determined at the time of shedding of the last male flowers from the panicles, two weeks later, and just prior to harvesting. These data are summarized in Table 5.

Table 5. Shedding of Immature Lychee Fruit in Dade County.

Tree No.	Number of Panicles Checked	Ave. Initial Number of Set Fruit	Ave. Number of fruit after 2 wks.	Ave. Number of fruit at maturity	Ave. % fruit at maturity
1	4	66	3	2	3.0
2	4	154	16	6	3.9
3	4	42	3	3	7.1
4	4	86	2	2	2.3
5	4	50	9	5	10.0
6	4	73	5	3	4.1
7	4	121	13	7	5.8
8	4	112	9	4	3.6
9	4	73	9	3	4.1
10	4	121	18	7	5.8

The data collected in Laurel and in Dade County show that the highest percentage of loss of fruit occurred during the first two to four weeks after the young fruit had set. It would seem that a fair estimate of potential crop yield might be made at the end of this period.

SUMMARY

The results of this investigation show that three types of lychee flowers appear consecutively on the same lychee panicle and that the shift from one type of flower to the other occurs as a gradual transition rather than as a sharp demarcation. The pollen produced by the different types of flowers varies in structure and in viability. The highest percentage of shedding of young fruit occurs during the first month after fruit "set." The shedding of young lychee fruit may be partially attributed to failure in fertilization and to embryo abortion.

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ROOTING GUAVA (PSIDIUM GUAJAVA L., c. SUPREME) STEM CUTTINGS IN A HYDROPONIC MIST-TYPE PLANT PROPAGATOR

JOEL KUPERBERG

Miami, Florida

In conjunction with the guava breeding and selection programs currently underway in South Florida, considerable work has been done toward the development of a rapid method for the vegetative propagation of this plant. Propagation problems have been a major factor in the slow development of commercial guava culture. Only within the past fifteen years have research workers in Florida done any breeding and selection work with guava. Virtually all of the approximately 400 acres of commercial guava plantings in Florida in 1948 consisted of seedling trees (4). Seedling guava trees do not "come true" to a degree which would recommend the use of such propagation material. Vegetative reproduction methods are of prime importance in multiplying the selected mother trees produced by the breeding and selection programs (4, 7).

Prior to 1948, root cuttings were considered the only practical plant material for reproducing a scion. This method, although successful (3), results in serious injury to the parent tree if any number of cuttings are taken. In 1948, Ruehle suggested the application of the plastic wrapped marcot technique (5). This has proved a rapid and efficient method for vegetative reproduction, the only objections being that it requires considerable time to apply and it yields relatively few propagules per mother tree.

Mr. Roy Nelson, of the University of Miami Experimental Farm, has devised a patch budding method which appears as another solution to this problem. Budding supplies the answer to the problem of producing large numbers of propagules, but introduces another difficulty. Guavas are subject to the death of their aerial portions at freezing temperatures (4, 8). In the case of grafted or budded trees such injury would result in loss of the scion. Trees on their own roots will regenerate from root suckers and frequently only one crop will be lost, with a mild winter the following year (8).

The experiment described herein included four basic types of environments in which guava stem cuttings were placed and maintained during a twelve weeks' period. Two of these cutting bed environments proved completely unsuitable; of the other two, root production was such as to suggest certain possibilities.

The experimental installation (Fig. 1) consisted of two hydroponic units, adapted for mist propagation (1, 2). Each unit con-

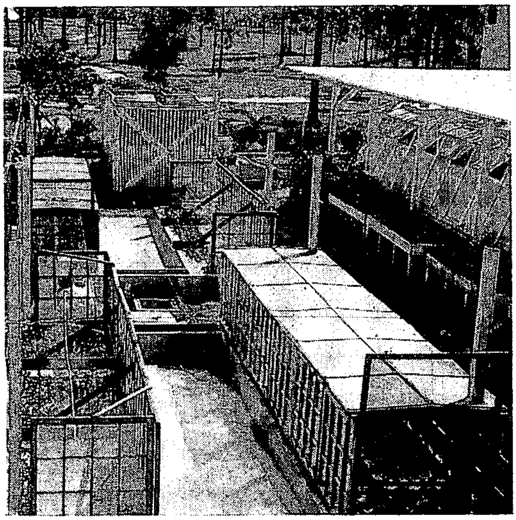

Figure 1. General view of hydroponic propagator units; unit one in foreground, unit two in background.

sisted of two beds, four and one half feet wide by nineteen feet long. The two beds were separated by a five foot walk-way. One bed of each unit was glass-enclosed to form a tunnel-like structure. At one end of each tunnel, an electric fan was placed behind two mist heads, so arranged that the mist was distributed along the length of the bed. The other bed of each unit had four mist heads per bed, spaced evenly along the length of the bed, mist distribution being accomplished by gravity only. These two beds had a vertical glass windbreak which extended along both ends and the windward side of each bed. The beds covered by the tunnel-like structures were referred to as the "enclosed" beds, the latter two beds were considered as the "open" beds. The two hydroponic units were essentially identical except in the mist material. Unit one operated with a nutrient mist while unit two utilized only water as a mist.

The plant material was obtained from the ten acre guava planting at the University of Miami's Experimental Farm. The trees in this experimental block are maintained on a regular fertilization and irrigation program and were in early flush growth, following fruiting, at the time the cuttings were taken. Overall condition of the planting was excellent. Three trees, grown from the supreme variety of *Psidium guajava* L. were selected as the mother trees. These were cut back and the material so obtained was transported, under wet burlap, to the propagation units where it was placed under a water mist. The material was maintained under a water mist during the period of cutting preparation.

Upon examining the plant material it was decided to establish eight classifications and prepare the cuttings to conform to these specifications. With regard to the age of the wood there were four types of cuttings, characterized as follows:

"T"—Terminal growth; represented by green, succulent tips (flush growth) with swollen apical buds.

"L"—Terminal growth; older than "T" and lacking terminal buds; ranged from green and succulent at apical end to brown and semi-woody at the basal end; square in cross-section, uppermost set of lateral buds swollen.

"I"—Intermediate growth; semi-woody to woody, brown in color; ranged from square to round in cross-section; uppermost set of lateral buds swollen, no apical bud.

"O"—Old growth; brown in color; woody; round in cross-section; uppermost set of lateral buds swollen, no apical bud.

Each of these four types were prepared in two different lengths:

"5N"—Five included nodes, basal cut was made through the sixth node.

"3N"—Three included nodes, basal cut made through the fourth node.

The required number of cuttings (3,072) were chosen from the more than four thousand which were prepared, with attention to optimum uniformity to type. The cuttings were set out as indicated (Fig. 2). The day after the last cuttings were placed, unit one was switched from a water mist to a nutrient solution mist, while unit two was maintained under a water mist. The mist on all beds operated continuously in this manner until the termination of the experimental period.

Upon termination of the experiment, the cuttings were removed individually and examined for the presence or absence of the following structures:

1. Original leaves. These were the uppermost set of leaves on each cutting, which were cut in half, laterally, at the time of cutting preparation.
2. Callus tissue and, when present, the relative amount.
3. Adventitious roots.
4. Flush growth; i.e., new growth, originating from buds which were unopened at the beginning of the experiment.

A study of the observations data suggested that all cuttings could be classified by using three categories:

A. Rooted—All cuttings which were living and possessed adventitious roots.

B. Living—All cuttings which were living, callused or uncallused, with buds opened or unopened, but without adventitious roots.

C. Dead—All cuttings which showed any sign of necrotic tissue.

The total yield of rooted cuttings for all beds was one hundred eighty cuttings or 5.86% of the total number of cuttings originally placed in the beds. The rooted cuttings were confined to the water mist unit, with one hundred forty-nine (82.8%) occurring in the "enclosed" water mist bed. The remaining thirty-two cuttings, representing 17.2% of the rooted cuttings, were found in the "open" water mist bed. The large number of dead cuttings and the complete absence of root development among the cuttings in the nutrient mist installation was apparently influenced by the prolific development of an algal population upon the stems and leaves of all cuttings in this unit. Early in the second week of nutrient mist application the first algal growth became evident. At about this time it also became evident that leaf drop in the nutrient mist unit exceeded that of the water mist unit. At the end of the experiment all of the cuttings in the nutrient mist unit had lost their original leaves. Leaf drop in both units was increased as a consequence of several low temperature periods which occurred in the course of the experiment.

The "open" water mist bed, which had twice as many mist heads as did the "enclosed" bed, was of interest because of the relatively numerous living and callused cuttings, as compared to the "enclosed" water mist bed. This suggested a correlation with observations made upon other plants that callus development will be initiated and will progress at higher water volumes than those which proved satisfactory for root initiation (6).

The arrangement of the rooted cuttings in the "enclosed" water mist bed was studied with the intention of determining if a relationship existed between the volume of water falling in a given area and the number of rooted cuttings found in that area. For this purpose, the bed was considered to contain eight groups of cuttings. A standard sized jar was placed at each of the four corners of each group of cuttings. Hourly measurements of the liquid collected in these jars were made during twenty-four hour periods. The average hourly volume, in milliliters, is indicated in Fig. 2,

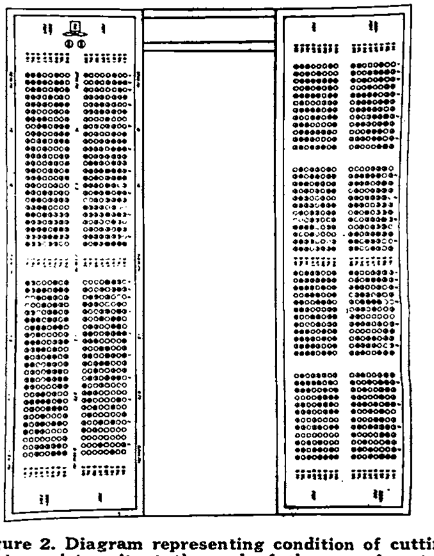

Figure 2. Diagram representing condition of cuttings in water mist unit at the end of the experiment, as follows: Blackened circles represent rooted cuttings. Half Blackened circles represent living but unrooted cuttings. Unblackened circles represent dead cuttings. Bed sections were numbered: 2 4 6 8 (from the fan end) 1 3 5 7

for each of these stations. The average for the four corners of each one-eighth of a bed section was also computed. This was also compared to the number of rooted cuttings found in each section (Fig. 3). Six of the eight bed sections show a direct correlation between the average water volume per section per hour and the number of rooted cuttings in that section. The two deviant sections were subjected to a severe mist deficiency during the first day of the experiment. The air

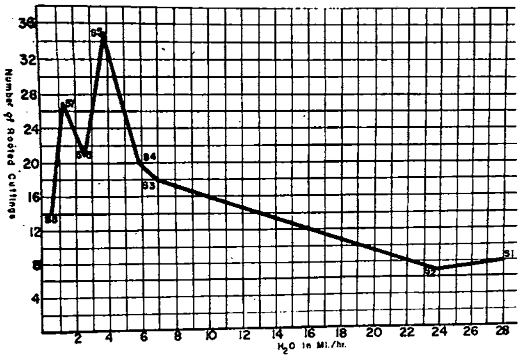

Figure 3. Graph representing relationship of water volume to production of rooted cuttings.

stream distortion produced by the direction of fan rotation created a dry spot in this area. This was alleviated but not before injurious drying to some of the cuttings took place.

The bed section that produced the greatest number of rooted cuttings received an average of 547 milliliters/square foot/hour of water. In this section, 37.6% of the cuttings developed roots.

A breakdown of the data according to source of cuttings produced the following information:

Seedling tree one–produced approximately 26.6% of the total number of rooted cuttings.

Seedling tree two–produced approximately 41.1% of the total number of rooted cuttings.

Seedling tree three–produced approximately 32.1% of the total number of rooted cuttings.

This was true for both the "open" and the "enclosed" water mist beds. The percentages varied slightly but the same order was evident.

A study of the rooted cuttings was made, according to type. Under the conditions of this experiment the flush-growth types produced the greatest number of rooted cuttings. The five node length proved superior to the three node length for all ages of wood tested. The intermediate and old types of wood rooted best under lower water volumes than those which appeared to be optimum for the flush-growth types of material.

The results of this experiment indicate that a continuous nutrient mist may not be used effectively in rooting guava cuttings. The same type of plant propagation unit, using a mist composed of water only, produced encouraging results. Eighteen per cent of the cuttings in the "enclosed" water mist bed produced roots. The correlation between water volume and number of rooted cuttings in this bed suggested that very small differences in the average hourly mist volume made the difference between relatively high root production and poor "take." Leaf drop by cuttings in the propagation unit appears to be largely influenced by low temperature.

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