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The Potential of New *Mangifera* Species in Florida

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Following over a decade of investigation into a number of Southeast Asian *Mangifera* species, some preliminary recommendations are possible for South Florida. *Mangifera odorata, M. casturi, M. lalijiwa, M. laurina,* and a putative *M. odorata/M. foetida* hybrid have been grafted successfully on 'Turpentine' rootstock. Resulting trees have been grown in the field at Fairchild Tropical Botanic Garden for a decade. All of these species have bloomed and fruited with reasonable reliability over this time. In addition, many of the *Mangifera* species have shown potential as ornamentals due to their profuse, showy bloom panicles. These species have withstood temperatures as low as 29 °F for more than 5 hours with only minimal damage. Additional investigation is necessary, but *Mangifera* species also have shown a high degree of anthracnose tolerance under Florida conditions. The fruit of each species is unique in terms of color, appearance, and eating quality, and all have potential as fresh fruit given proper selection of clones with superior fruit quality.

In Southeast Asia there is a wide diversity of *Mangifera* species bearing edible fruit, with 69 taxonomically recognized (Kostermans and Bompard, 1993). Among these species, *Mangifera indica* is the most important commercial fruit crop, being vital to domestic and international commercial markets. Two decades ago Kostermans and Bompard (1993) outlined their potential as edible fruit crops, rootstocks, and as sources of genetic diversity for the future breeding of disease resistance, and desirable horticultural traits in the modern mango. The importance of conserving these species and their genetic potential has been clearly recognized by the scientific community. However, after their taxonomic description, little has been done to advance these goals and there remains a lack of practical horticultural information about their care and domestication.

More than 12 *Mangifera* species from Borneo, peninsular Malaysia, Thailand, and Australia have been accessioned into the genetic collections of Fairchild Tropical Botanic Garden in Coral Gables since 1994. These wild mangos are part of the efforts of FTBG to introduce new fruits to South Florida for commercial, estate, and home garden horticulture (Campbell and Ledesma, 2002). These species were introduced as improved selections or clones of each species where possible; however, information about potential graft compatibility of each species was not readily available in this hemisphere and there have been many failures in establishment. The objective of this work is to detail our experience with *Mangifera* species that holds promise for South Florida as new ornamental, home garden, and estate agriculture crops.

Mangifera Species Studied

Mangifera species with edible fruit were identified and collected from private residences, commercial orchards, and public and private experimental farms in peninsular Malaysia; Sarawak and Sabah, Malaysia, and Brunei Darussalem on the island of Borneo; Australia; and Thailand. The species collected were *M. caesia, M. casturi, M. foetida, M. griffithii, M. lalijiwa, M. merillii, M. laurina, M. odorata, M. pajang, M. pentandra,* and *M. zeylanica* and several undetermined species. For *M. casturi, M. odorata*, and *M. pajang,* multiple clonal selections were collected on the basis of their superior fruit characteristics. These particular species were chosen for study due to their importance in this region, their fruit characteristics, and their tolerance of extreme weather conditions.

Clonal propagation (veneer grafts) of *M. caesia, M. foetida,* and *M. pajang* was ultimately unsuccessful, making it impossible to evaluate their potential in Florida. *Mangifera casturi, M. laurina, M. odorata, M. pentandra,* and *M. zeylanica* grafted on *M. indica* had success rates similar to *M. indica* grafted upon itself (80% to 100%). Scions of these species began to grow within 2 weeks of grafting and had good vigor. Graft unions healed normally with no visual signs of incompatibility. Trees have been growing in the field for more than 5 years with good vigor, flowering, and fruiting.

Mangifera zeylanica, or kaddu-ma, is a slow-growing tree in South Florida, forming a tight canopy with small, light-green leaves. The blooms are cream to off-white in color, compact, and rather inconspicuous. The fruit average 150 g; they have a thin skin and a watery, sweet, and pleasant flavor. Trees of a single accession of kaddu-ma collected in the Seychelle Islands have been grown for decades in South Florida on *M. indica* 'Turpentine' rootstocks. Additional accessions should be introduced to investigate improved fruit quality.

Mangifera odorata, called kuini, has also been in South Florida for over 50 years, but there has been only a single accession introduced from an unknown source. The tree is vigorous, forming an open canopy with large, deep green leaves and bright red new growth. The flower panicles are large, bright red, and highly ornamental. Fruit average 325 g and are from green to a canary yellow at maturity, with a rich, sweet flavor and slightly fibrous flesh. The fruit have an intense, earthy aroma, lending the name of the durian mango to the fruit. Fruit quality of kuini is dependent on the nitrogen status of the tree, with low nitrogen trees producing fruit of yellow skin color, less fiber, and higher

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Fig. 1. Putative *Mangifera odorata*/*M. foetida* cross growing at Fairchild Tropical Botanic Garden.

Brix. This same response to nitrogen might be found with the other species.

A putative *M. odorata*/*M. foetida* hybrid, called Rampagni (Fig. 1) for the experiment station in Sarawak, Malaysia, where it was collected, has performed well in the field for more than 7 years. The tree is similar in appearance to kuini, although the leaves are smaller, more rigid, and the growth habit is more spreading. The new growth and the inflorescences are a bright red color and highly ornamental. The fruit are larger than those of kuini and are more yellow at full maturity.

Mangifera laurina, or mangga aer, is vigorous and forms an upright, tight canopy with medium-sized light green leaves. The bloom panicles are pale white and conspicuous. The fruit are green to light yellow at maturity, and the clone currently under evaluation averages 300 g. The flesh is watery and sweet, with a strong resinous aftertaste. The tree closely resembles the common mango (*Mangifera indica*) in appearance and growth habit.

Mangifera casturi, or kastooree, is a vigorous tree that forms a tight, upright canopy with shiny, dark green leaves contrasted with bright red new growth. The trees do not readily flower in South Florida, but this may be the result of the presence of several clones of kastooree introduced from Australia. The clones within our collections have not flowered in more than 7 years within the field, although other trees from distinct sources have flowered with reasonable regularity. The fruit are produced in large racemes of 10 or more. They are small and fibrous, with a juicy, sweet flavor.

Mangifera griffithii, or rancha rancha, has been propagated with *M. casturi* as an interstock. The tree is compact and has small, leathery leaves with prominent venation. The new growth is a pale red, forming a beautiful contrast to the dark green color of the canopy. We have had no fruiting in South Florida. The fruit are small, produced in bunches, and are generally considered of good flavor, albeit fibrous.

Fig. 2. *Mangifera pajang* and *Mangifera caesia*.

Mangifera lalijiwa (laleejewo) and *M. merilli* have also been grafted with the aid of interstocks of *M. casturi*. Both of these species are too young for a proper discussion of their characteristics. All species have grown with good vigor and have no apparent environmental limitations. All species were subjected to nights (3 to 4 h) of 29 to 32 °C with no apparent twig or leaf damage.

The results reported here are preliminary and are for only nine of the 69 described species of *Mangifera* in Southeast Asia. If we are to address the potential of these species as marketable crops (fruit, fresh greens, and herbs), rootstocks, or breeding material, the graft compatibility and horticultural traits must be further evaluated under a wide range of conditions. Additionally, other species must be evaluated and suitable rootstocks identified. In this way we can begin to collect improved clones that will better serve our horticultural needs.

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