

## THE KWAI MUK, A TROPICAL FRUIT TREE FOR SOUTHERN FLORIDA

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**Abstract.** The kwai muk, a fruit tree native to southern China, is little known in southern Florida although it has been grown here since 1927. The trees in Florida were introduced as *Artocarpus hypargyreaus* Hance ex Benth., but may be *A. lingnanensis* Merr. This small, handsome tree has a dense, rounded canopy and grows best in full sun. The small leaves are dark green and leathery, and are retained on the tree throughout the year. The tree grows well in the soils and climate of southern Florida. Small trees are easily injured by frost, but mature trees will survive brief exposure to temperatures of 25-26°F.

The fruit is ovoid to globose, 1.5-2 inches in diameter, with a yellow, finely pubescent surface. The soft pulp is orange-red in color, with a melting texture and a pleasant, subacid flavor. The fruit matures from August to October. The fruit usually is eaten fresh, but also can be preserved with salt, with sugar syrup or by drying. This tree should be planted more extensively in gardens of southern Florida because of its attractive appearance and its useful, palatable fruit.

Several species of the genus *Artocarpus* are valued for their edible fruit in the tropics. The breadfruit and the jackfruit are the best known of these. Another, the kwai muk, has proved to be well adapted for cultivation in southern Florida. The plant was first introduced to Florida as *Artocarpus hypargyrea* Hance (1); the name was later modified to *A. hypargyreaus* Hance ex Benth. (2). It now appears that the plants here may be of a closely related species, *A. lingnanensis* Merr. (6, J. Popenoe, Fairchild Tropical Garden, personal communication).

The kwai muk is from China, where its native range includes southern Kwangtung Province, Hainan Island and Hong Kong. It has been introduced to other areas of the tropics, primarily in botanical gardens and experiment stations, but is not well-known outside its native area.

The kwai muk was first introduced to Florida in 1927 (1), but is still little known or planted here. The tree has attributes which recommend it for cultivation in home gardens in the state. The purpose of this paper is to describe the kwai muk and bring it to the attention of growers of tropical fruit in Florida and elsewhere.

### Description

The kwai muk tree grows to a height of 45 ft in China (6); mature trees in Florida generally attain a height of 20-25 ft. The following description is based on observations of trees growing in Dade County, Florida. The canopy is rounded and dense, with a width approximately equalling its height (Fig. 1). The tree retains its leaves throughout the year and has an attractive appearance at all times.

The leaves are simple, elliptic to elliptic-ovate, 3-6 inches long, with a stiff, leathery texture, acuminate tips and entire



Fig. 1. Ten-yr-old kwai muk tree.

margins (Fig. 2). They are shiny and dark green on the upper surface and dull medium green on the lower surface; both surfaces are glabrous. The stems, leaves and green fruits exude a white, sticky latex when they are cut or broken.



Fig. 2. Leaves and fruit of kwai muk.

The yellowish male and female flowers are borne in solitary, axillary, obovoid, separate inflorescences on the same tree. The minute flowers are joined and the inflorescence develops into a multiple fruit, a syncarp. Flowering occurs from May to July.

The fruit have a diameter of 1.5-2 inches and a weight of 0.5-1.5 oz. Fruit shape is irregular, being globose, ovate, or oblate (Fig. 2). The skin is thin and easily broken. It is yellow at ripeness and covered with a fine, soft, short pubescence. The pulp is orange-red to red, very soft and tender, with a pleasant subacid flavor. The fruit ripens from August to October. No yield records are available, but mature trees have the capability of producing 2000 fruit or more per year.

The fruit have 1-7 seeds, the number apparently affecting the size and shape of the fruit. Isolated trees often bear many small, seedless fruit, suggesting that the tree is self-

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incompatible and needs cross-pollination to produce viable seed and fruit of normal size. The seeds are whitish and ovoid, with a diameter of 0.3-0.4 inch.

Propagation has been done in Florida entirely by seed. Seed take several weeks to germinate and the young plants grow slowly. No research has been done on cultivar selection or vegetative propagation in Florida.

### Cultural Requirements

The observations in this section have been made on kwai muk trees growing at various locations in southern Florida.

*Soils.* The tree is well adapted to most Florida soils. It grows especially well in the mildly acid sandy soils and maintains a dark green leaf color throughout the year (3). Trees grow relatively well in the limestone soils also (7), but sometimes have leaf chlorosis from deficiencies of iron, zinc and manganese. The problem is most likely to occur in young trees, disappearing as the trees attain larger size and a greater distribution of roots. The deficiencies are easy to correct with foliar sprays of zinc and manganese and soil applications of iron chelates. No other research has been done on fertilizer requirements. Trees grow well when maintained on a fertilizer program such as that used for citrus trees in home gardens.

*Water.* The tree grows best in well-drained soils, but will survive brief flooding of the root system without apparent injury. For best growth young trees should be irrigated during hot weather at times when rain does not occur for several days. Well-established trees appear to need irrigation under Florida conditions only during extended dry periods, which can cause leaf drop and limb dieback if the trees do not receive water.

*Temperature.* Cultivation of the kwai muk is limited to the warm parts of southern peninsular Florida because of susceptibility to freeze injury. Young trees have leaf and branch injury at air temperatures of 28-30°F and are likely to be killed at lower temperatures. Large trees survive brief exposure to air temperatures of 25-26°F with injury only to leaves and small twigs, but are damaged severely or killed by temperatures in the low 20s (4, 5, 8). Mature trees at Homestead survived the worst freezes of recent decades, in 1958 and 1977, with only damage to leaves and small branches (4, 5). Trees growing in Central Florida were killed in the 1962 freeze, when air temperatures reached 20°F or below (8).

*Pests and diseases.* No pests or diseases are recognized at this time as causing significant damage to kwai muk trees in Florida. It should be recognized, however, that existing plantings consist of only a few trees growing at widely separated locations, a situation not conducive to the development of pests and diseases. This situation could change if large plantings were made.

*Spacing and pruning.* The tree grows and fruits best in

full sun. Mature trees have canopies with a diameter of 20-25 ft, so for best results they should be given that much space in garden or orchard plantings. Shading of the canopy invariably reduces fruit production. Trees grown in light shade will still have attractive dark green leaves, but will not have as compact a canopy as trees grown in full sun.

The tree develops a symmetrical, compact canopy without pruning. Pruning is necessary only to remove dead branches or to decrease the height or width of the tree.

### Uses of The Tree and Fruit

The kwai muk tree is slow-growing and relatively small. The canopy develops an attractive shape without pruning. The tree retains its dark green leaves throughout the year and leaf drop is very light. These characteristics make the tree a good one for landscaping of small urban properties.

The fruit must be completely ripe for fresh consumption; unripe fruit exudes a white, sticky latex when the skin is broken. The ripe fruit has an excellent flavor and is good for fresh consumption in the local production area. The fruit has best quality when ripened on the tree, but it also can be harvested in the mature-green stage and ripened at room temperature. Mature-green fruit ripens in 1-3 days, so shipping would be difficult. No experiments have been reported on storage of this fruit.

The fruit can be preserved with salt, with sugar syrup or by drying. The dried fruit has a good texture and flavor (B. A. Campbell, Homestead, personal communication).

### Conclusions

The kwai muk is well adapted to the environment of southern Florida. The tree is small and attractive and lends itself well to landscaping on small urban properties. The tree bears a good, useful fruit and deserves to be more widely grown in Florida.

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