

ripens. Ripe fruit held at room temperature stay firm and edible for an unusually long time after harvest. Limited trials indicate a relatively long life in refrigerated storage as well.

Discussion

This mango has been held in high regard around Valledupar, Colombia, for a long time. Traditionally the trees were grown from seed and the fruit was consumed primarily in the local area. Gradually growers and handlers realized that the 'Vallenato' had many characteristics which could make it desirable in the rapidly-developing international commerce in mango fruit. Among these were good, consistent fruit production, excellent skin color, firm flesh texture, long storage and shelf life, disease resistance, freedom from internal breakdown, and excellent flavor. Other favorable characteristics were vigor and precocity of grafted trees and wide climatic adaption.

The obvious undesirable characteristic is the small size of the fruit. Most cultivars in international commerce have fruit of 400 to 600 g weight, while fruit of 'Vallenato' weigh about 250 g. This has caused many growers to become doubtful about the commercial possibilities of this cultivar. It is possible that fruit size could be increased substantially by thinning

of the fruit on the tree at early stages of development, but no research has been done to determine the effectiveness of this method or its economic viability.

The 'Vallenato' mango has not been grown on a commercial scale long enough to enable growers and researchers to evaluate many aspects of its production. In Colombia there are several hundred hectares of orchards of grafted trees, but most of them are less than 10 years of age. In Florida there are only a few trees in cultivar collections. A few trees exist in other countries, but they are young. The 'Vallenato' has a tendency to make multiple blooms during the year, suggesting that it would be amenable to treatments which would initiate off-season bloom, allowing growers to take advantage of lucrative market windows. The feasibility of this remains to be determined.

Whether it becomes an important commercial cultivar or not, the 'Vallenato' is a good addition to any mango collection, because of its outstanding genetic characteristics. As interest grows in the world toward breeding of better mango cultivars, such genetic resources will become more valuable. The 'Vallenato' will also be a good cultivar for cultivation in the home gardens of Florida and other places where mango cultivation is an interesting and productive hobby.

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CARAMBOLA CULTIVARS IN FLORIDA

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Abstract. The carambola, *Averrhoa carambola* L., is grown in home gardens and commercial orchards in warm parts of southern Florida. There are currently about 650 acres of orchards in Florida. The main commercial cultivar is 'Arkin'. 'B-10' and 'Kary' are also grown commercially to a small extent. Brief descriptions are given for 'Dah Pon', 'Demak', 'Fwang Tung', 'Golden Star', 'Hart', 'Hew 1', 'Kajang', 'Lara', 'Maha', 'Sri Kembangan', 'Tea Ma', and 'Thai Knight', which are grown in home gardens and germplasm collections. Cultivars introduced recently for evaluation are 'B-2', 'B-6', 'B-8', 'B-11', 'B-16', 'B-17', 'Cheng Chui', 'Erilin', 'Kyra', 'Leng Bael', 'Miss', 'Pasi', 'Waiwei', and 'Wubentou'.

The carambola has been a popular home garden fruit in Florida for a long time, because of its good adaptation to the climate and the distinctive shape of the fruit. In recent years it has also been grown as a commercial crop (Campbell et al., 1985; Knight, 1989). There are presently about 650 acres of commercial orchards of grafted trees in the warmest regions of the state (J. H. Crane, personal communication). A few car-

ambola cultivars have originated in Florida, but the majority have been introduced from other countries. The purpose of this paper is to list the cultivars currently grown in the state and to describe their fruit characteristics.

Descriptions

The cultivars for which information is available are listed in Table 1, with data on their fruit characteristics. The 'Newcomb' and 'Thayer' are not included in the table because they appear to be identical to the 'Golden Star'.

Discussion

The 'Arkin' is the principal commercial cultivar in Florida. There is also some production of 'Kary'. A small amount of fruit of 'B-10' is sold, usually mixed with fruit of 'Arkin'.

Cultivars which are grown in home gardens or in germplasm collections include 'Dah Pon', 'Demak', 'Fwang Tung', 'Golden Star', 'Hart', 'Hew 1', 'Kajang', 'Lara', 'Maha', 'Newcomb', 'Sri Kembangan', 'Tea Ma' and 'Thayer'. Recent introductions which are being evaluated include 'B-2', 'B-6', 'B-8', 'B-11', 'B-16', 'B-17', 'Cheng Chui', 'Erilin', 'Kyra', 'Leng Bael', 'Miss', 'Pasi', 'Waiwei', and 'Wubentou'.

Carambola growers in Florida have a strong interest in selecting cultivars superior to the ones currently under cultivation. They should have success, considering the great diversity

Table 1. Characteristics of carambola cultivars.

| Cultivar | Origin | Fruit size ^a | Color ^a | Flavor | |
|---------------|-----------|-------------------------|--------------------|--------|--------|
| | | | | Sugar | Acid |
| Arkin | Florida | med | yo-o | high | low |
| B-10 | Malaysia | med | yo-o | high | low |
| Dah Pon | Thailand | sm-med | py | medium | low |
| Demak | Indonesia | med | o | medium | low |
| Fwang Tung | Thailand | lg | py | high | low |
| Golden Star | Florida | med | yo | medium | medium |
| Hew 1 | Malaysia | med-lg | yo-o | high | medium |
| Kajang | Malaysia | med-lg | yo-o | high | medium |
| Kary | Hawaii | med | yo-o | high | medium |
| Maha | Malaysia | lg | py | medium | low |
| Sri Kembangan | Malaysia | med-lg | yo-o | high | medium |
| Teau Ma | Thailand | med | my | medium | low |
| Thai Knight | Florida | med | yo-o | high | medium |

^aFruit size; sm = small, med = medium, lg = large.

^aColor; py = pale yellow, my = medium yellow, y = yellow, yo = yellow-orange, o = orange.

of genetic characteristics in the existing cultivar collections and the relative lack of work of work done to date on selection within Florida.

Literature Cited

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CONTROL OF POSTBLOOM FRUIT DROP ON 'TAHITI' LIME BY FOLIAR APPLICATIONS OF FOLICUR

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Abstract. *Colletotrichum acutatum*, which causes postbloom fruit drop (PFD), continues to be a problem for lime growers in Dade county, Florida. The recommended treatment for *C. acutatum* control remains a combination of Benlate and Carbamate at bloom and continued through petal drop. The fungus *C. acutatum* is resistant to Benlate but still provides control when combined with Carbamate. Folicur at 4 and 6 oz alone, and combined with Carbamate at 1.5 lb per acre, when applied as a protective spray, reduced the number of buttons and provided significant control of PFD caused by the fungus *C. acutatum*.

Postbloom fruit drop (PFD) was first noted on 'Tahiti' lime, *Citrus aurantifolia* (Christm) Sw., in Dade and Lee Counties, Florida in 1983 (McMillan and Timmer, 1989). The disease is known to occur in Argentina, Belize, Brazil, Colombia, Dominica, Panama, Venezuela, Peru, Ecuador, Guatemala, Costa Rica, El Salvador, Mexico, and Trinidad (Denham, 1988; Fagan 1984, and personal observations by the author). Until PFD occurred in Florida, most of the studies concerning this disease were conducted in Belize. In 1971, Fagan

(1971) mentioned that PFD had been observed in Florida, but there is no other documentation of those observations. The only disease similar to PFD, noted for the first time in 1960 by C. W. Campbell TREC, Homestead, was the persistence and enlargement of the calyxes in limequat. To date, the disease occurs in limes, as well as on other citrus in Dade, Lee and other citrus growing Counties in Florida (McMillan and Timmer, 1989; Timmer, 1990).

The first symptoms of PFD in 'Tahiti' limes are small reddish-brown necrotic spots on the open petals. These necrotic spots coalesce, with the petals becoming hard and dry and persist several days beyond normal petal fall for health flowers. Young 'Tahiti' lime fruit, 0.5 cm or less in diameter, first show a faint yellowish discoloration and rapidly abscise, leaving the calyxes and stalk intact. The calyx, instead of abscising may remain green for a year or more. The young diseased fruit are also distinguished by the persistence of the stigmas and styles. Profuse fungal growth is noted along the persisting styles. Dissected young fruit show a faint brownish internal discoloration at the stem end. The fungus most consistently isolated from the petals, styles and young fruit from Dade and Lee Counties was *Colletotrichum acutatum* and subsequently identified in 1988 and genetically in 1991 and 1996 as a specific strain of *C. acutatum* (McMillan and Timmer, 1988; Liyanage et al., 1991; Brown et al., 1996).

The amount of fruit loss due directly to PFD is not known, however, there were estimates of losses of 200 to 300 boxes per acre per year.

In Dade County the groves near the East Everglades were found to have high incidence of PFD. In one lime grove which Moss and McMillan (1989) evaluated for PFD disease