The Fruit Growers of Southwest Florida

OCTOBER 2020

Dr. Stephen Brady will be the speaker at the October 20th meeting of the Collier Fruit Growers. He will speak on the history, selective pruning, and care of mangoes. Dr. Brady is well known as a local authority on fruit growing and nationally known as a world fruit hunter. Since planting his first mango tree as a child, Dr. Brady has had passion for growing tropical fruits. A retired physician with an undergraduate degree in Botany, Stephen has a collection of approximately 600 fruit trees surrounding his Naples home. He is one of several local fruit enthusiasts featured in the 2012 documentary 'The Fruit Hunters," which follows the search for exotic cultivars by preservationists around the world.

Collier Fruit Growers Meeting: TUESDAY, October 20, 2020.
A tasting table starts at 7:00 pm.
The meeting starts at 7:30 pm.
Life Center, Tree of Life Church
2132 Shadowlawn Dr., Naples, FL 34112
Please always observe the wearing a face masks and social distancing guidelines.

THIS MEETING WILL NOT BE STREAMED LIVE ON FACEBOOK

For those persons who cannot attend, or do not feel safe attending the Collier Fruit Growers' meeting pertinent information on Dr. Brady's presentation will be linked to the CollierFruit.org website.

What a year! Slowly, things are returning to 'normal,' if there is such a thing. People are being encouraged to get out and enjoy themselves safely. In the interest of meeting with fellow members once again, Collier Fruit Growers will discontinue live streaming of its meeting, starting in October 2020.

Please, please, please, if you have the least bit of a temperature, or have any of the SARS COV 2 symptoms, as recognized by the CDC, please stay home and self-isolate.

Bonita Springs Tropical Fruit Club Meeting
will be OCTOBER 13, 2020.
Workshop: Tuesday, OCTOBER 27, 2020.
Revive Wellness Center, 3521 Bonita Springs Blvd., Bonita Springs, FL 34134
Please always observe the County's Mask Mandate
and social distancing guidelines.

RECIPES OF THE MONTH:

Mango Beef & Rice

Serves four persons

This is a great recipe for those that may still have fresh or frozen mango slices left from this year's season.

1 lb. sirloin steak
1 green pepper in strips
1 medium onion, chopped
2 Tbsp. vegetable oil
2 cups water
¼ cup soy sauce
1 cup uncooked rice
1 ripe mango, peeled & sliced
½ cup sliced almonds, toasted

1 Partially freeze steak, slice across the grain into ¼ inch thick strips.
2 Sauté the meat, green pepper & onion in the vegetable oil in a large skillet over medium-high heat until meat is browned, stirring often.
3 Add water, soy sauce & rice, bring to boil, stir well.
4 Arrange mango slices over the top of the rice mixture, cover, reduce heat and simmer for 20 minutes or until rice is tender.
5 Sprinkle with almonds and serve.

Avocado Lime Sorbet

This recipe from savvyvegetarian.com was prepared as part of an Avocado 101 Class taught by Chief Raben at the Naples Botanical Garden in 2015.

½ to 1 cup sugar
1 Tbsp. lime zest
2 cups ripe avocado (about 3 fruits)
2/3 cup fresh lime juice (about 3 limes)
1 cup water

1 Process sugar and zest in food processor for 2 minutes.
2 Add avocado, lime juice and water, and process until smooth.
3 Strain mixture and discard solids.
4 Cover the bowl and freeze for 2 hours.
5 Return to food processor, and process until smooth.
6 Repeat freezing and blending two more times, then freeze for one to eight hours.

Best if served within 24 hours.

Constructing a Propagation Mist House

Serious growers need to invest in the construction of a mist house for propagation of seeds and rooting of cuttings where nearly a constant humid environment is required. A minimum area of six by six feet is deemed adequate for most individual and small commercial growers. A mist house consists of two major elements, that of the enclosure and irrigation system.

Enclosure:

Start by constructing an elevated planting bed surrounded by a minimum five-inch high boarder, lined with 6-mill thick clear plastic vapor barrier. Next install the distribution piping grid as described below, before fully filling a bed with loose potting soil mixed with perlite.

Construct a tubular aluminum tent-frame over the planting bed, a looped top, a minimum of four-feet high. Allow for one or two access openings at either end as may be required. Provide a rigid frame using small aluminum angles for mounting of door at either/both ends of the mist house. Cover tightly with plastic sheeting, making sure that all seams are fastened tightly together and sealed, making them nearly airtight. Provide framed access door(s) with flexible door seals.

Irrigation System:

On top of the vapor barrier, install a symmetrical distribution grid of 1/2-inch diameter PVC plastic pipe, with equally spaced spray risers on approximately 30-inch centers. The top of each of the risers should terminate with a threaded female connection. All the risers need to be set at the same elevation. Provide threaded bushings as necessary to reduce the pipe size to match the spraying/fogging nozzles selected. [Fill the distribution system with water which seek its own level, thus determining the exact top level of each risers.] Install low velocity spraying/ fogging nozzles with integral stainless-steel inlet screens. The nozzles can be obtained from AGRIsales, Inc. for about $1.50 each.

Providing an adequate timed water supply is a challenge. Select an appropriate controller, such as a Galcon six station indoor irrigation, misting, and propagation controller, model 8004 AC-6S which can be purchased for around $85.00. The 'S' suffix designation on this controller is very unique that it can be programed in the 'cyclical program mode' during which the electric solenoid actuated diaphragm zone valve opens for an adjustable set period of time, as short as five seconds, every five minutes (both settings are adjustable), up to 23 hours-59 seconds daily. The settings will also need to be adjusted seasonally based on the anticipated peak outdoor temperate and length of daylight. The controller requires a 24 Vac power source and as it is suitable only for indoor mounting, a weatherproof enclosure will need to be provided. Mounted inline after the zone valve, a minimum 60 mesh mini strainer should be provided to protect the spray nozzles from becoming clogged.

If city domestic potable water is used as a water source, install the activated carbon filter with replaceable cartridges to remove all residual chlorine from the water. If well water is utilized, provide a water softener/demineralizer. With surface (lake or canal) water used as a water source, provide both an intake roughing filter & 20 mesh 'prefilter' and a small demineralizer or reverse osmosis system, as may be necessary to remove contaminants [It is best to have the surface water tested for impurities].

Instructional Videos:

Jim Putman (HortTube) has filmed four episodes, starting with "Backyard Plant Propagation 1 - Starting A New Greenhouse" on YouTube [https://www.youtube.com/watch?v=RGa54SHfnTI], describing how he constructed a backyard propagation mist house. Disregard the reference to 'snow load,' and note that Jim's lightweight frame structure will not withstand high winds.

The Tippling Point | The Great Vine Blight: How Taking American Vines to Europe Decimated French Vineyards

The Vikings saw a lot of tough-rooted vines in the New World. So, when the European colonisers came and settled in America, the first thing they did was to bring European vines from the Continent to make their poison.

Manu Remakant

Updated: February 10, 2019

It was the best of times for French wine. Though the English had already become ardent fans of the drink for quite a long time, wine turned sour on its long journey across the English Channel. Moreover, the prestigious Champagne, the topmost elixir from Southern France behaved like virtual molatov cocktail that would burst at the slightest pressure.

But everything got solved with the invention of corks and sturdy glass bottles. So it was the best of times for the French wine.

With no more worries, the French industry looked cockily into a bright future. Then in 1863 vine growers in the country noticed a curious thing happening around them. They were shocked and clueless. Grapevines were dying. Impossible! They took a closer look at the plants that were wilting as if they had caught the plant-form of tuberculosis.

It could be some invisible bugs, they guessed, but where did they suddenly arrive from!

One thousand years ago in America. The barbaric invaders from the North, the Vikings, saw a lot of tough-rooted vines in the New World. But the fruits tasted yucky. So when the European colonisers came and settled in America, the first thing they did was to bring European vines from the Continent to make their poison. The experiment failed as the frail vines from their homeland across the Atlantic could not stand the extreme conditions in America. Now the colonisers took the other way around. Why not take the American vines to Europe to see whether their taste would improve in the new soil?

By sending the American vines to the Continent, all that the colonisers intended was to seek a solution; they hardly knew they were sending home the problem as well.

Phylloxera, a plant lice, an aphid, hardly visible to human eye, and that which was obstinately stalling the European vine from taking root in America hitherto, was now on a new mission. It was crossing the ocean as a stowaway, or as a green Dracula buried deep inside the innocent-looking American vines.

Once the aphid landed on the Continent, especially in France, the homeland of vines, it dug its teeth deep into the rich spread of vine roots and leaves all around. Plants wilted by millions. The rampage began.

In a period of barely 15 years, almost half of French Vineyard were decimated with the rest teetering on the brink. The French economy was badly hit with thousands of grape growers thrown out of business and even from their vineyards which now looked like desert lands. Wages were cut to less than a half. In order to tide over the crisis of an international wine deficit, some traders resorted to using cheap sugar syrup and other adulterants and pressed it to do the work of wine. That drove a deep nail in the coffin of whatever reputation wine still salvaged from the wreck. People now were unsure of picking the original from the spurious wines that flooded the market.

For the first time ever since the emergence of wine, people began to turn their attention to other drinks like absinthe and whiskey.

The authorities sprang to action. More than 6 million acres of vineyards were destroyed to kill the blight. Many growers in a state of panic banked upon weird methods to save their vineyards. Some buried toads under each vine, and some others let their poultry into the vineyard hoping they would find their meat in the insects. Phylloxera prevailed.

Meanwhile, a few scientists who had found that the killer had arrived from America now zeroed in on a solution. Even with this blight for many centuries, if America still had vineyards, there could also be a solution for the

(The Tipping Point / The Great Vine Blight - Continued)

problem that arrived from there, they guessed. What about grafting European vines to aphid-resistant American rootstock and create new vines?
Well, the solution worked like magic. The reconstitution of the vineyards was a slow and tiresome process, but the growers had no other option. The French wine industry was rebuilt from the vine root up.
The devil of the genie, named Phylloxera was finally put back in the bottle, but that doesn't mean the threat has disappeared forever. In 1983, phylloxera struck again in California, sending shivers down the spine of grape growers all around the world. With bitter memories and lessons from the past, they worked hard and could somehow tide over the crisis.
The only question that remains now is: did wine taste better before grafting?
There are places which remain unaffected by the Great Vine Blight of the nineteenth century [i.e., a small area in Italy] Could they answer the question? The purists hardly think so. Because the best vineyards of the yesteryears were mostly in France. They had all gone through the fire.
(Manu Remakant is a freelance writer who also runs a video blog - A Cup of Kavitha - introducing world poetry to Malayalees. Views expressed here are personal)

LEASEHONEY

In 2015 Ms Gianna Whitver, of the Tampa Bay area, first thought of how she could start a business, an AgTech firm, to connect beekeepers who need places to keep their bees with landowners interested in tax savings. To help foster those connections Gianna created 'LeaseHoney,' a web portal, a matchmaking site and finally a website for a real marketplace platform.
LeaseHoney has a nationwide mission to help beekeepers grow their businesses, help landowners
make under-utilized land productive, and help famers pollinate their crops. Unaffected by the pandemic, LeaseHoney's users now include people in about 32 states and who numbers are continually increasing.
New marketing tools are in the works to provide additional value for users of the website.

Fruits which Ripen in October:

Atemoya, banana, Barbados cherry, carambola, carissa, coconut, fig, guava, jackfruit, kwai muk, macadamia nut, miracle, fruit, monstera, Otaheite gooseberry, papaya, passion fruit, peanut butter fruit, pomegranate, Spanish lime, guanabana (soursop), strawberry tree, sugar apple.

Annual fruits: beans, eggplant, hot peppers, okra, cherry tomatoes, winter squash (Cushaw/ Seminole pumpkin), watermelon

Floral morphology of seven *Mangifera* species

N. Ledesma[1], R.J. Campbell[1], H.W. Poor[1], J.J. Figueroa[1] and S. Zona[2]

[1]Fairchild Tropical Botanic Garden, 10901 Old Cutler Road, Coral Gables, FL 33156, USA; [2]Florida International University, 11200 SW 8th St, Marc 510, Miami, FL 33199, USA.

Abstract

A study was conducted on *Mangifera casturi*, *Mangifera lalijiwa*, *Mangifera rubrapatela*, *Mangifera odorata*, *Mangifera* sp. 'Tenom', *Mangifera zeylanica*, and *Mangifera* sp. 'Rampagni' grown at the Fairchild Tropical Botanic Garden living collection located in Homestead, FL, USA. These species are part of a *Mangifera* species collection that currently consists of 40 accessions collected from or native to Brunei Darussalem, Cambodia, Indonesia, Malaysia, Thailand, and the Philippines. There exists limited information on bloom morphology of wild mango relatives, and most information in the literature was derived from herbarium specimens. Information collected includes color, petal number, hermaphrodite/male ratio, aroma, and panicle architecture. The study was conducted from 2012 to 2015. Evaluations of flower morphology were done during January to May. Inflorescences were randomly selected from each tree, photographed and drawn for evaluation of flowering morphology structure of the seven species. In terms of floral morphology, they all have differing percentages of hermaphrodite and male flowers; have four to six petals; range in color from cream to white, burgundy and red; have aromas from lilacs to jasmine; and show variable panicle branching patterns. *M. casturi*, *M. lalijiwa*, *M. rubrapetala*, *M. zeylanica* and *Mangifera* sp. 'Tenom' have more hermaphrodite flowers than *M. odorata* and *Mangifera* sp. 'Rampagni'. Hermaphrodite to male ratios were greater in these two species in both years. The relationship between hermaphrodite and male flowers is discussed, as well as the ramifications for breeding and fitness as parents for crosses with *Mangifera indica*.

INTRODUCTION

Mango (*Mangifera indica*) has been cultivated for thousands of years in India (Gangolly et al., 1957), and there has been extensive work on the mango for the past century both in Asia and in the Western Hemisphere. However, at least 69 species of edible *Mangifera* are recognized in Southeast Asia (Kostermans and Bompard, 1993), and several of these species have been locally important for both subsistence and economic impact in their communities for centuries (Ledesma and Campbell, 2014). These species have seen little or no research or production emphasis, and have experienced significant degradation of genetic resources (Bompard, 1993). If these species are to be preserved and they are to have an impact on modern fruit production and sustainability in both Asia and the Americas, a fundamental understanding of these *Mangifera* species is essential.

We have been collecting and assembling a living collection of *Mangifera* species for 25 years at Fairchild Tropical Botanic Garden (Campbell and Ledesma, 2013). This living collection, growing side by side under controlled field conditions, will allow for the study and characterization of important phenological aspects of each species. This is essential for developing a baseline of species phenology, given that these *Mangifera* species, in habitat, may flower and/or fruit only once every 15 years or more.

The objectives of this study were to begin the development of baseline information on floral morphology to aid present and future breeding efforts with *Mangifera* species and the development of these species as crops in their own right. This work is possible only because these species are growing side by side within a single collection under standard commercial growing conditions.

MATERIALS AND METHODS

Mangifera species used in this study were grown at the Williams Grove Genetic Facility of the Fairchild Tropical Botanic Garden, located in Homestead, FL, USA (25.47°N, 80.46°W). The trees were planted in the field and maintained according to standard cultural practices of South Florida. In all cases, the *Mangifera* species were grafted on *M. indica* 'Turpentine' rootstocks, with several different species of interstocks (Campbell, 2004). Blooming of the *Mangifera* species occurred naturally from November to April. No bloom induction was used with the trees in the study. During the two blooming seasons of this study, we had multiple flowering events in most of the species.

Floral morphology

For each species, five inflorescences were randomly selected from each tree. Inflorescences were collected when the panicles were fully open. Panicles and flowers were photographed and drawn. Pictures were used to study the structure of the flower: in particular, color, petal number, stamen number; size of the flower, percentage of males, females and hermaphrodite flowers, and other floral morphology characters. Pictures and fresh samples were used to support the botanical illustration of each species. Flowers were collected for future reference and were kept at the Fairchild Garden herbarium in liquid media.

Measurements of flower number and type (male and hermaphrodite)

Ten inflorescences were randomly selected from *M. casturi*, *M. lalijiwa*, *M. rubrapetala*, *M. odorata*, *Mangifera* sp. 'Tenom', *Mangifera* sp. 'Rampagni' and *M. zeylanica*. After all the flowers opened, the hermaphrodite and male flowers were counted. The number of male and hermaphrodite flowers in each of the inflorescences was determined and the percentage of hermaphroditic flowers was calculated.

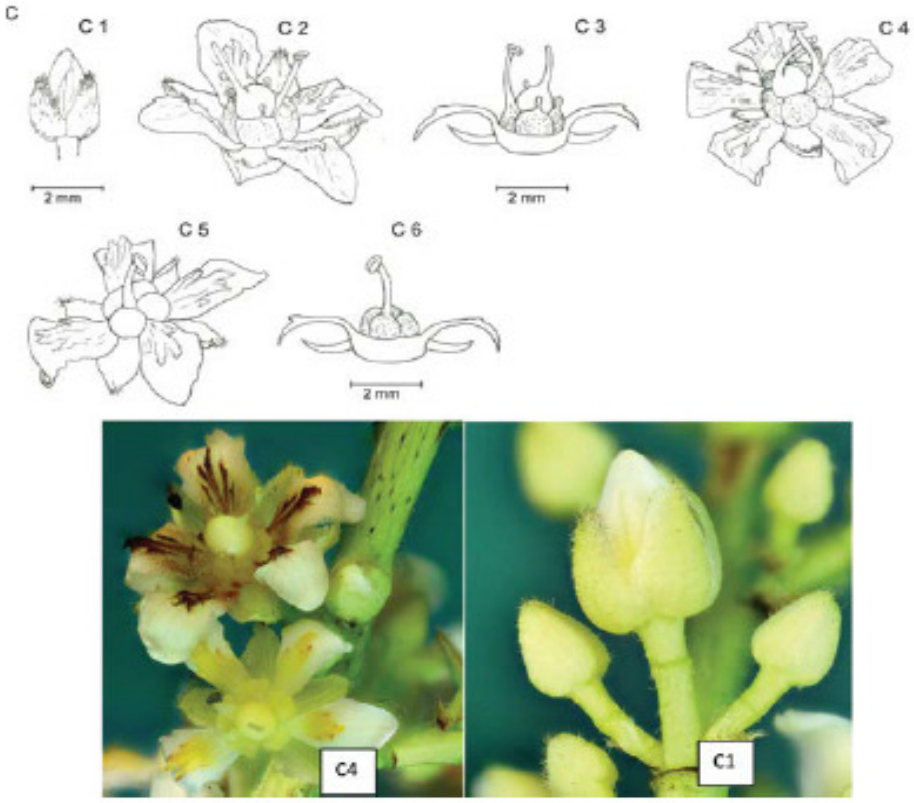


Figure 1. *Mangifera casturi*. C1, flower bud; C2, hermaphrodite flower with four sepals, four petals, one fertile stamen, three stamoides and one pistil; C3, hermaphrodite flower (side view); C4, hermaphrodite flower with five sepals, five petals, one fertile stamen, no stamoides and one pistil; C5, male flower with four sepals, four petals, one fertile stamen, no stamoides and pistil; C6, male flower (side view).

RESULTS

Mangifera casturi (Figure 1)

Panicles terminal, 21-30 cm long, branched to six orders, pubescent with short hairs; branches numerous, flowers in cymes, the central flower of each cyme is bisexual; flanking flowers are staminate, pedicel 1.0-1.2 mm long. Flowers rotate, 8.4-8.9 mm across. Sepals four or five, triangular, 2.5-3.2 mm long, 1.6 mm wide, margins hyaline, hispid pubescent on abaxial surface. Petals five, ovate, 3.5-4.4 mm long, 2.1-2.2 mm wide, with three yellow crests in the center of each petal; the center crest is larger than the two flanking crests. Nectar disk torus-shaped, unequally lobed, 1.4-1.5 mm long, 2.6-3.4 mm in diameter. Stamens one or two, filament 2.2-2.4 mm long, awl-shaped, anthers 0.6-0.7 mm long and 0.5-1.7 mm wide; staminodes (in pistillate flowers) two or three, minute and bearing rudimentary anthers. Ovary globose, 1.1-1.3 mm long, 1.3-1.6 mm in diameter, glabrous, style 1.2-1.6 mm long, curved.

Additional comments

M. casturi is a vigorous tree that forms a tight, upright canopy with shiny, dark green leaves, contrasted with bright red new growth. Although inconsistent in flowering, the tree is well adapted to our climate and the leaves, blooms and fruit are tolerant of anthracnose, but can be susceptible to powdery mildew.

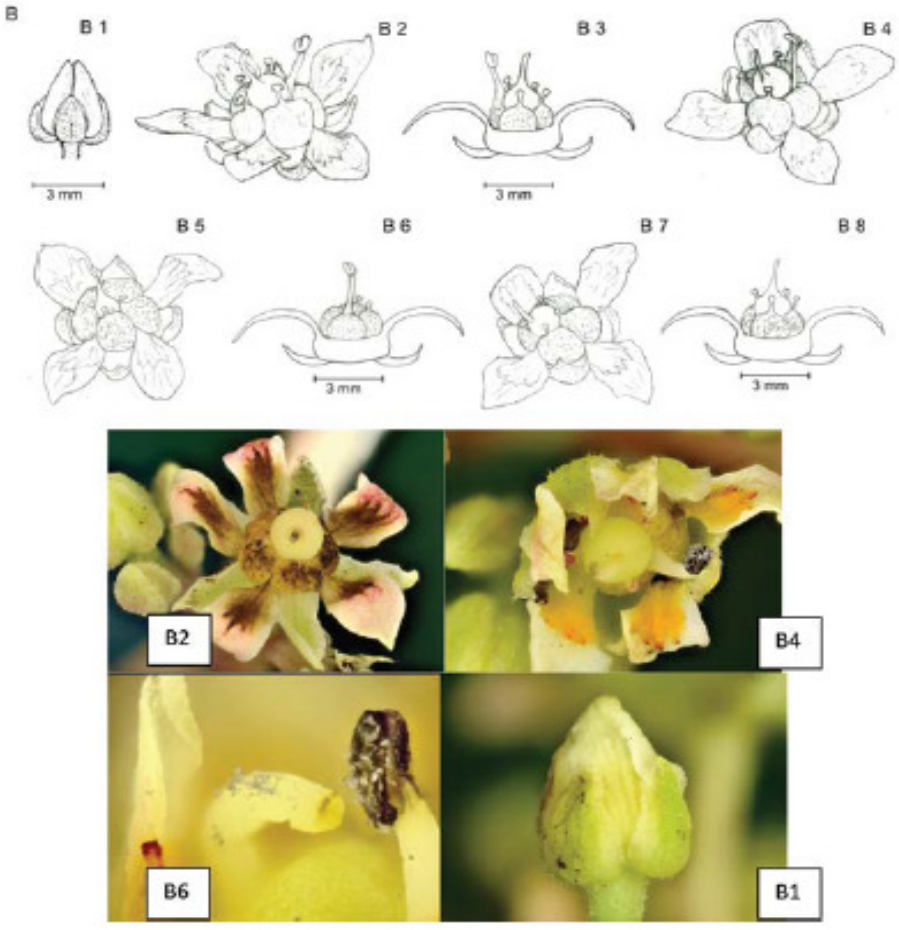


Figure 2. *Mangifera lalijiwa*. B1, flower bud; B2, hermaphrodite flower with five sepals, five petals, one fertile stamen, four stamoides and one pistil; B3, hermaphrodite flower (side view); B4, hermaphrodite flower with four sepals, four petals, one fertile stamen, three stamoides and one pistil; B5, male flower with four sepals, four petals, one fertile stamen, two stamoides and no pistil; B6, male flower (side view); B7, female flower with four sepals, four petals, one pistil, four stamoides and no fertile stamen; B8, female flower (side view).

Mangifera lalijiwa **(Figure 2)**

Panicles terminal, 40-42 cm long, branched to five orders, mostly glabrous; few branches, flowers in cymes, the central flower of each cyme is bisexual; flanking flowers are staminate, pedicel 1.0-1.1 mm long. Flowers rotate, 8.3-8.8 mm across. Sepals four or five, triangular, 2.4-3.2 mm long, 1.5 mm wide, margins hyaline, hispid pubescent on abaxial surface. Petals five, ovate, 3.5-4.3 mm long, 2.0-2.2 mm wide, with three yellow crests in the center of each petal; the center crest is larger than the two flanking crests. Nectar disk torus-shaped, unequally lobed, 1.4-1.4 mm long, 2.5-3.4 mm in diameter. Stamens one or two, filament 2.2-2.4 mm long, awl-shaped, anthers 0.6-0.7 mm long and 0.5-1.6 mm wide; staminodes (in pistillate flowers) two or three, minute and bearing rudimentary anthers. Ovary globose, 1.1-1.3 mm long, 1.3-1.5 mm in diameter, glabrous, style 1.2-1.5 mm long, curved.

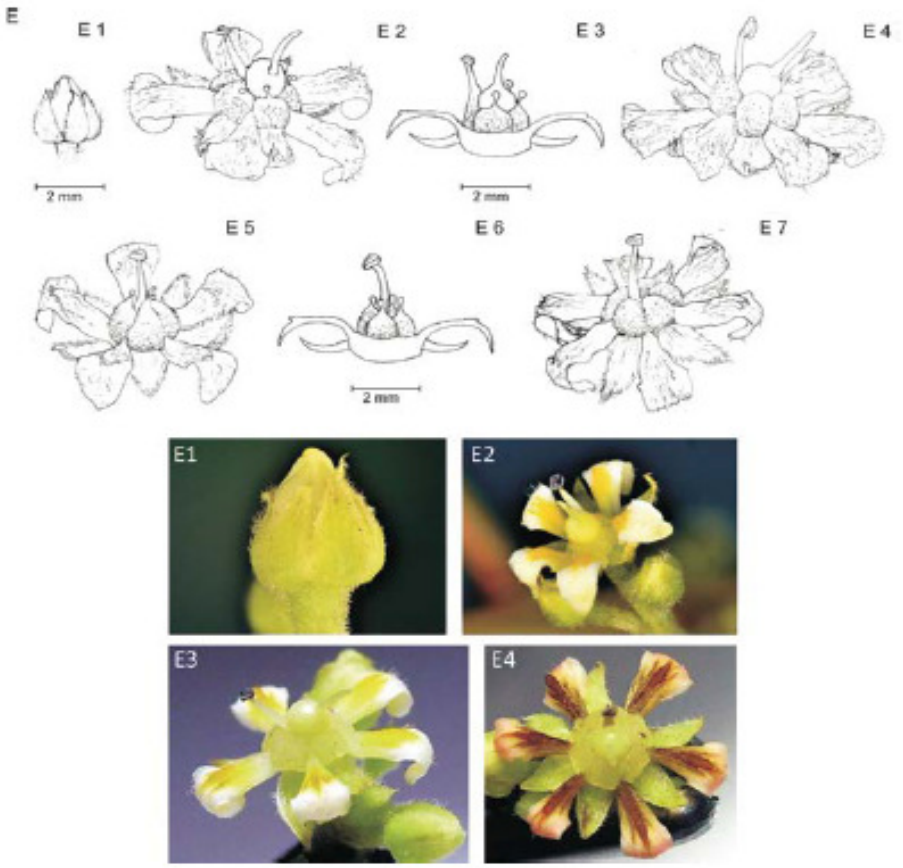


Figure 3. *Mangifera rubrapatela*. E1, flower bud; E2, hermaphrodite flower with five sepals, five petals, one fertile stamen, three stamoides and one pistil; E3, hermaphrodite flower (side view); E4, hermaphrodite flower with six sepals, six petals, one fertile stamen, no stamoides and one pistil; E5, male flower with five sepals, five petals, one fertile stamen, three to four stamoides and no pistil; E6, male flower (side view); E7, male flower with six sepals, six petals, one fertile stamen, one stamoides and no pistil.

Mangifera rubrapatela **(Figure 3)**

Panicles terminal, 30-32 cm long, branched to five orders, pubescent with long wispy hair; numerous branches, flowers in cymes; pedicel 3.2-3.6 mm long. Flowers rotate, 6.0-7.0 mm across. Sepals five, ovate-triangular, 1.9-2.5 mm long, 1.1-1.4 mm wide, margins entire, hispid pubescent on abaxial surface. Petals five, spreading to reflexed, elliptical, 3.0-3.5 mm long, 1.4-1.5 mm wide, with trident-shaped (three-pronged) yellow crest in the center of each petal; the crests are more or less equal in prominence. Nectar disk divided into five equal lobes alternating with the petal insertion, 0.9-1.0 mm long, 2.3-2.5 mm in diameter. Stamen one, filament 1.6-1.8 mm long, awl-shaped, anthers about 0.7 mm long and 0.5-0.6

mm wide; staminodes absent. Ovary globose, 1.0-1.1 mm long, 1.2-1.4 mm in diameter, glabrous, style 1.4-1.6 mm long, straight.

Mangifera zeylanica **(Blume) Hook.f. (Figure 4)**

Panicles terminal, 29-31 cm long, branched to five orders, pubescent with long, coarse hair; branches numerous, flowers in cymes, the central flower of each cyme is bisexual; flanking flowers are staminate, pedicel 1.6-2.0 mm long. Flowers rotate, 5.0-7.0 mm across. Sepals five, triangular, 2.3-2.7 mm long, 1.3-1.3 mm wide, margins hyaline, hispid to pilose pubescent on abaxial surface and apex. Petals five, ovate to elliptical with undulate margin and apex strongly reflexed, 3.8-4.0 mm long, 1.6-1.9 mm wide, with three indistinct yellow crests in the center of each petal. Nectar disk blocky, five-lobed, 1.2-2.2 mm long, 1.2-2.1 mm in diameter. Stamens one or two, filament 2.2-2.6 mm long, awl-shaped, anthers 0.7-0.8 mm long and 0.5-0.6 mm wide; staminodes (in pistillate flowers) two or three, minute. Ovary globose, 1.5-1.6 mm long, 1.4-1.8 mm in diameter, glabrous, style 2.0 mm long.

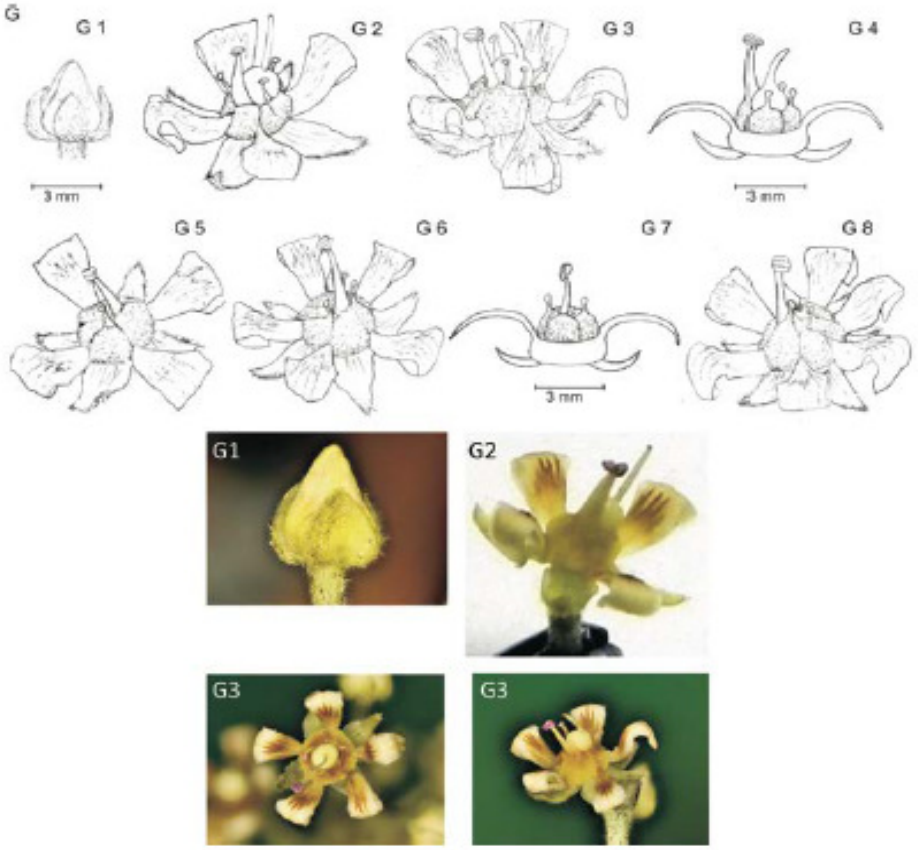


Figure 4. *Mangifera zeylanica*. G1, flower bud; G2, hermaphrodite flower with four sepals, four petals, one fertile stamen, three stamoides and one pistil; G3, hermaphrodite flower with five sepals, five petals, one fertile stamen, four stamoides and one pistil; G4, hermaphrodite flower (side view); G5, male flower with four sepals, four petals, one fertile stamen, one or two stamoides and no pistil; G6, male flower with five sepals, five petals, one fertile stamen, one to three stamoides and no pistil; G7, male flower (side view); G8, male flower with six sepals, six petals, one fertile stamen, four stamoides and no pistil.

Mangifera odorata **(Figure 5)**

Panicles terminal, 30-31 cm long, branched to six orders, glabrous to lightly pubescent; branches numerous, flowers bisexual or staminate, pedicel 1.0-1.6 mm long. Flowers campanulate, 3.5-4.0 mm across. Sepals five, triangular, 2.0-2.5 mm long, 1.3-1.5 mm wide. Petals five, strongly reflexed, elongate oval, with convolute apex, 5.0-5.4 mm long, 2.0-3.0 mm wide, with three, indistinct yellow crests in the center of each petal. Nectaries present as

small, triangular callosities on the abaxial side of the filaments, 1 mm wide at base and 0.6 mm long, adpressed to filament. Stamen one, filament 3.7-4.0 mm long, awl-shaped, anthers 0.9-1.0 mm long and 0.5-0.6 mm wide; staminodes (in pistillate flowers) two or three, staminodes present, to 2 mm long. Ovary globose, 1.1-1.5 mm long, 1.0-2.0 mm in diameter, glabrous, style 3.0-3.2 mm long.

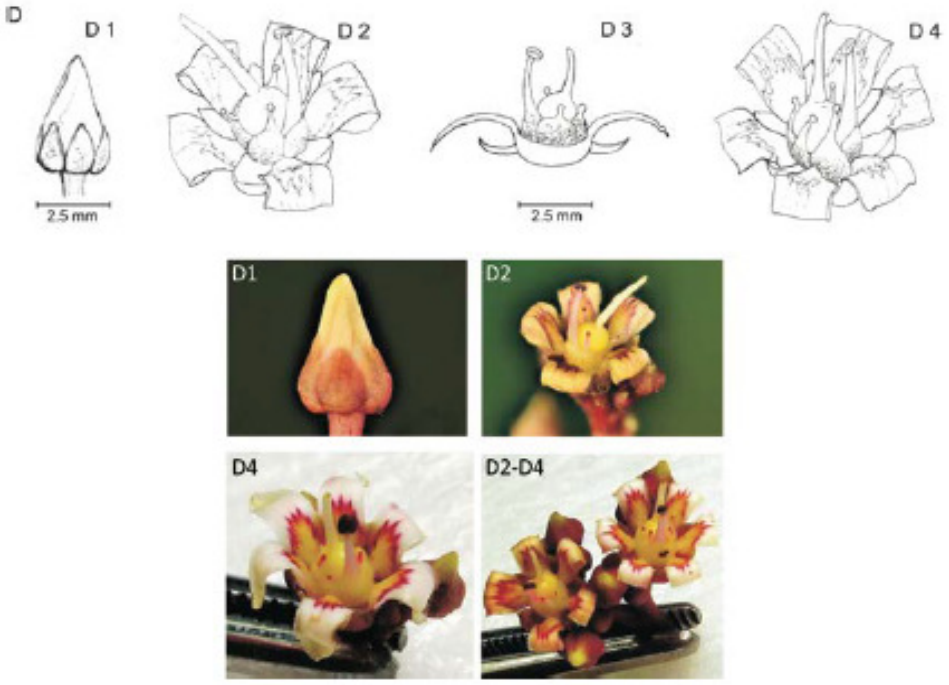


Figure 5. *Mangifera odorata*. D1, flower bud; D2, hermaphrodite flower with five sepals, five petals, one fertile stamen, three stamoides and one pistil; D3, hermaphrodite flower (side view); D4, hermaphrodite flower with six sepals, six petals, one fertile stamen, four stamoides and one pistil.

***Mangifera* sp. 'Tenom' (Figure 6)**

Panicles [terminal/axillary], 29-31 cm long, branched to five orders, [glabrous/pubescent] [hair type]; branches [few/numerous]; flowers in cymes, the central flower of each cyme is bisexual; flanking flowers are staminate, pedicel 1.0-1.6 mm long. Flowers rotate, 5.0-6.0 mm across. Sepals four or five, ovate with acute apex and three prominent veins, 1.6-2.2 mm long, 1.0-1.6 mm wide, hispid pubescent on abaxial surface. Petals five, elliptical with undulate margins, 3.0-3.8 mm long, 1.8-1.9 mm wide, with three yellow crests in the center of each petal; the center crest is larger than the two flanking crests and is inserted in between lobes of the nectary. Nectar disk torus-shaped, five-lobed, 1.2-1.6 mm long, 2.1-3.0 mm in diameter. Stamen one, filament 2.0-2.5 mm long, awl-shaped, anthers 0.7 mm long and 0.5 mm wide; staminodes (in pistillate flowers) one to three, minute. Ovary globose, 1.0-2.0 mm long, 1.3-2.4 mm in diameter, glabrous, style 1.2-1.5 mm long.

***Mangifera* sp. 'Rampagni' (Figure 7)**

Panicles terminal, 32-33 cm long, branched to six orders, glabrous; branches numerous, flowers bisexual or staminate, pedicel 1.3-1.8 mm long. Flowers campanulate, 4.0-4.5 mm across. Sepals five, triangular, 2.4-2.8 mm long, 1.5-1.7 mm wide, hispid pubescent on abaxial surface. Petals five, strongly reflexed, elongate oval, with convolute apex, 5.1-5.5 mm long, 2.0-3.0 mm wide, with three, indistinct yellow crests in the center of each petal. Nectaries present as small, triangular callosities on the abaxial side of the filaments, 1 mm wide at base and 0.7 mm long, adpressed to filament. Stamen one, filament 3.7-4.1 mm long, awl-shaped, anthers 0.9-1.0 mm long and 0.5-0.6 mm wide; staminodes (in pistillate flowers) two or three, staminodes present, to 2 mm long. Ovary globose, 1.1-1.6

mm long, 1.0-2.0 mm in diameter, glabrous, style 3.0-3.3 mm long.

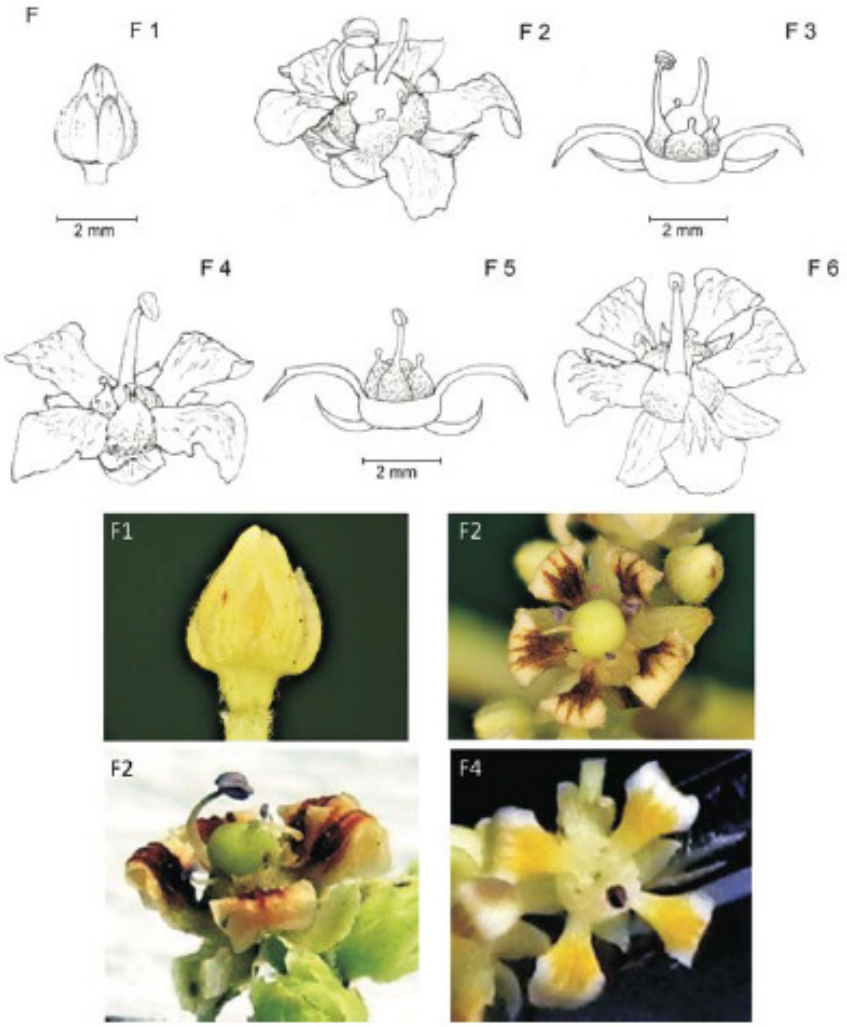


Figure 6. *Mangifera* sp. 'Tenom'. F1, flower bud; F2, hermaphrodite flower with five sepals, five petals, one fertile stamen, three or four stamoides and one pistil; F3, hermaphrodite flower (side view); F4, male flower with four sepals, four petals, one fertile stamen, one or two stamoides and no pistil; F5, male flower (side view); F6, male flower with five sepals, five petals, one fertile stamen, three or four stamoides and no pistil.

DISCUSSION

Among the seven species of *Mangifera* studied here, there are obvious gross morphological differences in the tree and panicle architecture, length, color and aroma, allowing one to differentiate between species in the field (Table 1). In contrast, the primary structure and composition of the flowers among the species is similar to the naked eye. The flowers are composed of four to five sepals and four to five petals (Table 2), with petal size and color differing among species. The color range of the petals is from white to cream, yellow, pink or burgundy, and combinations thereof. There are differences among the species in pubescence of the rachis and the sepals.

Mangifera sp. 'Rampagni' and *M. odorata* were separated from the other species in appearance, architecture and aroma. The two of them had the biggest flower buds among the species. In case of color, both *Mangifera* sp. 'Rampagni' and *M. odorata* were red, while the others were white, cream or yellow. There is evidence in the literature that both of these species could possibly be hybrids of *Mangifera foetida* and *M. indica* (Eiadthong et al., 2000); however, the authors do not believe that the data presented are conclusive based on sampling error and identification of genetic standards used in previous studies. For our

study, we consider both *Mangifera* sp. 'Rampagni' and *M. odorata* to be species.

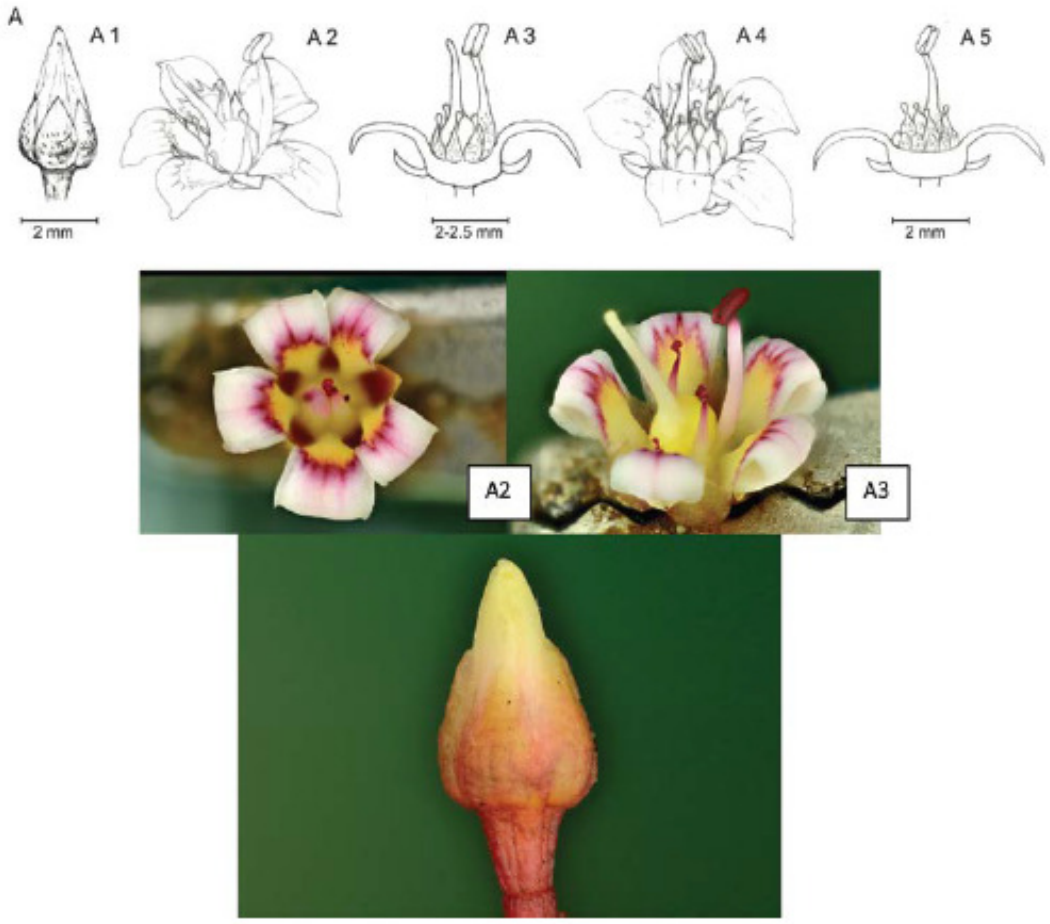


Figure 7. *Mangifera* sp. 'Rampagni'. A1, flower bud; A2, hermaphrodite flower with five sepals, five petals, one fertile stamen, four stamoides and one pistil; A3, hermaphrodite flower (side view); A4, male flower with five sepals, five petals, one fertile stamen, four stamoides and no pistil; A5, male flower (side view).

Table 1. Floral morphology characteristics of different species of *Mangifera*.

Species	Inflorescence length (cm)	Rachis color	Sepal color	Pubescent presence	Flower bud diam. (mm)	Petal color
M. casturi	30-21	Greenish	Yellowish	(Many) Rachis bottom	2	Cream
M. lalijiwa	40-42	Pale green	Pale green	(Few) Rachis bottom	3	Cream
M. odorata	40-42	Pink	Pink	None to few	2.5	Burgundy
M. rubrapatela	30-32	Green	Green	(Many) Rachis bottom	2.0	White
M. zeylanica	29-31	Yellow	Pale yellow	(Many) Rachis bottom	3.0	White
Mangifera sp. Rampagni	32-33	Red	Red	None to few	2.0	Pink
Mangifera sp. Tenom	29-31	Reddish	Reddish	(Few) Rachis bottom	2.0	Yellow

Only *M. lalijiwa* produced pure female flowers in both years of the study, while the other species had no females throughout. *M. odorata* produced only hermaphroditic flowers throughout the study. *M. indica* and other species will often flower multiple times within a given season and, in each flowering, there can be marked differences in the number and

ratio of male, female and hermaphroditic flowers (personal observations). A baseline of floral biology can contribute to a better understanding of anthesis and receptivity dynamics based on the proportion of male, female and perfect flowers (Mukerjee, 1953; Malik, 1957; Schnell and Knight, 1998).

Table 2. Comparison of inflorescences of the different species of *Mangifera*. Stam., Stamoides.

Species	Year	Hermaphrodite			Male			Female		
		Sepals	Petals	Stam.	Sepals	Petals	Stam.	Sepals	Petals	Stam.
Mangifera sp. Rampagni	1	5	5	4	5	5	4	0	0	0
	2	5	5	4	5	5	4	0	0	0
M. lalijiwa	1	4	4	3	4	4	2	4	4	4
	2	5	5	4	4	4	2	4	4	4
M. casturi	1	4	4	3	4	4	0	0	0	0
	2	5	5	0	4	4	0	0	0	0
M. odorata	1	5	5	3	0	0	0	0	0	0
	2	6	6	4	0	0	0	0	0	0
M. rubrapatela	1	5	5	3	5	5	3	0	0	0
	2	6	6	0	6	6	1	0	0	0
Mangifera sp. Tenom	1	5	5	3	4	4	1	0	0	0
	2	5	5	4	5	5	3	0	0	0
M. zeylanica	1	4	4	3	4	4	1	0	0	0
	2	5	5	4	5	5	1	0	0	0

The present findings are of practical relevance to the development of the *Mangifera* species as crops and on current and future breeding work between *M. indica* and *Mangifera* species. The time of anther/stigma maturation is important to determine the effective period for pollination (Pinto and Byrne, 1993), and the presence and ratios of male, female and hermaphroditic flowers within individual panicles may also be important for fruit set and breeding.

Literature cited

Bompard, J.M. (1993). The genus *Mangifera* rediscovered: the potential contribution of wild species to mango cultivation. Acta Hortic. *341* (*341*), 69–77 https://doi.org/10.17660/ActaHortic.1993.341.5.

Campbell, R.J. (2004). Graft compatibility between *Mangifera* species and *Mangifera indica* 'Turpentine' rootstocks and their subsequent horticultural traits. Acta Hortic. *645*, 311–313 https://doi.org/10.17660/ActaHortic.2004.645.35.

Campbell, R.J., and Ledesma, N. (2013). Update on new *Mangifera* species in Florida, USA. Acta Hortic. *992*, 95–98 https://doi.org/10.17660/ActaHortic.2013.992.10.

Eiadthong, W., Yonemori, K., Kanzaki, S., Sugiura, A., Utsunomiya, N., and Subhadrabandhu, S. (2000). Amplified fragment length polymorphism analysis for studying genetic relationships among *Mangifera* species in Thailand. J. Am. Soc. Hortic. Sci. *125* (*2*), 160–164.

Gangolly, S.R., Singh, R., Katyal, S.L., and Singh, D. (1957). The Mango (New Delhi, India: Indian Council of Agricultural Research), pp.530.

Kostermans, A.J.G.H., and Bompard, J.M. (1993). The Mangoes: Their Botany, Nomenclature, Horticulture and Utilization (London, UK: IPGRI).

Ledesma, N., and Campbell, R. (2014). Conservation and commercial development of *Mangifera* species (wild mangos) in Florida, USA. Paper presented at: 127th Annual Meeting of the Florida State Horticulture Society (Clearwater Beach, FL, USA).

Malik, P.C. (1957). Morphology and biology of the mango flower. Indian J. Hortic. *14*, 1–23.

Mukerjee, S.K. (1953). Origin, distribution and phylogenetic affinity of the species of *Mangifera* L. Bot. J. Linn. Soc. *55* (*356*), 65–83 https://doi.org/10.1111/j.1095-8339.1953.tb00004.x.

Pinto, A.C.Q., and Byrne, D.H. (1993). Mango hybridisation studies in tropical savannah ('Cerrados') of Brazil

Bonita Springs Tropical Fruit Club

Who We Are & What We Do

The Bonita Springs Tropical Fruit Club, Inc., is an educational not-for-profit organization whose purpose is to inform, educate and advise members and the public in the selection of plants and trees, to encourage their cultivation, and to provide a social forum where members can freely exchange plant material and information. The club cooperates with many organizations, and provides a basis for producing new cultivars. We function in any legal manner to further the above stated aims.

General Meeting:

General meeting, that include an educational program, are held the *second Tuesday* of each month. General meetings begin at **6:15 pm for social time**, and the **speakers begin promptly at 7 pm**., at the Revive Wellness Center, **3521 *Bonita Bay Blvd.,*** Bonita Springs.

Workshops:

Workshops (monthly discussions) are held on the *fourth Tuesday* of each month at **7 PM** at the Revive Magazine, when practical. This open format encourages discussion and sharing of fruits and information. Bring in your fruits, plants, seeds, leaves, insects, photos, recipes, ect.. This is a great chance to get answers to specific questions, and there always seems to be a local expert on hand!

Tree Sales:

Semi-annual tree sales in OCTOBER and November, in the Bonita Springs area, raise revenue for educational programs for club members and other related purposes of the club.

Trips:

The club occasionally organizes trips and tours of other organizations that share our interests. The IFAS Experimental Station and the Fairchild Nursery Farm are examples of our recent excursions.

Membership:

Dues are $15 per person for new members, and $25 per household. Name tags are $6 each. Send checks to: PO Box 367791, Bonita Springs, FL 34136, or bring to any regularly scheduled meeting.

Bonita Springs Tropical Fruit Club

Feel free to join BSTFC on **our Facebook group**, where you can post pictures of your plants, ask advice, and find out about upcoming events!

https://www.facebook.com/groups/BSTFC/

Link to the **next meeting**: https://www.facebook.com/groups/BSTFC/events/
Meetup Link (events/meetings sync with the calendar on your phone!):

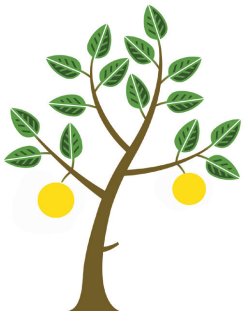
https://www.meetup.com/Bonita-Springs-Tropical-Fruit-Club/

Our **Website** (and newsletters with tons of info):
https://www.BonitaSpringsTropicalFruitClub.com/

Officers and Board of Directors:
Jorge Sanchez, President
Luis Garrido, Vice President
Dwain Kiddo, Treasurer
Talitha DeLuco, Secretary
Crafton Clift , Director
Lisa Mesmer, Director
George Kaladiny, Director

Like Us on Facebook! https://www.facebook.com/groups/BSTFC/

The Collier Fruit Growers Inc. (CFG) is an active organization dedicated to inform, educate and advise its members as well as the public, as to the propagation of the many varieties of fruits that can be grown in Collier County. The CFG is also actively engaged in the distribution of the many commonly grown fruits, as well as the rare tropical and subtropical fruits grown throughout the world. CFG encourages its members to extend their cultivation by providing a basis for researching and producing new cultivars and hybrids, whenever possible. CFG functions without regard to race, color or national origin.



VISIT US AT:
www.collierfruit.org

REMEMBER TO RENEW YOUR MEMBERSHIP!

2020 CFG BOARD OF DIRECTORS

OFFICERS:
President, Rodger Taylor - 239-384-9630
Bonnie Hawkins, Vice President
Melissa Parsons, Treasurer
Lisa Hare, Secretary

DIRECTORS AT LARGE
Crafton Clift, Director
Micah Bishop, Director
Jorge Sanchez, Director
Lisa White, Director

Like Us on Facebook! https://www.facebook.com/CollierFruitGrowers/

The Collier Fruit Growers monthly meetings are now broadcast live on Facebook at 7:30 pm on the third Tuesday of each month. The meetings are posted on the 'Collier Fruit Growers Group's Facebook page. Access the page by requesting to be a Member.