

THE MANGO INDUSTRY IN THE AMERICAS

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I will present a brief overview of production in Florida, some data on production in South and Central America, and some remarks on production in Mexico and Central America.

We had more than 2,000 acres of mangos in south Florida the day before Hurricane Andrew. The hurricane destroyed about 60 percent of the trees. Many are still dying as a result of the storm, so the final toll won't be known for some time. About 60 to 70 percent of these were 'Tommy Atkins', with the balance composed primarily of 'Keitt' and 'Van Dyke'. The age of groves broadly ranges from about three years to more than 40 years old. In general, the young growers are rather pessimistic about rebuilding a Florida mango industry in the face of overwhelming amounts of fruit being imported from Mexico. Other sources of income are being considered, including sugar apple, carambola, lychee, vegetable crops, and tract homes. Urban sprawl is taking over many areas suitable for mango production.

Many orchards in Central America are less than four years old. Much of that acreage is in 'Tommy Atkins'. Because they were advised that it is our best seller (which, in fact, it is in the U.S.), and it is an excellent shipper, they elected to plant many acres in this cultivar. Unfortunately, it does not perform as well in the tropics, particularly with regard to flowering and manipulation of flowering with KNO_3 . It is a cultivar which was originally selected in the South Florida subtropics. It flowers much better in Florida than in more tropical climates such as Central America, where night temperatures do not get low enough to promote flowering, particularly in the warm, coastal regions. Large-scale growers are considering topworking to more reliable cultivars.

Table 1 lists tropical American countries with 10,000 metric tons or more of production. Pre-hurricane Florida had the least production, with just over 1,000 hectares. Mexico is by far the largest producer, with over one million metric tons annually. Most of their export production, about 75 percent, is 'Tommy Atkins' and 'Haden', but they also export 'Keitt', 'Kent', 'Irwin', and 'Sensation'. The primary production for domestic use in Mexico is 'Manila'. Brazil is the next largest

producer, but most of that is shipped to Europe. Mexico only exports about 5 percent of its production, mostly to the U.S. They have hot-water treatment facilities throughout the production areas, especially in the northern parts of the mango producing states.

Q: How do yields in Florida compare with other locations?

A: I think we are getting around 500 bushels per acre. This is not my specialty, and I don't keep these numbers in my head. You may be able to calculate comparative yields from the data in the table.

Q: Is Florida the only U.S. mainland state that produces mango?

A: Yes. There are a few acres in California, but that is not much in terms of production. In Florida, the growing area is limited to about 50 square miles located south and west of Miami. Most production in the Homestead area is on small orchards of 5-10 acres managed by retired people. J. R. Brooks & Sons packing house is doing a lot of importing these days from areas with USDA-approved treatment facilities, such as Haiti. Treatment facilities are being developed in Guatemala, Nicaragua, and Costa Rica for exporting mangos to the U.S.

Table 2 lists Tropical American countries producing less than 10,000 metric tons. Some of these figures may be questionable. Jamaica is trying to develop an export market. Most of their export production now goes to Europe, but they want to set up a treatment plant for exports to the U.S.

As an aside, one exciting prospect for the future is a hyperbaric storage system developed by Stanley Burg. He has a design for an aluminum, refrigerated, vacuum-storage unit that is light, portable, and costs about the same as a standard refrigerated container. Growers will be able to put this container near their production area and load it with fruit as it is harvested and graded. The container will maintain the fruit for about four months, with improved shelf life once removed. It

Table 1. Tropical American countries with 10,000 metric tons or more estimated annual production of mango

Country	Area (ha)	1990 production ^z (metric tons)	Commercial cultivars ^y
Brazil	36,490	415,000	Rs, Es, Ir, Hd, Ex, Rn, Sr, Tm, Vd, Pl, Kt, Ls
Colombia	3,000	30,000	Tm, Kt, Vd, Ir, Kn, Hd, Pl, Yl, Sf, Az
Costa Rica	5,000	12,500	Kt, Tm, Kn, Hd, Ls
Cuba	12,000	85,000	
Dominican Republic	18,000	150,000	Tm, Kt, Ir, Hd, Mf, Kn, Pl, Bn
Ecuador	4,300	35,000	Hd, Pl, Sn, Kt, Tm, Vd, Ed, Gl, Ls
Florida, USA	1,170	10,000	Tm, Kt, Vd, Kn, Hd, Pl, Zi, Sn, Pr, Sm, Fs
Guatemala	5,000	10,000	Tm, Hd, Kt, Ir, Mf, Kn, Zi, Pl, Vd, Ls
Haiti	36,000	300,000	Mf, Tm, Bp
Honduras	1,500	10,000	Hd, Tm, Kt, Kn, Ps, Ls
Mexico	109,700	1,122,000	Mn, Tm, Hd, Kn, Ls
Paraguay	2,700	19,000	
Peru	7,000	60,000	Hd, Kn, Kt, Tm, Ed, Ls
St. Lucia	6,500	46,000	Jl, Im, Gr
Venezuela	8,500	127,000	Hd, Tm, Sp, Fd, Pl, Gl, Bc, Hl

^zSource: FAO production yearbook, Vol. 44, 1990, except for Mexico, which is a 1992 estimate from a private source. Table from C. Campbell and C. W. Campbell, poster presented at the 4th International Mango Symposium. Central American acreage figures from J. R. Mondonedo, PROEXAG, Guatemala.

^yCultivar key: Azucar (Az), Banilejo (Bn), Baptista (Bp), Bocado (Bc), Espada (Es), Edward (Ed), Extrema (Ex), Fascell (Fs), Ford (Fd), Glenn (Gl), Graham (Gr), Haden (Hd), Hilacha (Hl), Imperial (Im), Irwin (Ir), Julie (Jl), Keitt (Kt), Kent (Kn), "Local selections" (Ls), Madame Francis (Mf), Manila (Mn), Palmer (Pl), Parvin (Pr), Pespira (Ps), Rosa (Rs), Rosinha (Rn), Sensation (Sn), Springfels (Sp), Smith (Sm), Sufaida (Sf), Supresa (Sr), Tommy Atkins (Tm), Van Dyke (Vd), Yulima (Yl), Zill (Zl).

is quite remarkable. They are building the prototype and trying to raise funds to get into full production.

Mexico.

Most mango production in Mexico and Central America is on alluvial plains adjacent to mountain ranges bordering the Pacific Ocean. Orchards in Mexico are often interplanted with other crops, such as coconut palm. The trees get little or no fertilizer, although they are irrigated, usually by furrow. The polyembryonic cultivar 'Manila' first comes into production around February in the southernmost region of Chiapas, using potassium nitrate to simulate flowering. Fruits from this area are not available for export due to the Medfly quarantine. Trees become

responsive later and later the further north they are planted, and even if the spray concentration is increased, leaf burning results with no inducing effect. For example, KNO₃ stimulates flowering in October in Chiapas but not in Colima (18°N), where it isn't until late November when they begin to get a response to spraying. Four percent solutions of KNO₃ or two percent solutions of ammonium nitrate are typically used. Increasing amounts of chemical are needed to obtain a response from about 20°N to 23°N. Trees in latitudes north of 23° have no predictable response, regardless of spray concentration. I don't have an explanation for that. In Mexico, tip burn is used as an indication that they sprayed the tree effectively, but that is not so in other areas; it may be because of the dry climate in Mexico.

Table 2. Tropical American countries with less than 10,000 metric tons estimated annual production of mango fruit.

Country	Area (ha)	1990 production ^z (metric tons)	Commercial cultivars ^y
Antigua	150	1,000	Jl, Gr, Im
Argentina	280	2,000	
Belize	1,500	1,000	Tm, Kt
Bolivia	850	6,000	Ls
Dominica	400	4,000	Jl, Im, Gr
El Salvador	150	1,200	Ls
Grenada	280	2,000	Jl, Gr
Guadeloupe	280	2,000	Ls
Guayana	420	3,000	Ls
Jamaica	440	4,000	Jl, Bm, Tm, Kt, Pl, Hd, Vd
Martinique	110	1,000	Ls
Nicaragua	1,400	5,000	Hd, Tm, Kt, Kn
Panama	570	4,000	Jl, Fr, Hd, Kn, Zl, Fc
Puerto Rico	650	6,000	My, Mz, Cb, Pt, Kt, Pl, Dh, Pr, Ir, Tm, Kn, Os, Sp
St. Vincent	280	2,000	Jl, Im, Gr

^zSource: FAO production yearbook, Vol.44, 1990. Table from C. Campbell and C.W. Campbell poster presented at the 4th International Mango Symposium. Central American acreage figures from J. R. Mondonedo, PROEXAG, Guatemala.

^yCultivar key: Bombay (Bm), Cubano (Cb), Davis-Haden (Dh), Francisque (Fr), Graham (Gr), Haden (Hd), Imperial (Im), Irwin (Ir), Julie (Jl), Keitt (Kt), Kent (Kn), "Local selections" (Ls), Mayaquezan (My), Manzano (Mz), Osteen (Os), Palmer (Pl), Parvin (Pr), Pasote (Pt), Springfels (Sp), Tommy Atkins (Tm), Van Dyke (Vd), Zill (Zl).

Q: Why do they use the hot-water bath?

A: They must meet USDA quarantine requirements for fruit fly control. They do not have the seed weevil, but they do have the Mexican fruit fly. The plants are all monitored by USDA personnel; accurate records are kept, and the process is tightly controlled. The fruits go through a barrier to keep flies out of the packing area. The fruits are either submerged in batches or run under the water in a continuous-chain conveyor for the prescribed amount of time. The fruits slowly cool down before transfer to a cold room prior to loading on trucks. Trucks back up to the loading doors with sealed edges to prevent entry of flies into the truck.

One problem associated with the hot-water treatment is shrinking of the fruit shoulders accompanied by white, pulpy voids inside the fruit. This appears to be related to harvest of immature

fruits. The Mexicans tend to ship a lot of immature fruit. Florida learned long ago that shipping immature fruit, or fruit of less than good quality, ruins the market, especially if it is a developing market.

Central America.

Guatemala has about 5,000 acres in mango, one-third of which are under four years old. Most of that is along the coast in the Chiquimula area. Zacapa is another area of production. It is a dry area with water available for irrigation.

Honduras has about 1,500 acres, also with one-third of the trees under four years old. Much of the production, by necessity, is near the main highway through the country, so that it can get to a port for export shipment.

El Salvador has only about 150 acres in production, mostly on small farms around San

Salvador.

Nicaragua has one area of production, San Francisco, along Lake Managua, a very dry area that requires irrigation. The planting is about 1,400 acres, but the company is in receivership.

Belize has limited production at Stan Creek, about 1,500 acres on humid, coastal land better suited for bananas. I think that company, too, is in receivership.

Costa Rica is vigorously working toward export to the U.S. Most of their production is in the area of Orotina and Guanacaste near Liberia, with several very large plantations, mostly in 'Haden' and 'Tommy Atkins'. They are doing an excellent job of production management. There is a lot of interest in mango production, with plenty of government support.

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Q: Are there any plantings north of Miami?

A: There are no commercial plantings. Mangos do not do very well north of Miami because of periodic freezes.

Q: Do you know how the Mexicans are financing their large plantings?

A: The government is helping them, although I am not sure exactly how, or how extensive the assistance is. I think much of the growth in the Mexican mango industry has been due to the success of their exports. They get better prices than locally distributed fruit.