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## Fruit and Nut Species

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- Book Review: Fruits of Warm Climates  
(<https://www.echocommunity.org/resources/9c283a57-1844-4263-83e8-ece56bd148ea#Book>)
- "Tropical Fruit Production and Research" Course  
(<https://www.echocommunity.org/resources/9c283a57-1844-4263-83e8-ece56bd148ea#Trop>)
- ECHO's Video Series on Tropical Fruits  
(<https://www.echocommunity.org/resources/9c283a57-1844-4263-83e8-ece56bd148ea#Echo>)
- Tropical and Subtropical Fruit Trees for Arid Regions  
(<https://www.echocommunity.org/resources/9c283a57-1844-4263-83e8-ece56bd148ea#Subt>)
- Apples for the Highland Tropics  
(<https://www.echocommunity.org/resources/9c283a57-1844-4263-83e8-ece56bd148ea#Appl>)
- Cashew as a Cash Crop: Is It as Good as It Appears?  
(<https://www.echocommunity.org/resources/9c283a57-1844-4263-83e8-ece56bd148ea#Cash>)
- Florida Citrus Publications  
(<https://www.echocommunity.org/resources/9c283a57-1844-4263-83e8-ece56bd148ea#Flor>)
- Some Notes on Guavas  
(<https://www.echocommunity.org/resources/9c283a57-1844-4263-83e8-ece56bd148ea#Some>)
- The Jaboticaba Tree, *Myrciaria cauliflora*  
(<https://www.echocommunity.org/resources/9c283a57-1844-4263-83e8-ece56bd148ea#Jabo>)
- Are Macadamia Nuts a Good Crop for Belize?  
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- Comments on Worms and Polyembryony in Mangoes  
(<https://www.echocommunity.org/resources/9c283a57-1844-4263-83e8-ece56bd148ea#Comm>)
- Mango Trees That Do Not Produce  
(<https://www.echocommunity.org/resources/9c283a57-1844-4263-83e8-ece56bd148ea#Mang>)
- Introducing Native Fruits in Zaire  
(<https://www.echocommunity.org/resources/9c283a57-1844-4263-83e8-ece56bd148ea#Intr>)

**FRUITS OF WARM CLIMATES** by Julia Morton is an authoritative source for information on sub/tropical fruits from around the world. Possibly our most-used reference book at ECHO, this 505-page hardcover book has comprehensive information, excellent photographs, and practical growing hints for over 150 well- and lesser-known fruits and related species. It offers regional names, complete information on varieties, food value and toxicities, propagation, harvesting and storage, and medicinal uses, etc. of the various fruits. It is an indispensable resource for anyone who works extensively with tropical fruit production. Order from ECHO for US\$75 plus postage (\$5.50 within the US; \$10 to Canada or Mexico) by credit card or check drawn on a US bank. Due to the weight and value of this book, we cannot ship overseas. ([https://cdn.ymaws.com/echocommunity.site-ym.com/resource/resmgr/a\\_to\\_z/azch4fru.htm#Table](https://cdn.ymaws.com/echocommunity.site-ym.com/resource/resmgr/a_to_z/azch4fru.htm#Table))

**"TROPICAL FRUIT PRODUCTION AND RESEARCH"** is a very popular graduate course that has been offered every other year at the University of Florida's Tropical Research and Education Center by Dr. Carl Campbell. When ECHO hired Scott Sherman as Assistant Director in 1988 the first thing he did was take that course. Although Carl is "retired" he still teams up with Dr. Jonathan Crane, the man who assumed his position, to offer the course in the summer (approximately mid-May to mid-June). This course is geared toward highly motivated students. You must register for credit through the university and pay tuition (which will be out-of-state for most of you). There are no special scholarships. A B.S. degree in a plant or agricultural science is a prerequisite (with some exceptions). Enrollment is limited. Lectures and field trips take place between 8 and 5 weekdays, so the course requires a full-time commitment. Contact Dr. Crane at TREC, 18905 S.W. 280 St., Homestead, FL 33031, USA; phone 305/246-6393; fax 305/246-7003. The course will be offered in 1996. ([https://cdn.ymaws.com/echocommunity.site-ym.com/resource/resmgr/a\\_to\\_z/azch4fru.htm#Table](https://cdn.ymaws.com/echocommunity.site-ym.com/resource/resmgr/a_to_z/azch4fru.htm#Table))

**ECHO'S VIDEO SERIES ON TROPICAL FRUITS.** Dr. Carl Campbell is well known to readers of EDN. His answers to your tropical fruit questions have appeared in many issues. Until his recent retirement, Carl was professor of tropical fruit at the University of Florida, responsible for teaching, research and extension. He is also known to many Floridians for his popularity on the speaking circuit at the many tropical fruit clubs in this State. His knowledge of and enthusiasm for the subject of tropical fruit is contagious.

Imagine standing under a mango tree with Carl while he shared the most interesting and helpful things he knew about mangoes. Then envision going to other trees and doing the same thing for 10, 20 or 30 minutes: avocado, canistel, loquat, macadamia etc. I had this privilege during four different seasons, videotaping his discussion. ECHO intern Mary Cockram, a communications and agriculture graduate of Cornell, then spent hours editing it down to approximately 8 hours of teaching. Now you too can meet Carl under some of his favorite trees!

The first tape in the series, called "Introduction to Tropical Fruit," was made last. We found that people coming to ECHO to study before heading overseas were so unfamiliar with tropical fruits that they did not even know it was a subject they should want to learn about. I must admit that 20 years ago, when reading the account of Adam and Eve in the Garden of Eden, I would envision them eating apples, pears, cherries and other temperate fruits. Most Americans would be hard pressed to even name a tropical fruit other than banana, pineapple, mango, and

avocado. So we asked Carl to put together a 70-minute slide presentation. Fruits of the lowlands, middle elevations and then high elevations are discussed in order, each divided into major fruits, lesser known fruits with considerable potential, and locally important fruits. Every time I see it I am not only enthused again for the potential of tropical fruits in development projects, but am struck with awe at the richness of the world God has created for our joy and benefit.

The only other tape that was not made "standing under the trees" is the one on papaya and coconut. Carl's discussion of these two fruits is based around a series of slides.



(/resources/2300b9d3-f13a-4cc0-bfa4-59c8e098ee3a)

The tape on grafting tropical fruit will be of special interest to many of you. Closeup photography and Carl's running comments show several of the most useful grafting techniques. After viewing this tape a few times, then getting some hands-on practice, you should have a powerful new tool for your ministry. You can use the tape in teaching if you provide the commentary in the local language.

**TAPE # 1** -- (73:03 minutes) Introduction to Tropical Fruit.

**TAPE # 2** -- (81:58 min). Part I. Grafting Tropical Fruit (60:08 min); Part II. Avocados (21:50 min).

**TAPE # 3** -- (85:13 min). Part I. Guava, pineapple and macadamia (34:30 min); Part II. Mamey sapote, sapodilla, eugenia family, jaboticaba, velvet apple, black sapote, white sapote, white mombin, strawberry tree (50:43 min).

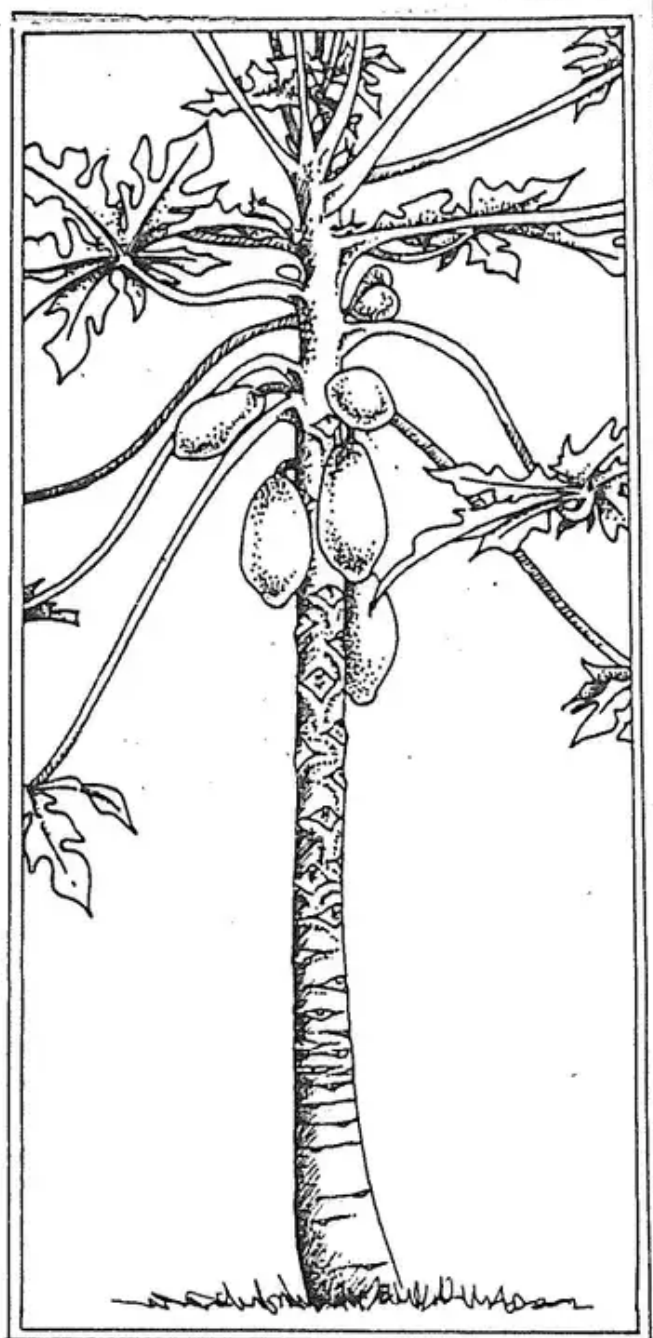
**TAPE # 4** -- (79:02 min). Part I. Atemoya, passion fruit, inga, loquat and naranjilla (29:15 min); Part II. Akee, tamarind, jujube, carissa (21:16 min); Part III. Carambola, canistel, monstera, barbados cherry (28:31).

**TAPE # 5** -- (69:12 min). Part I. Mangoes (40:00 min); Part II. Papaya, coconut (29:12 min).

**TAPE # 6** -- (67:36 min). Part I. Banana and jackfruit (26:00 min); Part II. A conversation with Carl Campbell about tropical fruit and development (41:36 min).

**ORDERING INFORMATION.** Several have written asking us to remember that the world uses three video systems. We have done so, though the duplicating costs for other than NTSC tapes (NTSC is the system used in the USA) are much higher. Each

NTSC tape sells for \$29.95 plus shipping and handling; all six for \$150. Prices in the other two systems, PAL and SECAM, are \$40 per tape, \$200 per set. FOR POSTAGE: contact ECHO. Payment must be in US dollars, either a check drawn on a US bank or your credit card (send authorization to use it and expiration date). Please add 6% sales tax for orders shipped to Florida addresses.



(/resources/75aed130-9b80-40ae-88a4-f97f03fc0c7a)We are offering a subsidized price for only those readers who work directly through non-profit organizations to help peasant farmers or urban gardeners in the Third World. These qualify for a 50% discount on the price of tapes. Explain the nature of your work and name of the non-profit organization (unless it is on file with your EDN

application). This discount applies also to PAL or SECAM, although in SECAM that price represents less than our costs of reproduction alone.

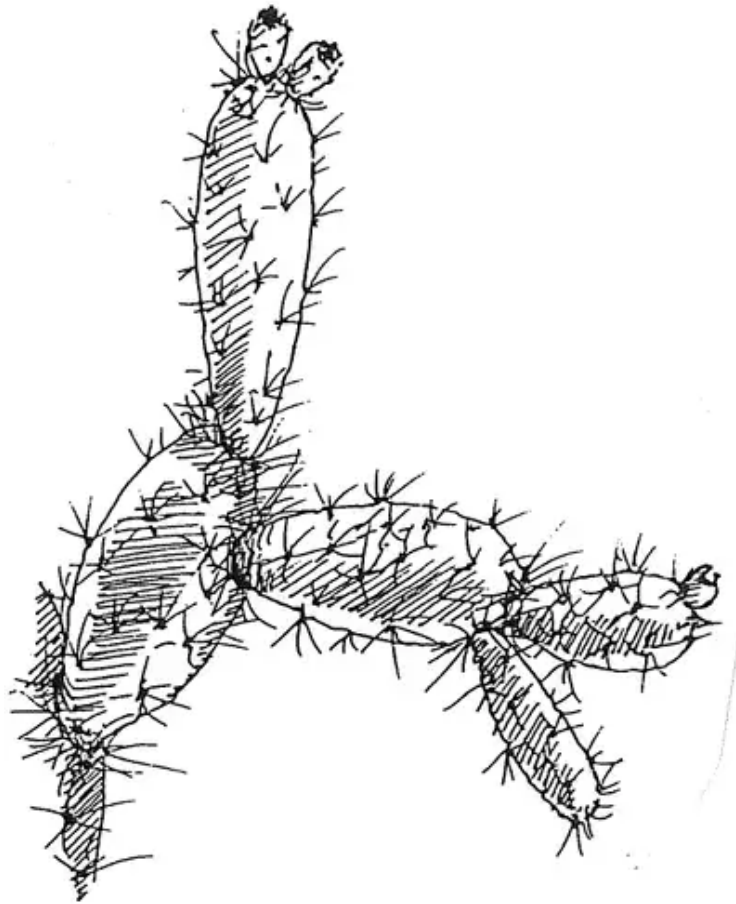
We are excited at the potential of video for taking the training to you. (Of course people studying at ECHO can study them here at no cost.) Other series are being planned. We welcome suggested topics. Maybe you could even offer some raw footage of your own on a special local technique that we could include in a future video. We especially want an evaluation of this series from those who use them.

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**TROPICAL AND SUBTROPICAL FRUIT TREES FOR ARID REGIONS.** I spent some time in conversation with Dr. Carl Campbell recently about fruit trees for areas that are arid for much of the year. Dr. Campbell, researcher and state extensionist for tropical fruit in Florida, has been the source of other information in these pages. Sentences or phrases preceded by an asterisk mean that we need more information that some of you may be able to supply.

**Balanites.** This desert date is one of the toughest of trees in Ethiopia and Somalia. It is "survival fare," as the edible small fruit is bitter, but it is high in carbohydrate and is not toxic. \*Who can get us some seed to share? **Prickly pear cactus**, *Opuntia* spp., can be quite productive. [Popenoe's *Manual of Tropical and Subtropical Fruits* (MTSF) says that the best varieties can produce on lean sandy or rocky soil, ill-suited for growing ordinary crops, with yields up to 18,000 pounds of fruit to the acre which would contain about 2500 pounds of sugar.] \*Varieties have been selected but we have little information on this. There is some commercial production in California, Italy and North Africa. The fruits are quite tasty, about the size of a lemon. They can be started from seed, but more commonly from joints. Carl thinks quite highly of this fruit. MTSF says, "An important advantage is the regularity of the yearly crop. They begin to bear about 3 years after planting and continue for many years". If you cannot find plants locally you can write us for seed. I have not yet located a supply, so be patient. **Indian jujube** (*Zizyphus jujuba*) tolerates both fairly wet or fairly dry conditions and will grow in **near** desert conditions. It is a very (/resources/18f85b7d-5fcd-4ec4-919e-9b829f7e1293)vigorous and hearty tree that will take about anything except freezes. It is extremely productive and has few disease problems. Though it grows to a good size, it can be pruned into any shape and would be good for espalier. People feed leaves to goats during dry weather. Carl knows of no named varieties. Do not confuse this with the Chinese jujube which is hardy even into the Ohio valley in the USA but will not do well in warm climates like southern Florida. ECHO has seed each year around February. **Imbe** (*Garcinia livingstonei*) grows in some pretty arid places and is fairly productive, though it is not a desert tree. It has a bulbous base underground like many arid and fire-resistant trees. It is so closely related to the mangosteen that it can be used as mangosteen rootstock. Quoting from *Sturrock's Fruits for Southern Florida*, it is "quite hardy in southern Florida and grows equally well on the acid sandy soils and alkaline rock soils. [To be hardy here means it can stand high rain and humidity also.] (Several generations of) trees grown from seed were quite fruitful with little variation in fruits. There are male and female trees. The stiff, unsymmetrical growth and the grey-green stiff foliage give it an unusual and striking appearance. ...The small orange-colored fruits have a thick tough skin and a very large seed. The small amount of juicy acidulous pulp has a pleasant flavor. It is,

however, more a curiosity than an economic fruit."



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**APPLES FOR THE HIGHLAND TROPICS.** We became acquainted with Jim Abbott in 1982 when we were looking for someone willing to give attention to small overseas orders. Some of you will remember the "bench grafted" apple trees that he offered some years ago. These apple roots with scions grafted to them were so small that up to 30 could be shipped in a package the size of a shoe box. There were a few successes, but most shipments had died in transit.

I called Jim for an update. He has had better luck with bench grafted trees that were ordered in sufficient quantity to ship by air freight (faster than regular airmail). However, several of them still have died within a few months.

Now he prefers to dig up established but quite young trees, much younger than would be dug for domestic shipment. Typically he chooses plants 12-18 inches tall that were budded in May or July and dug in the winter. They are still small enough that a person could fit 100 trees into a suitcase.

Advance planning is essential, even with small orders. Jim likes to begin correspondence early in the year, but can only ship when the trees are dormant (mid-December through March). If you travel to the States, it would be ideal to talk with him by phone. Whenever possible it is best to transport the trees in a suitcase when returning home or when someone is visiting. Otherwise there may need to be an exchange of letters to determine just how the trees are to be shipped and how



many dollars to send him in advance to cover shipping--which can be more than the price of the trees. Jim figures that the **maximum** safe time for trees to be in the mail is about two weeks. The trees themselves are US\$2.50. (They would be less if you are ordering several hundred, but unless apples are already proven in your area I would hesitate to start with that many.)

Jim can provide a phytosanitary certificate if requested. You will need to check with your government to obtain necessary permits for importing trees. A very small hand-carried or mailed package might be allowed into some countries, but the risk of a large, expensive shipment dying in customs is too great not to investigate beforehand.

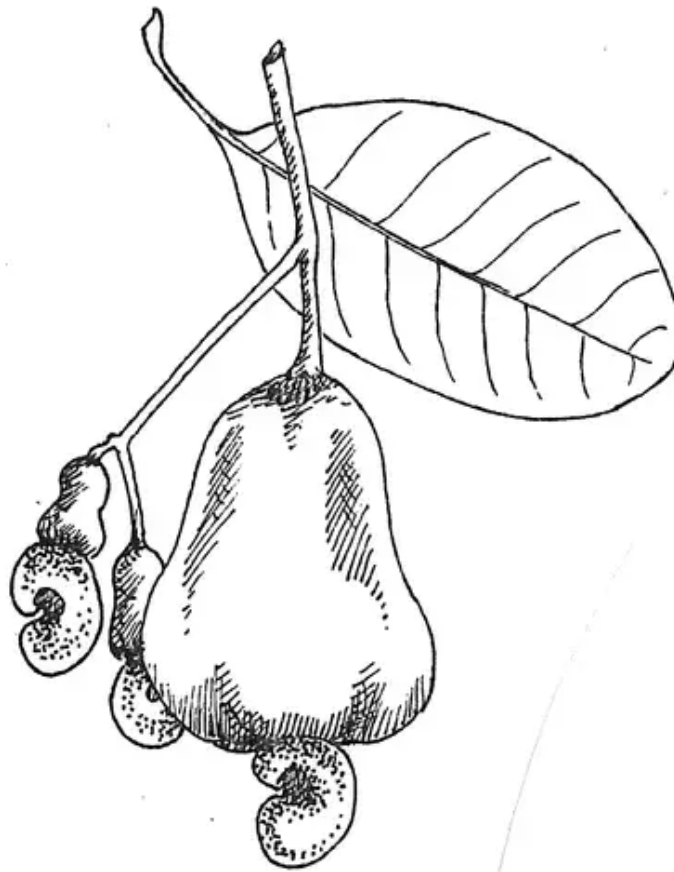
Recently Jim has sent fairly large orders to Ethiopia, and 28,000 trees to Honduras where a Japanese project has built a cooler to keep trees dormant until planting season. In Honduras (I believe at about 7,000 feet) the Excelsior plum and hood pear are also doing well. Chet Thomas wrote that the trees in Project Global Village's planting high in the mountains in Honduras did not need to be defoliated to blossom. They seemed to bloom frequently, even while apples were ripening on the tree. I heard the same thing from a site in Rwanda. Jim reported that blueberries are apparently doing well at one site in Honduras.

So what should you do? (1) I hate to ever say "never," but I would not bother with subtropical "temperate" fruits at elevations less than 3,000 feet (1,000 m). The cutoff elevation will be higher near the equator than at higher latitudes. Islands may have more moderate climates than sites well inland on continents. If I was at 6,000 feet I would begin to think of subtropical "temperate" fruits very seriously. (2) Write to Jim Abbott early enough to allow a few exchanges of correspondence. He will need to have payment for trees and shipping in advance. The address is Monticello Garden & Nursery, Route 4, Box 4048, Monticello, FL 32344, USA; phone 850/997-6778; e-mail [aj5a@webtv.net](mailto:aj5a@webtv.net) (<mailto:aj5a@webtv.net>). (3) If you want them to come airfreight, how is word to be gotten to you quickly that they have been sent? It is much easier if you or a friend can hand-carry the trees. (4) Start small. ([https://cdn.ymaws.com/echocommunity.site-ym.com/resource/resmgr/a\\_to\\_z/azch4fru.htm#Table](https://cdn.ymaws.com/echocommunity.site-ym.com/resource/resmgr/a_to_z/azch4fru.htm#Table))

**CASHEW AS A CASH CROP: IS IT AS GOOD AS IT APPEARS?** You would be surprised how often we receive a question similar to this. It does indeed do very well on poor soil. However, Dr. Campbell has mentioned to me that it is seldom a successful development project. One serious problem is the terribly toxic fumes that are produced during processing. They can be safely processed on a large scale, but it is not simple to do. The Natural Resources Institute (Publications Distribution ([/resources/6fe70f09-47bd-407f-9a3b-44ce9376c099](https://resources/6fe70f09-47bd-407f-9a3b-44ce9376c099))Office, NRI, Central Avenue, Chatham Maritime, Kent, ME4 4TB, UK) has some intermediate technology designs for processing cashews. My guess looking at the picture is that it would cost several thousand dollars.

I was replying to a question on cashews from Tom Taylor in Guyana when Dr. Frank Martin came by to begin work on a new teaching video for us on tropical root crops. I asked his opinion. Dr. Martin said that while cashew is often touted for areas where soils are poor, the tree has serious fruit setting problems. If there is excess moisture during flowering the fruit will not form. He gave this example. "A project I was consulting with in northern Haiti asked me to look at cashews. I

questioned many farmers very carefully. It turns out that even though the climate is dry, there is enough condensation of water at night to impede fruit development." That does not mean it is never a good choice. "I have never seen it grow as well as it does in central Panama." Dr. Martin said that if you have not already had a successful experience with cashews (including good fruit set) in the particular area being considered, be careful.



He also pointed out that cashew trees are associated with poverty worldwide. There is so much labor involved that there is little income produced per person. So it has little promise unless there is cheap labor. "It is a poor person's crop and a crop for poor soils." If you know of a cashew project that would lead you to a different opinion, we would like to hear about it.

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**FLORIDA CITRUS PUBLICATIONS.** Ed Noyes in Zaire wrote us about problems he was having with citrus, wondering if extension bulletins in Florida covered the topic. This led us to the Fruit Crops Extension office. (They used to publish a range of booklets on various topics, but that service is no longer available.) The information is now available for sale in book form; some titles are: Nutrition of FL Citrus, FL Dooryard Citrus, Rootstocks for FL Citrus, Citrus Disease and Insect Flashcards; FL Citrus Varieties, and Citrus Spray Guide. Each costs about \$10 plus postage. Order from Florida Cooperative Extension; 2109 Fifield Hall; Gainesville, FL 32611, USA; phone 800/226-1764; fax 904/392-2628. [If you write to ECHO for information on a particular fruit, we may send you the 2-page University of Florida's Fruit Crops Fact Sheet on that plant.] ([https://cdn.ymaws.com/echocommunity.site-ym.com/resource/resmgr/a\\_to\\_z/azch4fru.htm#Table](https://cdn.ymaws.com/echocommunity.site-ym.com/resource/resmgr/a_to_z/azch4fru.htm#Table))

**SOME NOTES ON GUAVAS** from Wilson Popenoe's (out of print) classic book *Manual of Tropical and Subtropical Fruits*: "The guava is used primarily for jelly-making and other cooking purposes." "It is one of the least exacting of all tropical



fruits in cultural requirements." "The guava succeeds on nearly every type of soil." "Plants should be set 10-15 feet apart." "It is the custom to propagate by seed, but choice varieties must be perpetuated vegetatively." "Both shield budding and patch budding are successful." "A simple method of propagation is to cut the soil 2-3 feet from the tree, severing the roots. Sprouts will soon make their appearance. When they are of suitable size they may be transplanted, giving a tree exactly like the parent tree." "The guava is subject to numerous insect and fungus enemies." "Unlike the preceding species, the strawberry guava is subtropical and can be grown wherever citrus succeeds." ([https://cdn.ymaws.com/echocommunity.site-ym.com/resource/resmgr/a\\_to\\_z/azch4fru.htm#Table](https://cdn.ymaws.com/echocommunity.site-ym.com/resource/resmgr/a_to_z/azch4fru.htm#Table))

**THE JABOTICABA TREE, MYRCIARIA CAULIFLORA.** A lot of local interest and publicity came our way with the opening of ECHO's "Edible Landscape Nursery." Our goal is to raise a portion of the expense of running this ministry by selling edible plants for both the yards and gardens of people in our local community. At the same time we are having a lot of fun acquainting our neighbors with some of the wonderful plants with which God has blessed our world.

A personal favorite is the jaboticaba tree. If I could rename it, I would call it "the grape tree." Early each spring the tree is loaded with purple fruits the size of large grapes. Fruits contain one seed which is larger than a grape seed but small enough that there is a lot of flesh to enjoy. The flavor and texture remind me somewhat of a muscadine grape. Uses are also similar to muscadine grapes. They can be eaten fresh, but the peel is tough enough that people often spit it out. They can be processed in ways similar to grapes, such as in jelly or wine. The visual appeal of the tree is striking. The trunk and larger branches, which are attractive in their own right, are suddenly covered with fluffy blossoms (in contrast to most fruit trees which set fruit on smaller branches). Soon the purple fruits almost hide the larger limbs.

There are drawbacks. The major limitation is that it is so slow to produce. Although Julia Morton's *Fruits of Warm Climates* mentions side veneer grafting, inarching and air layering, the conventional wisdom around here is that one might just as well start from a seedling. Seedlings are slow to begin bearing, typically about 9 years. Trees are very slow growing, reaching a maximum height of perhaps 30-40 feet. A second limitation is that they are not for the hot lowlands. They like a mountainous or subtropical area. At ECHO they only blossom during the coolest few months of the year. In some ideal (cooler) locations they produce several times a year. The tree is not harmed by frosts, nor by a freeze if it is light enough that it would not kill citrus.

If the weather cooperates, ECHO can share seeds each March. We will combine requests and fill at harvest time. Be sure to plant the seeds immediately, as they do not have a long life. ([https://cdn.ymaws.com/echocommunity.site-ym.com/resource/resmgr/a\\_to\\_z/azch4fru.htm#Table](https://cdn.ymaws.com/echocommunity.site-ym.com/resource/resmgr/a_to_z/azch4fru.htm#Table))

**ARE MACADAMIA NUTS A GOOD CROP FOR BELIZE?** Several have expressed an interest in macadamia nuts as a cash crop in one country or another, so our answer to this question may be of interest to many. Carl Campbell says, "Poor yield is a very common problem where people have planted in the Americas. In Hawaii they figure their break even point at about 100 pounds of nuts per mature tree. By comparison, in Florida we get 15-20 pounds. Macadamia trees seem to do best in the areas where coffee does best. Processing is a problem too. People have put in little

plantings, only to find that they cannot get the nuts processed. Some have even shipped from Central America to Hawaii for processing. Many of those who have been in it the longest seem discouraged." Carl adds that *Macadamia tetrafolia*, the rough spiny leafed and rough shelled macadamia, is the preferred rootstock. *M. integrefolia* is the other macadamia. ([https://cdn.ymaws.com/echocommunity.site-ym.com/resource/resmgr/a\\_to\\_z/azch4fru.htm#Table](https://cdn.ymaws.com/echocommunity.site-ym.com/resource/resmgr/a_to_z/azch4fru.htm#Table))

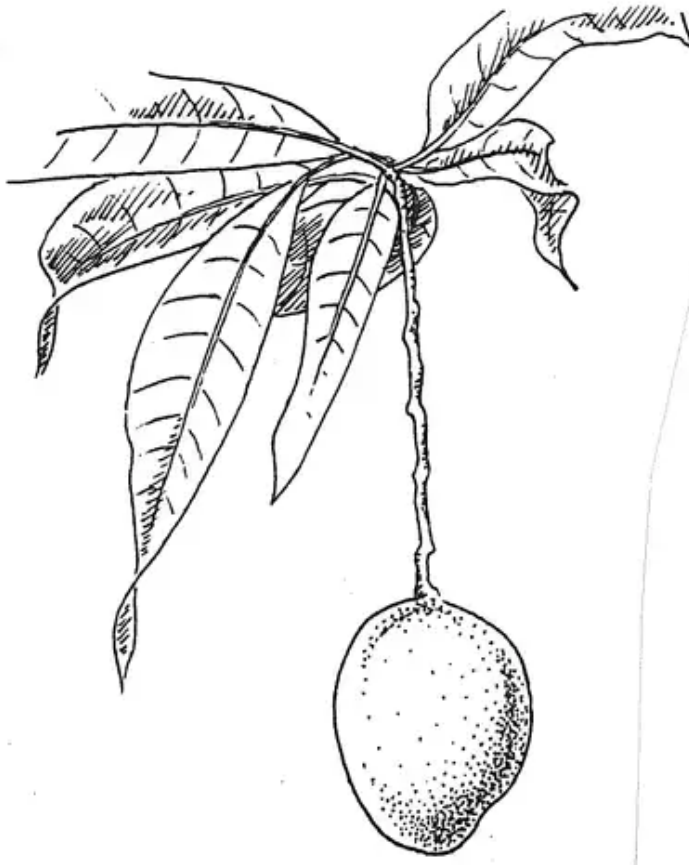
**COMMENTS ON WORMS AND POLYEMBRYONY IN MANGOES.** William Boykin in Zambia wrote, "We had 40 trees of peach mangoes. They are a lovely orange color, have very little fiber and are delicious. For four years we had only a small crop and nearly all that did mature were full of worms. On the other hand, the common local mangoes hardly ever have worms--but they are very stringy and fibrous. As a result we had most of the peach mangoes cut down and planted the common variety. Is there anything we can do to control the worms in the few remaining peach mangoes?"

I phoned Dr. Carl Campbell. As usual, I learned more than just what I phoned to ask. Carl said the pest is most likely the larvae of the fruit fly, most species of which like mangoes. There is very little that can be done. It is considered impractical to spray an entire area to get rid of the fruit fly. However, in Central America some folks get a crude molasses from the sugar mill at very low cost and mix malathion with it. Carl does not know the proportions or dilution. A swath is then sprayed onto leaves as a person with a backpack sprayer walks down the row of trees. Because it is a bait, it is not necessary to cover all the leaves or even every tree. Flies are attracted to the bait and are killed by the insecticide. He has seen it work fairly well with the Mexican fruit fly in Honduras. To make sure your species of fruit fly is attracted to the bait, try placing molasses on a few leaves and see if it attracts flies. I asked at what stage this should be done. Carl replied that control would be important about 3-4 weeks before the fruit is mature. Carl referred me to Dr. Jorge Pena, a specialist in insect control with tropical fruit, to answer my question of, "Why is it not used in Florida if it works so easily?" Dr. Pena said it is used by some. The problem is that it is not specific and kills a lot of beneficial insects as well. [For this reason you should definitely use it only during that key time when the fruit is susceptible to infestation.] People also make traps out of vinegar, hydrolyzed protein or anything that will ferment, plus insecticide. This method is used mostly in greenhouse and research plots.

Is there a general rule that fibrous mangoes are less susceptible to insect damage? Not necessarily, but there are great varietal differences in insect susceptibility between fruits of many species, including mangoes. I always urge our readers to do some of their own experimenting. Plant a lot of mango seeds here and there and see what kind of fruit each yields. Perhaps (</resources/473c902f-8bdc-46e3-b99c-e8b92b8d95aa>) you will come up with a superior mango that is even more resistant to the fruit fly! Carl is all for that, but said to watch out for polyembryonic mangoes. If you are still interested after that big word, read on.

Chances are extremely high that the local fibrous mango is polyembryonic. This means that each seed contains not only the embryo that resulted from cross-fertilization (called a gametic embryo), but also several (nucellar) embryos that developed from the parent tree's own tissue, the nucellus. Several trees may emerge from the single seed, but one of the stronger nucellar ones are more likely to survive. This can be a benefit if you like the parent tree and want to start identical

trees from seed. But if you want to start trees hoping that some will be better than the parent you are out of luck. You can tell if you have the polyembryonic type by removing the husk from the seed. You will find a lot of cotyledons curled around each other. If it is monoembryonic, you will find two big cotyledons and a single embryo. Trees coming from monoembryonic seed will have a combination of genes from two parents, resulting in many different combinations of traits.



In summary, if you want to try to develop a better mango, get seed from as many sources as possible, and concentrate on monoembryonic seeds. (Citrus presents a similar situation. It would be a shame to plant 100 citrus trees hoping for a few superior ones only to find that all were polyembryonic and "came true" from seed.) ([https://cdn.ymaws.com/echocommunity.site-ym.com/resource/resmgr/a\\_to\\_z/azch4fru.htm#Table](https://cdn.ymaws.com/echocommunity.site-ym.com/resource/resmgr/a_to_z/azch4fru.htm#Table))

**MANGO TREES THAT DO NOT PRODUCE.** Jack Mahaney wrote us after visiting Gary Dawson in Venezuela. "While they have many large, mature mango trees, no fruit is borne. There are heavy crops at other stations within a hundred miles or less. What is needed in order to produce fruit?"

I called our standby for tropical fruit questions, Dr. Carl Campbell, who was familiar with the problem. The most common cause is a location where the trees bloom during periods of high humidity and temperature. This leads to anthracnose infection of the flowers and no fruit set. It can be controlled by spraying with fungicides, such as those containing copper, carbamate (e.g. Maneb), or benylate. It is so humid in southern Florida that Florida growers are wiped out most years unless they spray. There are varieties from Southeast Asia that will do better under such conditions. He mentioned varieties Saigon, Florigon, Pico and Carabao.

It is very difficult to get tropical fruit trees shipped overseas. If you know someone who has the tree, can you have seed sent? The good news is that all of these varieties are polyembryonic and consequently most trees will be just like their parents. The bad news is that mango seeds are viable for only a couple weeks after

removed from the seed and dried. I asked whether you could extend the life of the seed by wrapping it in wet paper towels. Carl explained that mold is a terrible problem with seeds stored this way. The best approach is to surface sterilize the seed by dipping it in 10% chlorox, then pack it in **barely moist** (no free moisture should be visible) activated charcoal and ship in a plastic bag. (Might regular charcoal substitute for activated charcoal?)

There are locations where the trees do not even bloom. (Carl said you need to be alert because sometimes people have insisted their trees do not bloom, but more careful observers contradict them.) Fungicides will be no help there. For example, he has seen large areas in the Philippines where mangoes do not bloom. This appears to be due to the **uniformity** of high rainfall and temperature which does not permit the trees to have their normal dormancy. In 1972 scientists in the Philippines found that if they spray the leaves with as little as 10 g/liter of potassium nitrate, the buds will start elongating within 2-3 weeks and will bloom within a month. Spraying is done only once, but the trees are drenched completely. They time the spray to have bloom and fruit growth during the least stressful season possible. Apparently it is effective only when the tree has attained a "ripeness to flower." Signs of this stage include: leaves become dull green or greenish brown and brittle when crushed with the hand and the tree has an appearance of suspended growth. Another use of this technique is to induce earlier flowering to beat the market and get higher prices for the mangoes. The fruiting season can be advanced several months in the Philippines.  
([https://cdn.ymaws.com/echocommunity.site-ym.com/resource/resmgr/a\\_to\\_z/azch4fru.htm#Table](https://cdn.ymaws.com/echocommunity.site-ym.com/resource/resmgr/a_to_z/azch4fru.htm#Table))

**INTRODUCING NATIVE FRUITS IN ZAIRE.** Roy Danforth and Paul Noren, Zaire. "It was slow going at the beginning of our program as people used to refuse to plant fruit trees for reasons such as, 'I'll die before the tree starts fruiting' or 'if a man eats fruit, he'll get a hernia and have to be operated on' or 'fruit gives me diarrhea.' But now jakfruit, canistel, rollinia, black sapote, yellow passion fruit, abiu and inga are big favorites with the local people.

"We now have several hundred species of fruits, nuts and other useful trees/vines and have planted them out in various (/resources/c2eed0c7-f888-4e2b-bf8b-34fc51a6201c)locations ranging from a single tree in someone's yard to several acres in an orchard. Some species have little potential to help the people here as they take too long to come into production or the fruit is not of good quality.

"However, we have hit upon several really good winners for this area. The top vote getter with the local people is the canistel (*Pouteria campechiana*--see drawing), simply because it is good food. Its taste is similar to the sweet potato that is widely grown and eaten here [Ed: except that canistel does not need to be cooked.] Rollinia (an *Annona*) is a close second as it is a large fruit with a lot of edible flesh.

"Jackfruit (*Artocarpus heterophyllus*) is becoming more and more popular. Though not everyone appreciates it, those that do cannot get enough of it. More jackfruit trees have been planted than any other tree and many come into production in less than two years! Because they are seedlings, there is enough variation in fruit taste, consistency, latex content, etc. to find one that will please most everyone. ...The abiu is coming on strong as a popular fruit because the variety we are using has a short 2-year bearing age and produces large quantities of delicious fruit.