The Fruit Growers of Southwest Florida

MAY 2021

Bonita Springs Tropical Fruit Club Meeting
will be Saturday, May 8th, at 4:30 pm.
Workshop: Saturday, May 22nd, 2021, at 4:30 pm.
Location: Newport Animal Hospital
25100 Bernwood Drive, Bonita Springs, FL 34135
Please always observe the wearing of masks and social distancing.
Please remember to pay your 2021 renewal dues: $15/ individual, $25/ family.
Please always observe the wearing of masks and social distancing.

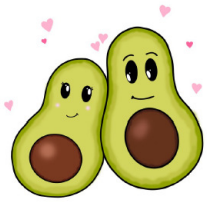
After nearly fourteen months of having to deal with COVID -19 we are all anxious for our lives to return to 'normal.' Memberships of both the Bonita Springs Tropical Fruit Club and the Collier Fruit Grows have significantly decreased during this time. Rebuilding interest and revaluating the objectives of these and related organizations is 'Job One.' To this end, the Collier Fruit Growers will host a meet & greet at their May 18 Membership Meeting for all the existing and possible new members to become reacquainted with the organization. Members should be prepared to actively participate in discussions to reconfirm the club's basic values and provide constructive criticism in charting the club's path and activities going forward.

The much-anticipated Grafting Class is now slated for Saturday, September 25. An overview of principles and basic techniques will be discussed. Mango grafting will be demonstrated by Dr. Noris Ledesma, considered by many as the world's foremost mango authority, followed by individualized instruction. There is an excellent possibility that the Class will be held at the Naples Botanical Garden, and participants will have the opportunity to tour the entire garden.

The twenty persons who signed up for the cancelled grafting class on June 6, 2020 will be automatically registered for the rescheduled class. Once the exact time and place has been established each person will be notified. The Participants will be given the opportunity to withdraw and have their $10 fee refunded. A short-list of possible substitutes will be compiled in the order of when their requests are received by e-mail at rtaylorrm@comcast.net The $10 fee will be due the day of the class.

Collier Fruit Growers' NEXT Meeting:
Tuesday, May 18, 2021.
The meeting starts at 7:15 pm.
Life Center, Tree of Life Church
2132 Shadowlawn Dr., Naples, FL 34112

Please practice social distancing.
Wearing of masks at the participants discretion.
Please remember that it is time to pay your $15.00 renewal dues for 2021 or risk not receiving the monthly newsletters. Please mail dues to: CFG, Inc. 1944 Piccadilly Circus, Naples, FL 34112.



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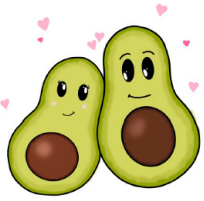

I'm a big fan of the avocado. There's lots to love. They are high in fiber, protein, B-vitamins, potassium and vitamin C. They also contain good fats - monounsaturated — which are known to promote heart health and cognitive function. I incorporate the avocado in my breakfast with some tomatoes, olive oil, Himalayan salt and lemon, just add a spoon. I add it to my salads, smoothies and even in my baked goods. You can substitute avocado for butter at a 1:1 ratio. To do this, scoop out avocado, mash it in a small bowl and press it into a measuring cup. If you use avocado instead of butter in your recipes decrease your oven temperature by 25 degrees and watch your bake goods golden as usual. They might have a slight green tint, but that makes it more fun.

PINA CÕLADA AVOCADO CAKE

I love the flavor of pineapple, coconut, and a hint of rum!

4 eggs at room temperature
1 cup mashed avocado
1 tablespoon baking powder
1 teaspoon vanilla
1 tsp. lime juice
2 cups pineapples cut small cubs
1 cup coconut milk (I buy mine in a can from the baking aisle, because my coconut tree is still a baby.
1 teaspoon rum extract
3 cups organic flour
1 cup granulated sugar- I personally use the organic sugar or monk fruit (monk sweetener has 0 calories and has zero effect on glycemic levels)
1 Tablespoon baking powder
1/2 teaspoon salt

To make the cake:

1. Preheat the oven to 350˚F (180°C). Cut the avocado(s) in half and remove the flesh of the fruit. Add to a bowl and purée with the lime juice until creamy (use an immersion blender or a fork for example) add sugar, vanilla extract, rum extract. Coconut milk and salt and mix well. Add the eggs one by one and mix well. Mix the flour with the baking powder and the ground coconut.
2. Grease a 12-inch loaf tin and dust with flour. Pour in the batter and even out the surface, add the pineapple cubes. Bake for 40 minutes until a toothpick inserted in center comes out clean. Let cool in the

AVOCADO CHOCOLATE MOUSSE

Avocado Chocolate Mousse is not just a healthy chocolate mousse; it is also one of the best vegan dessert recipes you will ever make! Creamy, rich and healthy Avocado Chocolate Mousse made with avocado, dark chocolate, and maple syrup. You can't taste the avocado! Vegan and gluten free. Delicious and easy!

Ingredients

4 ounces chopped semisweet chocolate or chocolate chips, at least 60% dark, about 1/2 cup plus 2 tablespoons of cocoa powder
2 large ripe avocados (about 8 ounces each)
2 tablespoons unsweetened organic cocoa powder
1–3 teaspoons light agave nectar or maple syrup
1 teaspoon pure vanilla extract
1/4 cup unsweetened almond milk
1/8 teaspoon kosher salt
Add all the ingredient in the food processor and mix until smooth.
For the toppings: Whip 1/4 whipped cream with 1 teaspoon sugar (or whipped coconut cream to keep vegan) add on top of the mousse

In a bowl add some mulberries, bananas cubes or slices and 2 teaspoon of lemon juice, 1 teaspoon of organic sugar or maple syrup. Mix and place on top of the whipped cream.

The 2021 MRFC Rare Fruit Tree Sale is on!!!
May 16th, 2021
9am-3pm
New Outdoor Location!
Premier Sports Campus
5895 Post Blvd, Lakewood Ranch, FL 34211

New location is a little less than 5 miles east of I-75 on Route 70 (Exit 217). The sale site is a huge open area (225 feet by 650 feet) that will provide plenty of room for our vendors and customers to spread out. The facility has ample parking, restrooms, and a concession stand.

Our contract requires that all participants use masking, safe social distancing, and follow all mandated covid safety procedures.

Rare Fruit Tree Sale

****New Location - Huge Outdoor Area****

Sunday, May 16th, 2021, 9am-3pm

Premier Sports Campus

5895 Post Blvd, Lakewood Ranch, FL 34211

Exit 217 (Route 70) off I-75, go east 4.65 miles and left on Post Blvd

Ample Free Parking Restrooms Expert Advice

- Apples (Low Chill varieties)
- Atemoya
- Avocado
- Banana
- Barbados Cherry
- Bay Leaf
- Blackberry
- Black Sapote
- Blueberry
- Carambola
- Caimito
- Canistel
- Cashew
- Cherimoya
- Coconut
- Figs
- Grapes
- Guava
- Jaboticaba
- Jackfruit
- Jujube
- Kumquat
- Longan
- Loquat
- Lychee
- Mangoes
- Dwarf Mangoes
- Macadamia Nut
- Malay Apple
- Miracle fruit
- Mulberry
- Monstera
- Papaya
- Passion fruit
- Pineapple
- Plantain
- Peaches (Low Chill)
- Pears (Low Chill)
- Persimmon
- Plum
- Pomegranate
- Pummelo
- Raspberry
- Rio Grande Cherry
- Rollina
- Sapodilla
- Soursop
- Star Fruit
- Strawberry
- Sugar Apple
- Surinam Cherry
- Wax Jambu
- White Sapote

Also other fruits, herbs, vines, and more
20+ Vendors
All plants subject to availability

Spondored by Manatee Rare Fruit Council, a non-profit 501(c)(3) organization

No Entry Without Masks; Safe Social Distancing Required

Most vendors accept credit cards, but bringing cash is a good idea.

No ATM onsite

Further information at mrfc.org

Lychee Fruit Cracking and Lychee Production in China, by Crafton Clift

*Litchi chinensis*is, of course, is native to South China and 70% of the forest trees in its native area are lychees[(1)], where they typically grow at moderately high elevations. The Philippines and Java have subspecies of lychees, and in 1999, Poonsak Vatacharikorn found a wild lychee in Thailand with fruit ripening in October. This Thai lychee grows robustly in South Florida, then suddenly dies like high altitude species often do in our hot, humid summers.

On the 12th of March 2004, at the John Campbell Agriculture Center in Homestead, Florida, Dr. Xuming Huang, who is now at The Pennsylvania State University, spoke to the Lychee Growers Association of South Florida.

Asians are known for their intensive, hands-on horticulture; but the month by month girdling, root pruning, new grown removal if flowers don't emerge, pollen collecting, and hand pollination make obvious the lychee is treated with great reverence in China.

I was impressed that there are a few hundred cultivars of lychee in China and the season opens in March on the frost-free island of Hainan. Then there is an isolated pocket of lychee production on the east coast, which is on the parallel of Washington, DC.

Outstanding cultivars include:

- Sami Hong – ripe in March
- Sanyuchang – ripe in May
- Naumupe - ripe in August
- Shixia - 70 grams per fruit on average, some seedless
- Wuheli – large seedless fruit
- Herichuan – large seedless fruit
- Feizixao – very large fruit, dwarf trees (1.5 m.)
- Hehua – very large fruit
- Maguili – very late fruiting
- Hualzhi – resistant to fruit cracking
- Nuamici – susceptible to fruit cracking

Grafting lychees is more common than air-layering in China. As we learned after Hurricane Andrew in Florida, grafted plants have a stronger root system.

To promote flowering, it is important to monitor the maturation of the autumn flush. To prevent winter growth – girdling, root pruning, withholding watering or apply growth inhibitors like paclobutrazole, ethylene, boron or their mixture may be practiced. If all else fails and leafy growth emerges without flowers, this growth should be removed. Winter fertilization may be practiced along with root pruning in induce flowering. Preharvest fertilization should also be applied.

The practice of girdling the branches the size of air-layers (finger diameter) has been attempted at near sea level in south Florida. Trees have been typically 'close' planted and kept small so girdling can be done without a ladder. After flowering, trees may be girdled to prevent carbohydrates from draining into the roots. [Positive results have been marginal at best.]

Lychees fruit cracking was addressed by Dr. Huang who said researchers had investigated the role of high temperatures, humidity, and rainfall – especially rain after an extended drought. Chemical analysis of cracked fruit versus healthy fruit shows lower calcium levels in cracked fruit. Then why would cracking occur on calcium carbonate soils of South Florida?

Florida research with citrus grown on calcareous soils shows there can be calcium deficiency in the foliage of limes grown in such soils. Calcium, like iron, may not be in a form available for absorption by plant roots.

After the program, growers crowded around Dr. Huang, most with the same question, "How can we get that cohesive fabric bags you use on the 20th day after fruit set to prevent pest damage, and enhance early ripening and coloration, avoid chemical dependence, and assist in storage and marketing?" [Now, sixteen years later, fabric 'agriculture' bags are readily available.]

Note: [(1)] D. J. Mabberley, the Plant Book (First Edition)

Forcing Lychee Trees to be More Productive

Lychee (*Litchi chinensis*) production is big business in many parts of the world. The sub-tropical plants thrive in temperate to warm regions with high humidity. The attractive fruits almost resemble a berry and are, in fact, members of the Sapindaceae (Soapberry) family. Misnamed lychee nuts, due to their solid exterior when overripe, the fruits develop from unremarkable tiny, greenish white flowers.
Like many fruit trees, Lychees require exposure to cold temperatures at specifically the right time for them to flower. This is especially true for Lychees, native to China, where they are grown at higher altitudes and cooler climates than exist in Southern Florida.

Plants often flower and fruit best when they feel threatened. Low vigor, inadequate moisture and other such conditions will send a message to the tree that its number may be up and force it to try to reproduce. [In fact, in many tropical countries Mango trees are beaten with chains to 'threaten' the trees, forcing them to increase production.]

Girdling is removal of a thin strip of bark from around the larger tree branches (typically 2-inches and large in diameter) or trunk in a circular manner. Variation of this technique is to reinsert and firmly secure the strip of bark back into the void created. Some persons have gone so far as to invert the bark before reinserting it into the void. The purpose remains the same, to interrupt the flow of carbohydrates down the tree, making more food available for fruit growth. Special girdling knifes are employed to make sure not to cut deeper than the cambium layer, the layer of wood just under the bark. Although girdling all the way around is likely to kill the tree, you can use a specific tree girdling technique to increase fruit yield in a few species. It has been found that girdling tree branches and even trunks for increase fruit production has had unproven results.

Some trials indicate that girdling done after the harvest (early in the fall) can enhance blooms on lychee trees. Girdling later in the season does not seem to promote this flush. It seems to be most effective on trees may have had poor crops the previous season but does not affect heavy bearing trees.
Consistent girdling will disrupt the flow of important nutrients, food, and water to parts of the tree and could negatively impact the tree's overall health. It is a practice reserved for only the trees that perform poorly and is not considered useful unless crop levels were low. Interestingly, girdling has been a standard practice with commercial Lychee producers.
Does lychee girdling work? The process does result in higher yields if done at the right time of the year, but it is not recommended as a consistent practice. If not done 'properly,' girdling will harm the tree permanently. The long-term effectives of girdling on Lychee trees are yet unproven and therefore not recommended.

Ringing is similar to gridling but is less intrusive as none on the bark is removed from around the branches. In this instance a single cut is made either in a circular or spiral manner around the base of the larger branches. The intended results are the same as girdling, that is to disrupt all or part of the required flow of nutrients, food, and water through the phlaem layer. The timing and technique employed with ringing is nearly the same as with gridling, and therefore this practice is recommended.

Restricting is the method of slowly reducing the flow of carbohydrates down the tree and force increased fruit production. The method involves tying nylon bands or non-stretch material tightly wrapped and secured around the base of the larger branches in torniquet type fashion. The restrictive bands will slowly strangle the tree and restrict the flow of nutrients, food and water in the phlaem layer of the tree. This method should not be used as it will slice into and permanently damage the tree and ultimately kill the tree. The practice has been not to remove the bands once they are installed, which leads to a reduced life expectance of the tree.

Cooler Temperature Conditions: Observations and experience suggest that a period of cold temperature (50° F or below) when the flower buds are between 1 to 2 mm in diameter forces the trees to maximize their fruit production. As a result, it is generally believed that Lychee trees in the middle of Florida will be more productive than in those trees the southern portion of the state. In South Florida, the location of a tree becomes especially important. Both the topography of the surrounding ground and water feature(s) help to create 'microclimates,' which have an influence on a tree's productivity. Even a slight depression in elevation may cause cooler air temperatures of a couple of degrees to occur.

Water features help to create 'microclimates' of the surrounding areas where natural cooling from evaporative process reduces the surrounding air temperature. The increased availability of water usually enhances evaporation, and the associated uptake of latent heat provides and additional daytime cooling effect. Even smaller bodies of water, i.e., canals and ponds, operate as the cooling source on the 'microclimate' of the surrounding area. Air temperature near or over bodies of water is much different from that over land due to differences in the way water heats and cools. Water bodies are noted to be about the best absorbers of radiation, but on the other hand, they exhibit marginal thermal effect on the air, but it may be just enough to reduce the required air temperature at the appropriate time to help force fruit production.

What Is Mangosteen: How To Grow Mangosteen Fruit Trees

There are many truly fascinating trees and plants that many of us have never heard of since they only thrive in certain latitudes. One such tree is called the mangosteen. What is a mangosteen, and is it possible to propagate a mangosteen tree?

What is Mangosteen?

A mangosteen (*Garcinia mangostana*) is a truly tropical fruiting tree. It is unknown where mangosteen fruit trees originate, but some conjecture the genesis to be from the Sunda Islands and the Moluccas. Wild trees can be found in Kemaman, Malaya forests. The tree is cultivated in Thailand, Vietnam, Burma, the Philippines and southwestern India. Attempts have been made to cultivate it in the U.S. (in California, Hawaii and Florida), Honduras, Australia, tropical Africa, Jamaica, the West Indies and Puerto Rico with extremely limited results.

The mangosteen tree is slow growing, upright in habitat, with a pyramid shaped crown. The tree grows to between 20-82 feet (6-25 m.) in height with nearly black, flaky outer bark and a gummy, extremely bitter latex contained inside the bark. This evergreen tree has short stalked, dark green leaves that are oblong and glossy atop and yellow-green and dull on the underside. New leaves are rosy red and oblong.

Blooms are 1 ½ -2 inches (4 cm.) wide and may be male or hermaphrodite on the same tree. Male flowers are borne in clusters of three to nine at the branch tips; fleshy, green with red spots on the outsides and yellowish red on the interior. They have many stamens, but the anthers bear no pollen. Hermaphrodite blooms are found at the tip of branchlets and are yellowish green bordered with red and are short lived.

The resulting fruit is round, dark purple to reddish purple, smooth and about 1 1/3 to 3 inches (3-8 cm.) in diameter. The fruit has a notable rosette at the apex composed of four to eight triangle shaped, flat remnants of the stigma. The flesh is snow white, juicy and soft, and may or may not contain seeds. The mangosteen fruit is acclaimed for its luscious, delectable, slightly acidic flavor. In fact, the fruit of the mangosteen is often referred to as the "queen of tropical fruit."

How to Grow Mangosteen Fruit Trees

The answer to "how to grow mangosteen fruit trees" is that you probably can't. As previously mentioned, many efforts to propagate the tree have been attempted all around the globe with little luck. This tropic loving tree is a bit finicky. It does not tolerate temps below 40 degrees F. (4 C.) or above 100 degrees F. (37 C.). Even nursery seedlings are killed off at 45 degrees F. (7 C.).

Mangosteens are picky about elevation, humidity and require annual rainfall of at least 50 inches (1 m.) with no drought. Trees thrive in deep, rich organic soil but will survive in sandy loam or clay containing course material. While standing water will kill off seedlings, adult

mangosteens can survive, and even thrive, in regions where their roots are covered with water most of the year. However, they must be sheltered from strong winds and salt spray. Basically, there must be the perfect storm of components when growing mangosteen fruit trees.

Propagation is done through seed, although experiments with grafting have been attempted. Seeds are really not true seeds but hypocotyls tubercles, as there has been no sexual fertilization. Seeds need to be used five days from removal from fruit for propagating and will sprout within 20-22 days. The resulting seedling is difficult, if not impossible, to transplant due to a long, delicate taproot, so should be started in an area where it will stay for at least a couple of years before attempting a transplant. The tree may fruit in seven to nine years but more commonly at 10-20 years of age.

Mangosteens should be spaced 35-40 feet (11-12 m.) apart and planted in 4 x 4 x 4 ½ (1-2 m.) pits that are enriched with organic matter 30 days prior to planting. The tree needs a well irrigated site; however, dry weather just before bloom time will induce a better fruit set. Trees should be planted in partial shade and fed regularly.

Because of the bitter latex exuded from the bark, mangosteens suffer rarely from pests and are not often plagued by diseases.

Editor's Note:

Although the 'true' mangosteen is *Garcinia mangostana*, there are three other varieties of which have the common name of mangosteen. These include the Seashore Mangosteen or Luli (*Garcinia hombroniana*), the Button Mangosteen or Cherapu (*Garcinia prainiana*), and the Lemon Drop Mangosteen or Monkey Fruit (*Garcinia intermedia*) which is similar in taste to the fruit of *Garcinia madruna*. To add to the confusion; in Portuguese, the Lemon Drop Mangosteen is called Achachairu, which it is not. G*arcinia humilis* has the widely accepted common name of Achachairu. .

GROWING THE MANGOSTEEN IN SOUTHERN FLORIDA

CARL W. CAMPBELL[1]

The mangosteen, *Garcinia mangostana* L., is a tropical tree which bears a delicious fruit, considered by many to be one of the world's finest fruits (1, 3, 4). This species is native to the East Indies and Southeastern Asia, and most commercial production of the fruit is limited to that part of the world.

Introduction of the mangosteen to other areas has proceeded very slowly because of its exacting cultural requirements. Nevertheless, bearing trees are now growing in many parts of the tropics (3, 4). Although many people have grown or tried to grow mangosteen trees in Florida, no one has succeeded yet in producing fruit in the state.

The most important limiting factor to successful cultivation of the mangosteen in Florida is low temperature. Injury occurs if the air temperature falls much below 40 F (3). Since temperatures in this range occur nearly every winter, even in the warmest parts of Florida, it is obvious that some sort of protection must be given to mangosteen trees if they are to be grown out of doors. Therefore, from a practical standpoint, mangosteen culture is limited to the Keys and the warmest parts of the southern coastal region of Florida.

Unfortunately, the soils in this area are not suited to mangosteen culture. The tree grows best in a well-drained soil containing a large proportion of organic matter. Trees soon die if they are planted in the sterile sands or the limestone soils of southern Florida.

This problem may be solved by growing the trees in a mixture of peatmoss and silica sand and supplying the necessary nutrients by frequent application of fertilizers. Mixtures derived mostly from organic sources have given good success. It is not advisable to use completely inorganic fertilizers because the plants are easily injured by excess salts. Trees may be grown in large containers or in holes in the ground in which the original soil has been replaced by the desired mixture of peatmoss and sand.

However, even when a suitable soil mixture and protection from cold injury are provided, young mangosteen plants often do not grow well. This is apparently a common occurence, because the mangosteen is well known to be difficult to grow (1, 2, 3). This condition is characterized by very slow growth, chlorosis, necrosis of the tips and margins of the leaves, and often death of the plant (1).

For a long time, horticulturists have investigated the possibility of improving the growth of the mangosteen by grafting it on rootstocks of its more vigorous relatives. This work was reviewed by Hume (1). The most extensive work was done by Oliver (2), who found that grafting of the mangosteen on a variety of related species was generally unsuccessful. Although he succeeded in uniting mangosteen scions with stocks of 20 other *Garcinia* species and some species of *Calophyllum* and *Platonia*, the grafts were unsatisfactory because of incompatibility or different growth rates of stock and scion.

Better success was obtained by growing a mangosteen seedling in the same container with a plant of *Garcinia tinctoria* W. F. Wight, approach grafting them, and allowing the mangosteen to develop on both root systems (2). Since *G. tinctoria* grows and produces fruit very well in Florida, and mangosteen seedlings often grow very poorly, it was decided to try this method under Florida conditions.

EXPERIMENTAL

Mangosteen plants were grown in containers from seeds received from Thailand in 1959. The growing medium consisted of equal parts of screened peatmoss, coarse vermiculite and silica sand. Of some 15 plants, only five remained alive in early 1963, and these were in poor condition.

One seed of *Garcinia tinctoria* was planted in each of three of the containers about 3 cm from the stem of the mangosteen plant. The *G. tinctoria* seeds germinated readily and by June, 1963, were large enough for grafting. They were approach grafted to the three mangosteen plants at a point approximately 10 cm above the soil surface. When the grafts were healed well, the tops of the *G. tinctoria* plants were cut off. Both root sytsems were left intact.

At the time of grafting, the mangosteen

Florida Agricultural Experiment Stations Journal Series No. 2525.

[1]Associate Horticulturist, University of Florida, Sub-Tropical Experiment Station, Homestead.

plants had stem diameters of approximately 5 to 7 mm and approximately five pairs of leaves. The *G. tinctoria* plants had stems approximately 3 mm in diameter.

Within three months, a great difference could be seen between the grafted and the ungrafted plants. Considerable new growth had occurred on the three grafted plants, and the leaves were deep green and had no necrotic areas. There was no visible change in the conditions of the two ungrafted plants at that time.

One year after the grafts were made, the grafted plants had developed six or seven pairs of new leaves, while the ungrafted plants had developed only one or two pairs. Similar differences in growth occurred in the following year, also. During all this time, the general condition of the grafted plants was superior to that of the ungrafted plants.

Final measurements were made in September, 1966, approximately there years after the grafts were made. Figure 1 shows grafted and ungrafted plants at this time. The grafted plants had 39 to 53 pairs of leaves and stems 2.2 to 2.4 cm in diameter. The root systems were well developed as evidenced by the firmness with which the plants were anchored in the soil. The ungrafted plants had 8 to 24 pairs of leaves and stems 0.8 to 1.3 cm in diameter. The root systems were poorly developed because the plants were relatively loose in the soil.

Interestingly, the *Garcinia tinctoria* stems on the grafted plants had grown very little during the three years. At the time of grafting, they were approximately 3 mm in diameter and in September, 1966, they were approximately 4 to 5 mm in diameter. A closeup of the stems of a grafted plant is shown in Figure 2.

Discussion and Conclusions

Culture of the mangosteen in southern Florida is destined to remain only an expensive curiosity because of the special care which must be given for the plants to grow well. The mangosteen is very demanding in its cultural requirements and generally will not grow at all in Florida unless it is planted in an artificially prepared soil and carefully protected from cold injury. It is also necessary to provide protection from direct sunlight, particularly for young plants, and to prevent any injury to the root system if transplanting is necessary.

Even when careful attention is given to all these requirements, young plants frequently do not thrive. It was found long ago (2), and confirmed in this study under Florida conditions, that growth of mangosteen plants can be great-

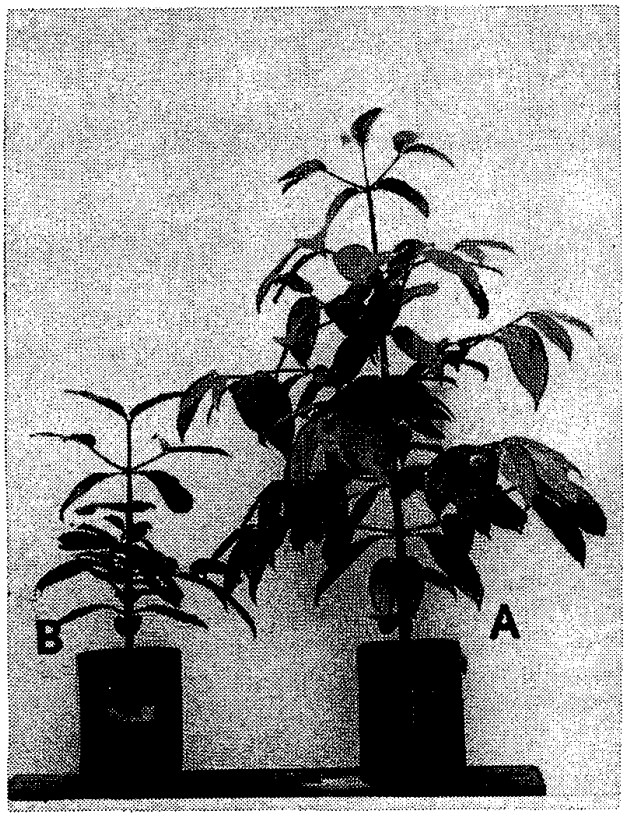

Fig. 1.—Mangosteen plants. A, approach grafted with Garcinia tinctoria; B, not grafted.

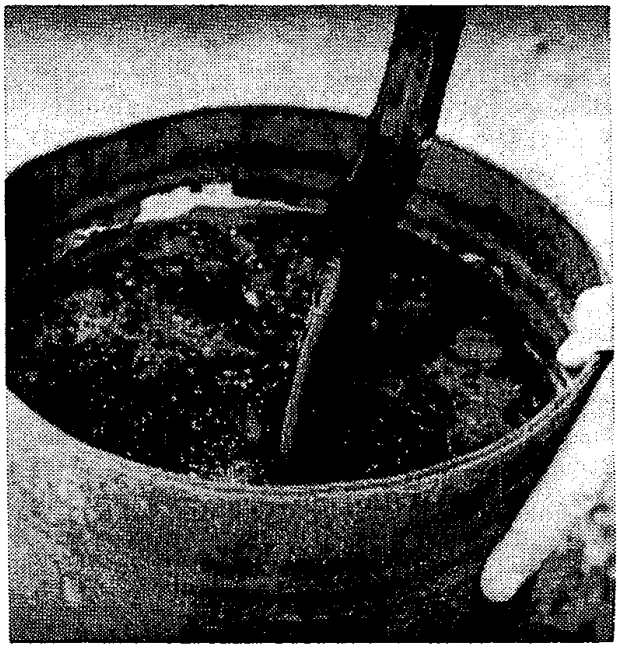

Fig. 2.—Stems and graft union of mangosteen plant approach grafted with Garcinia tinctoria.

ly improved by approach grafting them to seedlings of *Garcinia tinctoria* and allowing the mangosteen top to develop on both root systems.

SUMMARY

The mangosteen can be grown in southern Florida only if special attention is given to cold protection and soil requirements. Plants which fail to grow well when these conditions are met can be rejuvenated by approach grafting to seedlings of *Garcinia tinctoria* and allowing the mangosteen to grow on both root systems.

LITERATURE CITED

1. Hume, E. P. 1947. Difficulties in mangosteen culture. Tropical Agriculture 24: 32-36.
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3. Popenoe, W. 1927. The mangosteen and its relatives, p. 390-405. In Popenoe, W. Manuel of Tropical and Subtropical fruits. MacMillan, New York.
4. Winters, H. F. 1953. The mangosteen. Fruit Vars. and Hort. Digest 8: 57-58.

Current Fruit Related News

Registration for Upcoming University of Florida Sponsored Events
All events are scheduled to take place remotely.

PSA Remote Grower Trainings
- May 25-27, 2021
  - Registration: https://psa052521.eventbrite.com
- June 15-17, 2021
  - Registration: https://psa061521.eventbrite.com

UF Food Safety Virtual Office Hours (all 3:30-4:30 PM ET)
- May 6, 2021
  - Registration: https://ufl.zoom.us/webinar/register/WN_DD2rQmoUToi1jSWlFfL4qQ

Bridging the GAPS: Approaches for Treating Water On-Farm
(see attached flyer, workshop registration is through Virginia Tech) Keith, Michelle, and Taylor are serving as instructors.
- May 18-19, 2021
  - Registration: https://tinyurl.com/2021-PSA-H2O-Training

FDACS Offers Cost Share for Produce Safety Certification

The Florida Department of Agriculture and Consumer Services is offering a cost-share program for producers of specialty crops who obtain food safety certification.

If you obtained food safety certification for specialty crop products (fruits, vegetables, or tree nuts) through the USDA GAP/GHP, GlobalG.A.P., GFSI, or SQF programs, you could be eligible for reimbursement of 75% of certification costs, up to $1,500 per producer.

To apply, download the application form and return it by email to specialtycrop@fdacs.gov. Our staff will contact you to obtain any necessary documentation and help you complete your application package. More information on requirements and eligibility can be found through our industry assistance portal.

Applications will be processed on a first-come, first-served basis until available funds are expended. The final deadline for applications is **September 1, 2021**.

Please contact us by email to specialtycrop@fdacs.gov, or by telephone at 850-617-7340 with any questions.

INDUCED INFESTATION OF FRUIT BY THE CARIBBEAN FRUIT FLY, ANASTREPHA SUSPENSA (LOEW)

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Abstract. **Several cultivars or seedlings of mango, guava, grapefruit, murcott, and other fruit were exposed in an outdoor cage containing a large population of Caribbean fruit flies or by injection of fruit fly eggs into the fruit. Variation in susceptibility of species and varieties of fruit was determined.**

Infestations in grapefruit ranged as high as 10.6, 13.3, and 57.4 larvae/kg of fruit for natural, injected and cage infested fruit, respectively. Guavas, a natural host, supported infestations of 28.8 and 113 larvae/kg when the infestations were natural and cage-induced. Temple and murcott oranges exposed to cage infestations averaged 2.5 and 21.0 larvae/kg, respectively.

Cage infestations of mangos ranged to 163.9 larvae/kg. Cultivars and selections of mangos showed high variability; some were highly infested, and one remained uninfested.

This research was undertaken to obtain information needed for developing commodity treatments for use by quarantine personnel in approving shipment of fruit through quarantine barriers into areas where the Caribbean fruit fly does not occur.

The most recent infestation of the Caribbean fruit fly, *Anastrepha suspensa* (Loew), in Florida appears to have begun in April 1965. Since that time, the fly has spread as far north as Jacksonville and up the west coast of Florida to Tampa. There is still no indication that the present infestation will disappear as the first one did (it was detected in 1931 and disappeared in 1936). Indeed, such an outcome seems less likely than before. In 1972, Swanson and Baranowski (4) reported that 84 species of fruits in 23 famiiles were hosts of the fly. In 1966, Weems (6) reported only 34 host species and found that the Caribbean fruit fly was not a serious pest of commercial citrus, mangos (*Mangifera indica* L.) or avocados (*Persea americana* Mill.) in Florida, though it did heavily infest guavas (*Psidium guajava* L.), calamondin (*Citrus mitis* Blanco), kumquat (*Fortunella crassifolia* Swingle), Surinam cherry (*Eugenia uniflora* L.), rose apples (*Syzygium jambos* (L.) Alst.), Barbados cherry (*Malpighia glabra* L.), peach (*Prunus persica* (L.) Batsch), and other soft fruits. Swanson added loquat (*Eriobotrya japonica* (Thunb.) Lindl.) and tropical almond (*Terminalia catappa* L.) to the list of major hosts. He also presented information about the monthly infestation of the major host species. These data were obtained by holding fruit in polyethylene containers and allowing the fruit fly larvae to emerge from the fruit and drop to the bottom of the container where they pupated in vermiculite. Thus he could state that lychee (*Litchi chinensis* Sonn.), mango, and several types of citrus were occasionally infested and that only a few species of fruit were not, among them breadnut (*Brosimum alicastrum* SW.), Indian jujube (*Ziziphus mauritiana* Lamb.), karanda (*Carissa carandas* L.), and *Calophyllum inophyllum* L.

Likewise, von Windeguth et al. (5) examined the fluctuations in infestations of Caribbean fruit fly larvae in the preferred hosts on the island of Key West, which was to be the site of an attempt to suppress the fly population by using the sterile fly release method. They found that guava and tropical almond were the primary hosts of the Caribbean fruit fly in the test area and that the infestations in guava might reach 395 larvae/kg of fruit. However, loquat, Surinam cherry, and sapodilla (*Achras zapota* L.) also supported infestations in excess of 100 larvae/kg of fruit, and significant populations of larvae were found in calamondin, Barbados cherry, Governor's Plum (*Flacourtia indica* (Burm. f. Merr.), spondias (*Spondias* sp.), and kumquats. For these studies (5), fiberglass holding boxes were used for fruit and the larvae emerged and dropped into a layer of sand on the bottom of the box. By this method they found that minor hosts on the island of Key West included egg fruit (*Pouteria compechiana* (H.B.K.) Baehni), peach, cocoplum (*Chrysobalanus icaco* L.), satin leaf (*Chrysophyllum oliviforme* Lam.), lime (*Citrus aurantifolia* Swingle), mango, seagrape (*Coccoloba uvifera*), date palm (*Phoenix dactylifera* L.), and sugar apple (*Annona squamosa* L.). An additional 17 species of fruit that were examined for fruit fly larvae were negative.

Research to develop commodity treatments such as fumigation (2) for fruit infested with fruit flies requires that the investigator have available large numbers of fruit with moderate to heavy infestation of larvae. However, in Florida, commercial plantings of citrus, mangos, avocados and other fruit are generally not subject to heavy infestations by the Caribbean fruit fly. Usually, when citrus were natural hosts the fruit was on backyard trees and had been left until they were over-ripe (4). Even so, the incidence of larval survival was low.

Methods

In our research therefore, the natural infestation of larvae is being supplemented by using two techniques, cage infestation or injection of eggs. For cage infestation of fruit, the fruit are placed in a 12 x 12 x 9 feet high outdoor cage containing populations of adult fruit flies in excess of 30,000 for 3-5 days. Generally one species of fruit is placed in the cage at a time though several varieties have frequently been infested at the same time. For injection of eggs, eggs collected from oviposition cages are washed in water and sodium benzoate. Then, when the eggs are about 24 hours old, ca. 200 are injected into each fruit by using a hypodermic syringe and needle. Infested fruit are held in fiberglass containers at room temperature until the eggs hatch and larvae develop (5). Larvae and pupae of the fruit fly are removed weekly from the containers and held in sand for adult emergence. Simultaneous tests of total titratable acidity (expressed as citric acid) and of soluble solids (expressed as sucrose) in a representative sample of infested fruit are analyzed by standard methods (3).

Results

Early in February 1974, we obtained 159 fruit representing 5 varieties of grapefruit from the USDA Horticulture Research Laboratory in Orlando. These fruit, 39 locally grown Isle of Pine variety grapefruit, and 4 over-ripe grapefruit of mixed sources were placed in the infestation cage. The results (Table 1) showed that only 6 Caribbean fruit fly larvae survived in and pupated from 236 fruit; 11 were obtained from the 4 over-ripe fruit. The 6 larvae that did survive came from fruit with both thick (14.3 mm) and thin rind (5.3 mm). The analysis of the test fruit showed citric acid ranging from 0.6 to 1.4% and sucrose ranging from 9.8 to 11.0% in infested fruit compared with 1.2 to 1.5% and 9.2 to 10.0%, respectively, in uninfested fruit.

Similarly, in March and June, fruit obtained from local cooperators were cage infested. The mature Isle of Pine grapefruit supported an average infestation of 3.4 larvae per kg. fruit in March compared with 0.0 for similar fruit in February. Green fruit of this variety that had been injected did not support an infestation in June.

Beginning in late June 1974, other grapefruit were made available from fruit shippers in Ft. Pierce, Vero Beach, and Tampa through the cooperation of the Florida Fresh Citrus Fruit Shippers Association and their membership. These fruit and some locally grown grapefruit were either cage infested or infested by injection. The results (Table 1) showed levels ranging to an average of 57 larvae per kg fruit for cage infested fruit compared with 11 larvae per kg fruit for the naturally infested fruit. In this series of tests, varieties showed considerable variation in susceptibility (Table 1).

Finally, in early June 1974, we first placed fruit from 28 mango seedlings and 7 cultivars (generally 25 from each tree) in our infestation cage and held them for observation. (Four of these seedlings and a cultivar, Florigon, were derived from an open pollinated Cambodiana tree.) The infestation achieved by the exposure ranged from 8.9 to 132.3 larvae/kg fruit (Table 2). In another test of fruit from seedlings of 13269, N 2187, and M 1007, (F-2 seedlings from Cambodiana) the infestations averaged 7.2/kg; ranged from 0.4 to 163.9; and ranged from 0.0 to 13.5 respectively. In addition, fruit of 3 cultivars derived from Mulgoba and 3 from other sources were cage infested. The resultant infestations ranged from 5.9 to 64.9 (Table 3).

Discussion

Investigations have demonstrated that the Caribbean fruit fly has a wide potential range of hosts. Research is needed to determine the factors involved in the susceptibility of fruit to egg deposition, hatch and survival of the larvae. Such factors as terpene content (of mangos), maturity, acidity, peel thickness, all could have an influence.

All of the mango seedlings examined, the result of an open pollination, are highly heterogeneous in origin. Three parents (13269, N2187 and M1007) were selected because of outstanding horticultural performance. Although all 3 derive originally from P.I. 11645, 'Cambodiana', all show

Table 1. Infestation of Caribbean fruit fly larvae in fruit.

Time of year	Fruit			Infestation Data	
	Kind	Variety	Number	Technique	No/kg. fruit
February	Grapefruit	Duncan	37	cage	0.0
		Temple x Nakon x Duncan	38	cage	0.3
		Pink seedless	44	cage	0.0
		Isle of Pines			
		Rough	35	cage	0.0
		Normal	4	cage	0.4
		Marsh	40	cage	0.1
		Mixed over-ripe	4	cage	6.9
March	Grapefruit	Isle of Pines	32	cage	3.4
	Guava	Common	60	cage	67.0
	Orange	Temple	25	cage	2.5
		Murcott	25	cage	21.0
June	Grapefruit	Ruby red	24	cage	41.2
		Isle of Pines	12	injected	0.0
		Marsh	102	cage	57.4
	Lime	Persian	18	injected	2.3
	Guava	Common	40	injected	113.0
		Common	20	natural	28.8
	Grapefruit	Pink seedless	34	natural	0.1
		Marsh	23	natural	10.6
		Marsh	13	injected	8.8
		Marsh	13	injected	13.3
July	Grapefruit	Ruby red	86	injected	3.8
		Marsh	125	injected	2.4
		Marsh	242	injected	0.5

signs of a mixed background and two (M1007 and N2187) obviously carry genes of Indian origin: M1007's fruit is blushed red and has a strong turpentine-like "Indian" flavor, and N2187 bears an elongate, blushed fruit with a mild, sweet flavor resembling that of 'Ameeri' (an Indian import). All 4 seedlings of M1007 were less susceptible to Caribbean fruit fly larvae than the samples from 10 of the 19 seedlings of N2187. M1007 itself did not fruit heavily this year and therefore could not be included in the infestation test.

The infestation of fruit in seedlings of N2187 ranged from 163.9 to 0.4 larvae/kg. Attractiveness to *Anastrepha* may depend on the inheritance of specific substances presently unknown. No obvious external character relates directly to a cultivar's

Table 2. Infestation of mango fruit by Caribbean fruit fly larvae resulting from cage exposure.

Seedling identification	Number of Fruit	Infestation/ kg.fruit
	Cambodiana	
N 2188	20	132.3
Florigon	25	63.0
N 2162	25	60.9
13269[z]	25	47.4
13269[z]	25	26.2
N 2187	25	8.9
	13269	
WA40926	25	7.2
	N 2187	
WA31720	2	163.9
WA31529	25	83.5
WA31426	15	39.1
WA31314	25	30.8
WA31715	25	28.1
WA31723	25	23.9
WA31626	25	22.5
WA31302	25	21.6
WA31612	25	17.1
WA31324	25	15.7
WA31428	21	10.9
WA41453	10	10.5
WA31506	15	10.4
WA31712	25	5.2
WA21704	24	5.2
1451	25	2.3
WA31726	25	2.0
WA31304	25	0.7
WA41347	25	0.4
	M 1007	
WA41231	25	13.5
WA31923	25	10.8
WA32020	25	4.6
WA31926	25	0.0

[z] Two samples tested from 13269.

Table 3. Infestation of fruit from mango cultivars by Caribbean fruit fly larvae resulting from cage exposure.

Cultivar[z]	Infestation/ kg fruit
Haden	5.9
Irwin	11.3
Pope	38.7
Ono	14.8
Tyler Premier	64.9
Kensington	11.5

[z] 25 fruit/cultivar

attractiveness to the fruit fly. N2188, 'Florigon', 13269, and 'Tyler Premier', among the more heavily infested, bear predominantly yellow fruit. N2187, 'Haden', WA41347, and WA31926, with low or no infestation, bear red-blushed fruit. However, WA41231 (infestation 13.5/kg) has an unblushed yellow fruit and 'Pope' (38.7) has a blushed deep red fruit. Thus fruit fly attractiveness in the mango cannot be related to color.

Grapefruit, like many species of fruit, are not generally subject to attack by the Caribbean fruit fly. However, some commercial grapefruit, do support fly infestations. As a result, treatments such as fumigation are needed to insure that fruit being shipped are free of fruit fly larvae.

Over 35 years ago, Baker (1) developed what is still the basis for commodity treatments to permit shipment of fruit from areas where they are subject to fruit fly infestation. Recommendation of a commodity treatment is dependent upon obtaining 99.99683% mortality in a population of ca. 100,000 fruit fly larvae exposed to treatment. Probit 9 security, as the procedure is known, would anticipate that only 32 of one million fruit fly larvae infesting commercal fruit would survive an acceptable treatment.

The population of fruit fly larvae in a particular species of fruit is dependent on many factors including the maturity of the fruit and the general condition of the fruit as related to other factors such as injury from weather, disease, or cold. Therefore, our methods of supplementing the

natural infestation of fruit by cage infestation or injecting eggs directly in the fruit is an aid in developing commodity treatments for citrus and other fruit grown in Florida and subject to infestation by the Caribbean fruit fly.

Summary

Infestations of Caribbean fruit fly larvae in citrus and mango, though occuring at a low level, indicate the need for additional basic information concerning the natural infestation present in fruit and the potential susceptibility of fruit to infestation by the Caribbean fruit fly. This research is time consuming and requires examination of large quantities fruit. Supplementation of natural infestations by cage infestations or injecting eggs into the fruit has reduced the time and amount of fruit required for such research. However, the technique does not eliminate the need to investigate natural infestations in fruit.

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Lychee Erinose Mite (LEM)

There have been big problems with the Lychee Erinose Mite (LEM) which has infested the Lychee trees in Southern Florida. This has resulted in the moratorium in the moment of Lychee trees from parts of Lee County.

Therefore, the management and possible eradication LEM is paramount to the Lychee growers.

Enclosed is a Youtube video and four related articles concerning the Lychee Erinose Mite provide by Doug Caldwell, UF Extension, Emeritus, Landscape Entomology & Horticulture.

Youtube Video: Lychee Leaf Curl Mite | Our Trees AFTER Treatment!
www.youtube.com/watch?app=desktop&v=YqE1q5SzHU8&feature=emb_rel_end
Detection of the Lychee Erinose Mite, *Aceria litchii* (Keifer) (*Acari: Eriophyidae*) in Florida

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:

The General Meetings will be held on the second Saturday of each month starting at 4:30 pm. The Meetings will be held at the Newport Animal Hospital.

Workshops:

Workshops will be held on the forth Saturday of each month starting at 4:30 pm. The Workshops will be held at the Newport Animal Hospital. 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 MAY and May, 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!):

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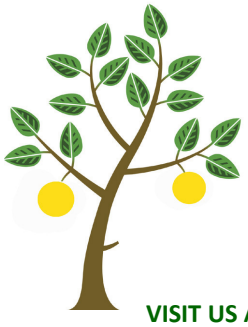
The Collier Fruit Growers Inc. (CFG) is an active organization dedicated to inform, educate and advise its members as well as the public, as to the propagation of the many varieties of fruits that can be grown in Collier County. The CFG is also actively engaged in the distribution of the many commonly 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.



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