# 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 Trees may be grown in large containers or in holes in the ground in which the original soil has been replaced by the desired mixture of peatmoss and sand.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.

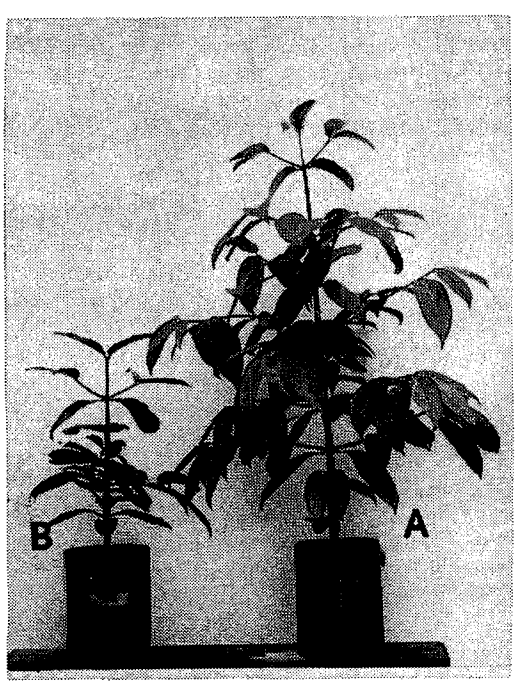


Fig. 1.—Mangosteen plants. A, approach grafted with Garcinia tinctoria; B, not grafted.

## 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-

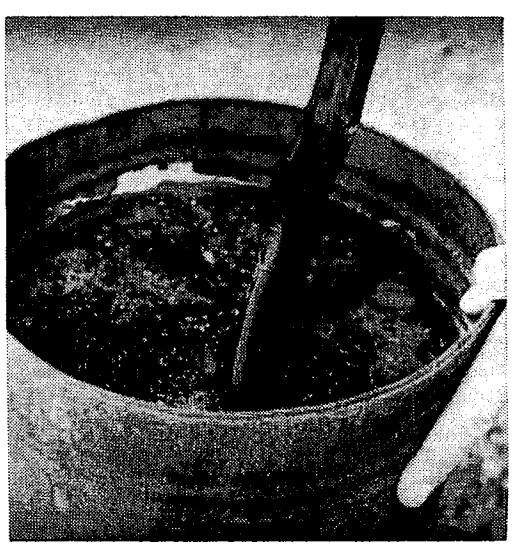

Fig. 2.—Stems and graft union of mangosteen plant approach grafted with Garcinia tinctoria.

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.
2. Oliver, G. W. 1911. The seedling-inarch and nurse-plant methods of propagation. U.S. Dept. Agr. Bur. Plant Industry Bul. 202.
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.

# THE CARIBBEAN FRUIT FLY IN FLORIDA[1,2]

H. V. WEEMS, JR.[3]

*Anastrepha suspensa* (Loew) (Fig. 1), commonly called the Caribbean fruit fly, the Carib fly and the gauva fly, is a near relative of a major pest of citrus and other tropical and subtropical fruits, the Mexican fruit fly, *Anastrepha ludens* (Loew). *Anastrepha suspensa* is one of several species of fruit flies which are indigenous to the West Indies and the larvae of which attack tropical and subtropical fruits. Since its reappearance in Florida in April 1965, the Caribbean fruit fly has spread over 23 counties in southern and central Florida, and hundreds of thousands of specimens have been collected in traps. From the original infestation in Miami Springs near the Miami International Airport, the fly spread rapidly over much of Dade County before the end of June, and by the end of 1965 it had been found in seven counties in southern Florida. The natural dispersion continued during 1966, and to date *Anastrepha suspensa* has been found in 16 additional counties (Fig. 2). Despite a hurricane in the fall of 1965, freezing to near freezing winter temperatures throughout central and southern Florida, and a scarcity of host fruits during the winter, the Caribbean fruit fly has been collected every week since April 1965.

When the Caribbean fruit fly was rediscovered in the Miami area, it failed to cause great excitement, since this species had been studied extensively in Puerto Rico; despite its abundance there, it had never been a problem to commercial fruit growers. However, a species of insect, or a particular strain of that species, sometimes acts substantially differently when introduced into new areas and may become a serious pest in those new areas. For that reason *Anastrepha suspensa* was viewed with

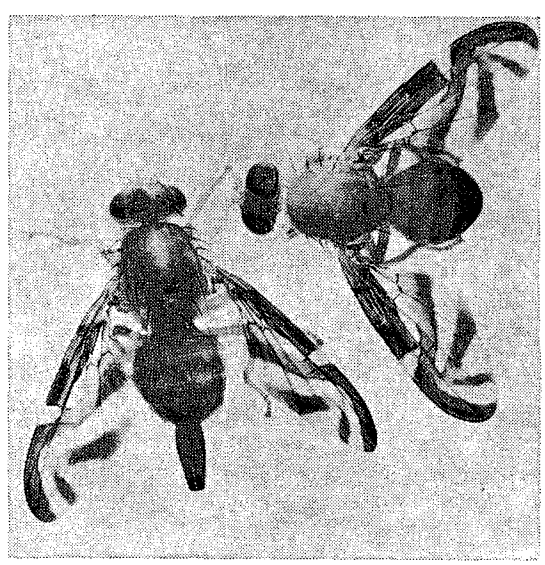

**Fig. 1.—Anastrepha suspensa (Loew) adult fruit flies, female (left) and male.**

1Contribution No. 91, Entomology Section, Division of Plant Industry, Florida Department of Agriculture.
2A 20 minute color movie prepared by Division of Plant Industry specialists was shown with the presentation of this paper.
3Entomologist, Division of Plant Industry, Florida Department of Agriculture, Gainesville, Florida 32601.