prevents any further oviposition. Moreover, the sugar content increases within a few days.

In addition to its seedless popular fruits, it furnishes a good shade and its lumber stands water decay efficiently. Stem cuttings are the common method for its propagation.

Several tropical and sub-tropical fruit-trees grow well in the experiment stations of the second and third sections, but they are not known commercially such as the oriental persimmon *Diospyros kaki,* feijoa, pine-apple, sapodilla, white sapote, carissa, avocado, pecan, tamarind, and loquat.

Excluding the grapes, the deciduous fruits of the temperate zone such as apples, pears, plums, cherries, etc. have little chance for any further extension. In reality, the future of the Egyptian fruit industry is mainly in the subtropical fruits.

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# HIGH HUMIDITY TREATMENT FOR AIR LAYERS OF LYCHEE

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Considerable progress has been made in the last few years by horticulturists in the propagation of plants by cuttings through the use of various types of water spray nozzles for maintaining a high humidity environment around the exposed portion of the cutting during the rooting process. This makes possible the retention of most of the leaves on the cutting and probably allows for some carbohydrate and hormone synthesis. It is very unlikely that photosynthesis in cuttings is able to proceed to a great extent without the intake of other nutrients in addition to $Co^2$ and water. However, apparently photosynthesis takes place to a sufficient extent for the stimulation of root production.

Extensive work has been reported from Trinidad by Evans (1951) on the rooting of cacao cuttings in open beds under constant water spraying and the subsequent hardening-off of the potted plants in a high humidity environment. Evans states that the rooting procedure was first attempted at the Imperial College of Tropical Agriculture, Trinidad, by Spencer (1936). Philbis continued this work in Trinidad (1949) and Bowman in Costa Rica (1948) also attempted to use this method. Rooting apparently was fairly successful but severe losses occurred in the attempts at hardening the rooted plants. Evans and Constable (1951) were successful in the hardening-off of cacao cuttings by use of several means of maintaining near saturation of the atmosphere in the chambers where the plants were placed after potting. The high humidity was maintained until the root system had enlarged and was capable of balancing the transpiration requirements of the plant. After this phase was accomplished the young plants were gradually acclimatized to a less saturated atmosphere and finally to the growing area until the planting in the field.

Ochse (1949) and Ochse and Reark (1950) of the University of Miami reported successful rooting of several species of subtropical plants by the use of continuous water spray in open beds under full sunlight. They state that a rooting media providing good drainage should be used and as much leaf surface as possible should be left on the cutting for maximum photosynthetic effect. Dijkman (1950) of the University of Miami reported successful rooting of Haden mango leafbud cuttings under water spray.

Success in the hardening of air layers depends, almost to the same extent as that of cuttings, on a highly humid environment for preventing dehydration of the immature plant. At the time of removal from the parent tree the root system of the air layer is inadequate to perform the function of absorption at the rate needed to replace the moisture given off by the leaves. This necessitates either severe pruning back, or if leaves are retained, saturation of the air surrounding the leaves with moisture is necessary.

Trials at the University of Miami Experimental Farm with various kinds of nozzles indicated that many were inferior for providing

a water mist of the degree desired, a minimum of water discharge and adequate leaf coverage being the ideal situation. Included among those used were the "Tee-jet" type No. 800067, and the "Thompson Baffle Spray No. 125." The "Tee-jet No. 800067," was unsatisfactory for this operation as there was insufficient breakup of the water-spray. This made necessary the addition of many more nozzles to get coverage of all the leaves. The increased volume of water caused severe water-logging of the soil in the plant pots. The Thompson Baffle nozzle provided a mist closer to the condition desired, although here again more water was discharged than was needed. To get better distribution and cut down the number of nozzles, air fans were placed in the slathouse to create air turbulence. This arrangement of nozzles and fans gave an inexpensive and workable humidifier and has been used to establish several species of airlayered plants in the two years that trials have been in progress.

No work has been done at this station on the use of automatic timing devices for controlling the on-and-off periods of fogging. It is the opinion of the writer however, that the use of automatic timers would eliminate a great deal of personal supervision and also eliminate the problems resulting from excessive amount of water on the plants when constant fogging is used. Considerable use has been made of automatic timers in the humidification of poultry houses in California. One that has come to the attention of the author is the Albert Automatic Timer sold by the Albert Zoraster Co., Van Nuys, California.

The "Thompson Baffle" nozzles were spaced approximately 7 feet apart and 7 feet high in a slathouse 20 feet by 100 feet. Four air fans were installed at the same height as the nozzles and located to most advantageously swirl the mist to all areas of the slathouse. The operating water pressure was approximately 30 pounds.

The soil mixture used under conditions where water logging is likely to occur should contain enough coarse material of either sand, cinders or whatever material is available to provide for good aeration and drainage. A soil mixture that worked very well consisted of equal parts of pulverized muck sand, red clay phase of pineland soils of Dade County, Florida, coarse sand and well rotted compost. A complete fertilizer, 4-7-5 was added at the rate of 4 pounds to 1 wheelbarrow of soil mix.

Potting of airlayers was accomplished as quickly as possible after removing from the parent tree. Very little of the foliage was removed and this was done only when it was necessary to shape up the small trees. By retaining most of the mature leaves of the plants, the tender flush that usually follows severe pruning was delayed. The growth taking place instead was apparently faster root production. The increase of photosynthesis by the greater leaf surface and the use of the stored food in the stem apparently contributed to this more rapid root production. Two weeks after potting, roots could be seen emerging from the sides and bottom of the asphalt paper container. The water spray was then gradually reduced and by the end of the third week, the plants were watered only when judged necessary.

Caution should be observed in hardening-off of the plants from such high humidity so that the change is a gradual process. Frequent moistening of the leaves should be provided during the third week. Regular nursery practices are followed in the fourth week until setting in the field.

Trees grown by this method were set out in the field one month after the time they were potted as air layers and root growth was great enough during that time so as to fill the containers with enough roots to keep the soil and root ball intact when the container was removed. However, it is advisable to allow at least two months from the time of potting to field planting. This will allow an additional month during which the plant should be placed in full sunlight to insure that a well hardened tree will be planted.

Using the above described procedures, 1100 lychee trees were established in the past year. Losses were less than 5% and these were due to the inadequate distribution of the mist in that particular area where these plants had been placed.

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