that of how much planting can be done before the volume of fruit depresses the price to the point of unprofitability.

New Fruits Being Propagated For Grove Planting

Black sapote, canistel, jackfruit and white sapote are now grown and sold only in small quantity. Demand for the fruit has encouraged potential growers to order plants from local nurseries and to make plans for establishing groves.

Superior cultivars of jackfruit from Southeast Asia are available, although untested in Florida. Some cultivars of white sapote have been selected in California and Florida, but little research has been conducted to evaluate their performance. A few local selections of black sapote and canistel have been made, but much more work is needed for reliable evaluation of their performance.

The white sapote has considerable cold tolerance and could be planted in areas where frost occurs frequently. Black sapote, canistel and jackfruit are easily injured by low temperature and should be planted only in the warmest areas of Florida.

Planting of the crops in this group must be considered highly speculative at this point. The next few years will show what sort of possibility they have for this area.

Fruits With Potential For the Future

A large, diverse group of tropical fruits appears to have potential for the future based upon demand for the fruit, which is now produced only in small quantity. No orchards of these crops exist, so the supply comes from plants growing in home gardens and along roadsides and fence rows. Akee, ambarella, Indian jujube, Spanish lime and tamarind are medium to large trees. Jaboticaba, purple mombin and wampee are small trees under Florida conditions. Monstera and pitaya are vines used primarily as ornamental plants, but now useful also for their fruit.

A few superior selections of some of these fruits have been propagated vegetatively, but otherwise little research has been done in Florida or elsewhere. Only a small amount of cultural information is available from other countries of the tropics. It is difficult to predict the future of these fruits, but some of them are likely to be planted more extensively in the next few years.

Fruits Not Well Adapted To Florida

Some fruit crops which are receiving much attention in the world evidently are not well adapted to the climate of southern Florida and should not be recommended for commercial planting here. They are discussed in this paper to answer the frequent questions from Florida growers about their suitability.

The kiwi (*Actinidia chinensis*) is adapted to cool subtropical and warm temperate climates. It is a deciduous vine which for successful flowering and fruiting requires much more winter chilling than occurs in peninsular Florida. It has been tried in all parts of the state and no plantings have been succcessful.

The feijoa or pineapple guava (*Feijoa sellowiana*) also requires some exposure to cool weather for successful flowering, although not as much as the kiwi. In southern Florida feijoa plants bloom well only after cold winters, so it would not be commercially successful in this area unless cultivars are found which require less exposure to cool weather. In central and northern Florida the feijoa flowers and fruits more dependably, perhaps well enough to be considered for commercial planting. Both kiwi and feijoa withstand freezing weather well.

The babaco (*Carica* hybrid), naranjilla (*Solanum quitoense*), pepino dulce (*Solanum muricatum*) and tree tomato (*Cyphomandra betacea*) have been planted in southern Florida repeatedly, but have not performed well. These are crops of the tropical South American highlands, best adapted to a climate which is cool but frost-free. They do not tolerate either prolonged high temperatures or temperatures below freezing. The plants grow fairly well dur-

ing the cooler part of the year in Florida. During the prolonged warmer time of the year they grow poorly and do not bloom and set fruit well. These species are not destined to be commercial crops in Florida unless cultivars are developed which are adapted to this climate.

General Considerations

The fruits discussed for commercial cultivation in Florida are primarily tropical crops and do not survive severe freezes. Low air temperatures which occur during December, January and February in Florida are the most important limiting factor to their distribution. Commercial production can be considered feasible only in the warm parts of the southern coastal region and at a few locations near bodies of water in the interior. Even there, some form of frost protection will be necessary during unusually severe freezes. Some small-statured tropical crops could be grown in greenhouses further north in the state, but their fruit would have to sell for a very high price to make this economically feasible.

Problems of production are many. Good cultivars are lacking for many species, so improvement programs are needed. Problems of mineral nutrition occur, but can be solved with the use of available technology. Various pest and disease problems are known and others are suspected. All of them are difficult to deal with because control measures either have not been developed or lack government approval for use.

Some species, such as black sapote, mamey sapote and jackfruit, have proved to be difficult to propagate. Satisfactory rootstocks need to be developed for atemoya and sugar apple. Good methods of propagation are basic to any horticultural industry, so this subject needs much research. Plants of many tropical fruits are difficult to find in quantities sufficient for commercial planting because nurseries do not keep large inventories on hand. Growers should make arrangements for plants well ahead of the proposed planting date.

Conclusions

Interest of consumers in the United States and other affluent countries for new and unusual fruits is at an all-time high. Growers are responding with a strong effort to satisfy the demand. This has led to experimentation with many new crops and renewed interest in some which have been known for a long time.

Information on cultivars, production practices and marketing is limited or nonexistent for many of these crops. Growers and researchers must work together to develop the necessary information because funding for such work is very limited.

Some of the tropical crops grown in Florida already are successful and others are almost certain to succeed. Some probably will fail to become commercial crops. Many of these crops are highly speculative and growers should make only small plantings until they are certain that the crops can be grown successfully.

It is not possible to predict accurately the future of these new tropical fruit crops in Florida, but their progress during the next few years is sure to be interesting and stimulating.

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Proc. Fla. State Hort. Soc. 99:219-221. 1986.

CURRENT STATUS OF LYCHEES AND LONGANS IN SOUTH FLORIDA

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Abstract. **Lychee, *Litchi chinensis* Sonn., and longan, *Euphoria longana* Lam., have become increasingly more important in South Florida in the past 10 years. Currently, there are 100 acres of lychee and 60 acres of longan planted in Dade County with 75 and 50 acres, respectively of each to be planted this coming year. The main commercial cultivars of lychee are 'Brewster' and 'Mauritius', while 'Kohala' remains the only cultivar for longan. Trees are propagated almost exclusively from airlayering and will usually begin production after 3 years. Trees of both are planted at densities ranging from 50 to 140 trees per acre. Lychee and longan trees may attain great size and mechanical pruning is a necessity. Mature trees may produce as much as 300-500 pounds of fruit per tree in a good season. However, alternate bearing is a problem and the production is rarely sustained for successive years. As more acreage is planted, harvesting, handling and marketing will become critical.**

Lychee and longan acreage in South Florida has been on a steady increase since 1975. Many factors have contributed to this increase. Among them are: 1. Interest in alternative fruit crops to avocado and limes; 2. Greater demand for exotic and ethnic foods by consumers; 3. The lure of high returns for fruit; and 4. A shift in the climatic zones where these trees can be successfully grown.