

is tied with a rubber band. The grafted twigs are put back under mist. After making twig grafts, our propagators dip the plants into the fungicide again before "stumping" them. The cut on the base of the plant is made square, dipped in hormone and flattened up.

The hormone we use is a formula given to us by O. A. Matkin, head of the Soil and Plant Laboratory, Inc., Orange, California. At one time we used Hormodin No. 3, and indolebutyric Acid in a liquid. The hormone we are now using consists of:

1.0	grams indolebutyric acid
25.0	grams fermate
99.0	grams talc
<u>125.00</u>	grams

We find it cheaper and it works just as well, if not better than, the hormone previously used.

During the course of the day if any twig is dropped or has fallen to the floor, it is always put back through the fungicide before it is returned to the working bench. Flats used to carry or hold plants while flattening, or when grafting, and containers used for the hormone are dipped in fungicide before being put away for the day. All excess hormone is thrown away every day.

Our grafting room is maintained in a state of "kitchen cleanliness." Access is limited to people who work there. At the end of each day's work, it is thoroughly cleaned. All prunings and left-over wood are discarded. The mist case in which twigs and completed twig-grafts are held during the day is scrubbed, using 16 ounces of 25 per cent Clorox in 2½ gallons of water. The table and counter tops, which are covered with vinyl linoleum, are scrubbed with the same solution. All tools are cleaned and stored in lined drawers. The floor is scrubbed, even the windows are washed daily. When completed we can go home.

## **SIMULTANEOUS GRAFTING AND ROOTING OF CITRUS UNDER MIST**

### **Part Three—"Hot House Operation"**

DON DILLON

*Four Winds Growers*

*Mission San Jose, Fremont, California*

We have adopted the U. C. System for container-grown plants, as discussed in University of California Manual 23, as the foundation of our growing operation. We are convinced that mother blocks of clean planting stock are essential for a sound growing operation. This is the first principle to support the production of quality nursery stock. The second principle is proper soil treatment. We use a modified U. C. soil mix, in that we use redwood sawdust instead of peat moss. The soil mix is an essential part of our operation. The last principle is proper sanitary practices. We make a real effort here also. All of these practices are necessary. They are goals. We rec-

ognize that in some of our practices we are a little short and that constant improvement is necessary. In this work we are regularly assisted by Mr. O. A. Matkin of the Soil and Plant Laboratory, Orange, California, one of the authors of Manual 23.

Incoming water, either clear or fertilized, passes through Monarch, 100 mesh, strainers. We use normally-open solenoid valves since we have found it is better to have continuous water on the twig-grafts than none at all in the event of a power failure. We use General Electric silicone cables for bottom heat. Each bench has its own HSC-5 thermostat, pilot light, and circuit breaker.

Our timer was inspired by discussions and papers we heard at the first Western Section, Plant Propagators meeting at Asilomar in 1960. We use a 24-hour clock to control two six-minute timers. The pins on the 24-hour clock can be set for 15-minute intervals, and the 6-minute clocks at any 5-second intervals. By proper placing of the pins, any combination of mist duration and interval can be programmed. Like other propagators, our controls must allow great flexibility yet provide a high degree of reliability. By the use of relays, the 24-hour clock prevents the chance of continuous misting in the event that the 6-minute clock were to stop for the night in an open (misting) position.

We have recently added a 1½ H.P. 3600 R.P.M. motor and pump to increase our mist line pressure to 140 P.S.I. A 120-gallon tank under air pressure maintains even pressure. This increases nozzle velocity and creates smaller droplets. These absorb more heat and tend to hang in the air longer. This allows us to reduce the mist duration and increase the mist intervals. We use a Monarch 3.0 120° oil-burner type nozzle. These would produce 3 gallons of water per hour if allowed to run continuously. These are also fitted with 100 mesh screens. Our lines are 3/8-inch copper tubing. We use Imperial fittings. Our ten benches have individually controlled water lines which are mounted on the ceiling rafters. The lines are located along the front edge of the bench with the nozzles pointing down. Any drip falls in the aisle. Benches are raised, 36 feet long, 3 feet wide. Heating cables are buried in 3 inches of gravel, covered with hardware cloth. After treating the wire mesh and wood benches with copper naphthenate, empty 18 x 18 inch flats are placed on the bench and filled with rooting media. We use coarse grind vermiculite of the type used for insulation fill. The twig-grafts are dipped in hormone and stuck.

When the mist is on it is impossible to see the other end of the greenhouse 40 feet away. Small droplets will still be in the air when the next cycle begins. While this seems like an excessive amount of water, please keep in mind that until the graft has healed, the scion has no contact with the moisture in the rooting media. It is suspended in mid-air, supported by the understock and has no other contact except the atmosphere around it.

When both scion and understock are fully healed and rooted, the bottom heat and the mist line are turned off. Sometimes, though the plants are rooted, we must wait until the graft has healed. The

flats are left to harden off for a period of several days to two weeks, depending on variety.

Please note that we do not use peat or other types of pots. The roots are straight and uncoiled. Trees are planted directly into one-gallon cans, bare-root.

It is our aim to produce good-tasting, full-sized fruit on a dwarf tree whose ultimate size has been controlled by the interaction of root-stock and scion. These trees are produced from carefully selected twigs, grafted under kitchen-clean sanitary conditions, then rooted and healed simultaneously under conditions of intermittent mist.