LITERATURE CITED

1 Milbocker, Daniel C 1979 Propagation with Agritech humidifier *Proc SNA Research Conference* 24 215-16

PROPAGATION WITH AN AUTOMATIC TRAVELING BOOM

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I would like to describe a traveling boom propagation system used for misting, watering, pesticide spraying, fertilization, and photoperiod control.

Gilbert's Nursery is located in northwestern South Carolina in USDA Hardiness Zone 7. We propagate and grow about 275,000 1-, 2-, 3-, and 5-gallon plants annually. Forty-five percent are conifers and 55% are broadleaved evergreens. All cuttings are stuck directly in Lerio SR325 plastic pots in flats in a medium of 70% pine bark (½" or less) and 30% coarse perlite. All cultivars are treated with Hormodin #2 or #3 and placed in greenhouses under intermittent mist. After rooting the liners remain in place until canning in April.

Our first two mist houses were equipped with stationary ¾ inch pipes with Flora-mist nozzles placed every 3 ft. This system has worked well in the past, but there were a few problems. These houses were not level, so when the pipes were leveled to prevent excessive dripping, they were closer to the ground on one end of the house. These pipes were supported by wires attached to the bows. Workers often bumped into the pipes and wires. While the old system had 160 nozzles per house to keep clean, the new one has just 16. The old system worked well for several years, but we wanted something better and more versatile.

In 1979 we purchased our first automatic traveling mist system from the Jaderloon Company, Box 685, Irmo, South Carolina 29063. We believe it has solved many of the problems associated with the old system, and offers many opportunities for improved liner production.

The boom travels from one end of the house to the other and returns (Figure 1). Spraying Systems Company nozzle body assemblies are located at about 1-ft intervals along the boom. Interchangeable nozzles and check valve strainers can be removed for cleaning. Many nozzle tip types and capacities are available, but we have had the best results from a hollow cone 5x tip and a

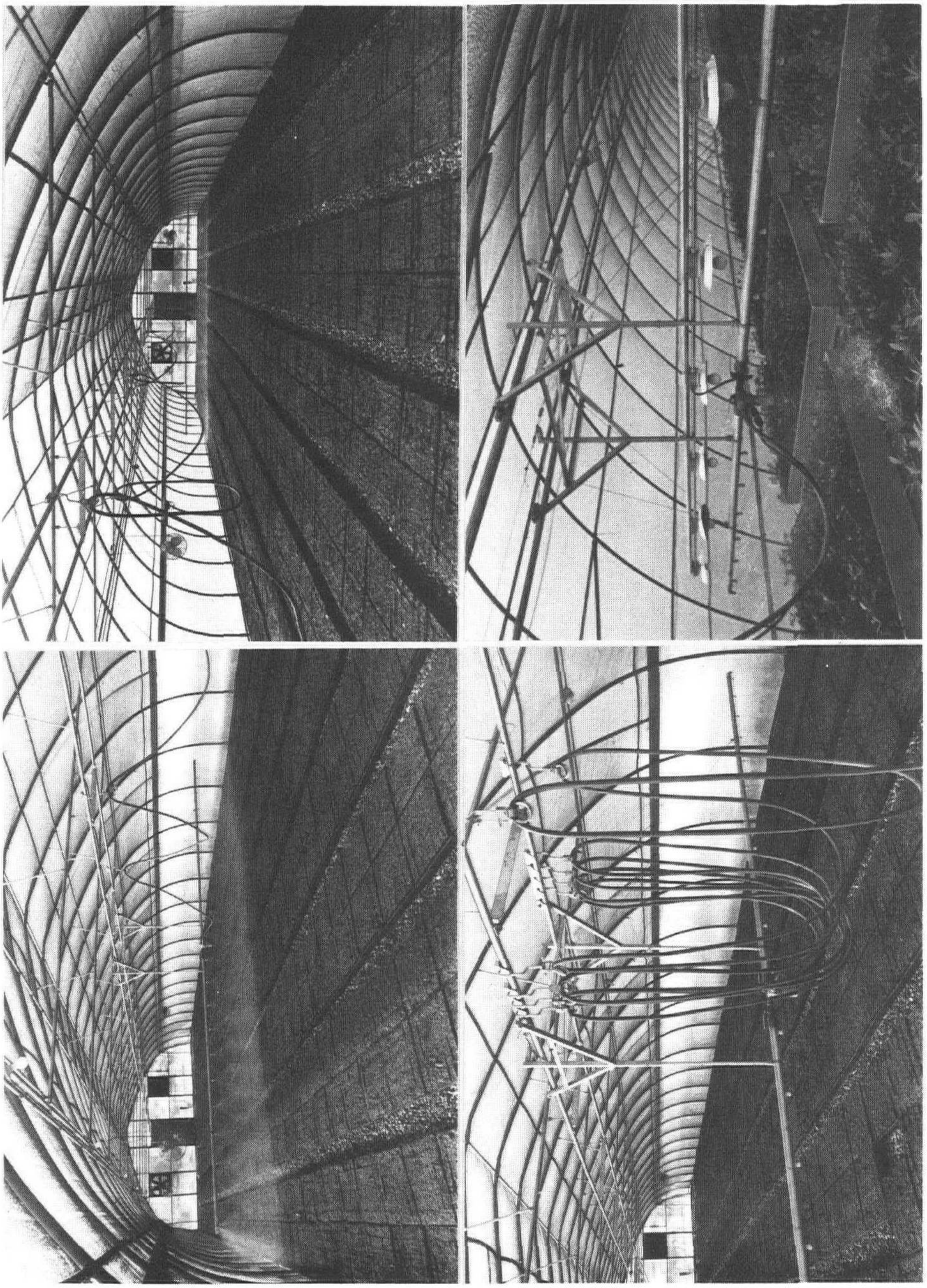

Figure 1. *Above left:* Mist boom in action. *Above right:* Mist boom approaching far end of house. *Lower left:* Boom returning to start position. *Lower right:* Boom with attached lights for photoperiod control.

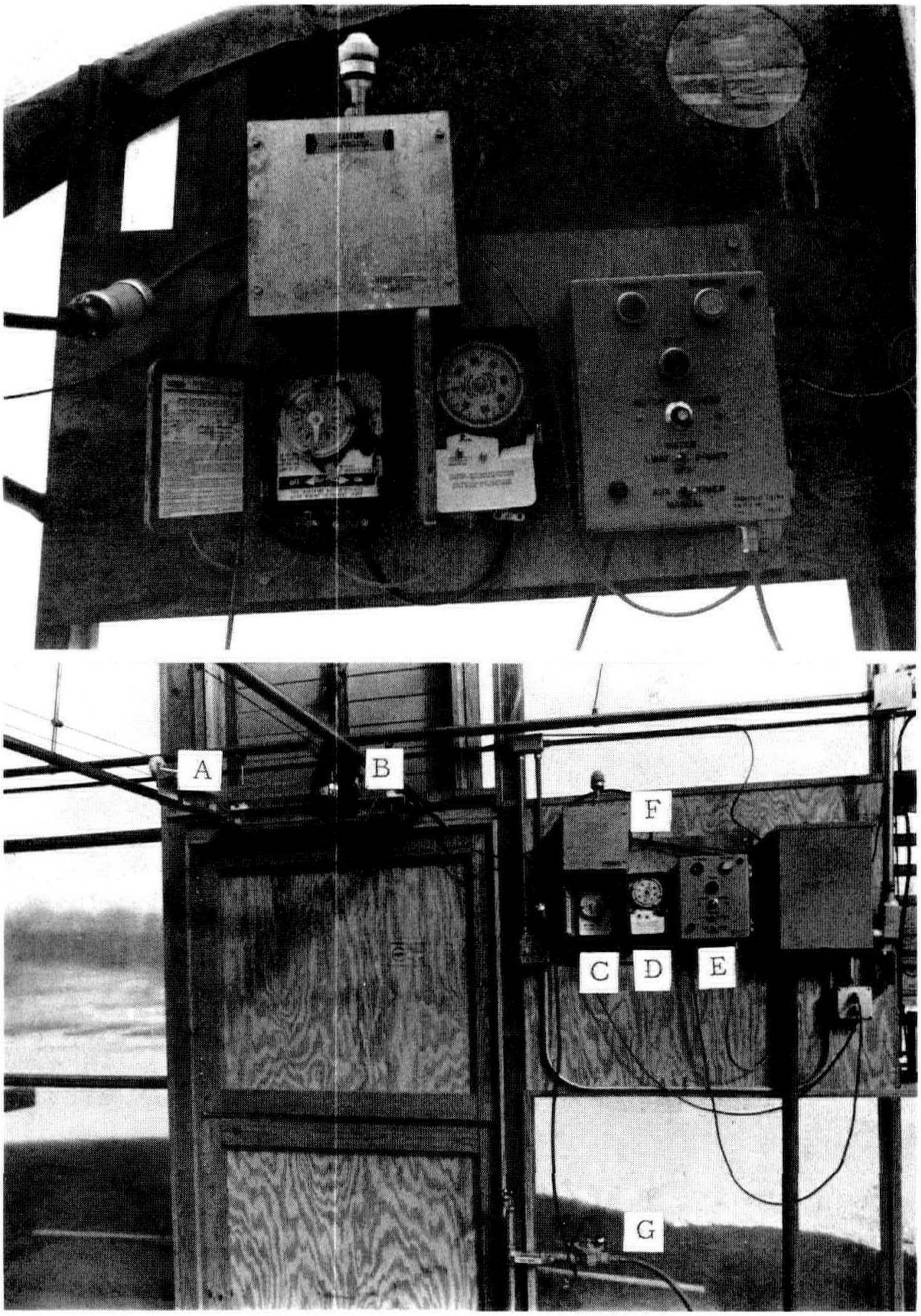

Figure 2. *Above:* Close-up of time clocks, main control panel, and lighting controller

Below: View of the main controller and drive mechanism from left to right:

A Switching mechanism and switching cable
B Reversible gear motor and drive cable loop
C Day-nite timer
D 2 hour interval timer
E Main control panel
F Optional lighting controller for photoperiod control
G 24-volt solenoid valve and hose attachment

TeeJet 8001-E tip. The boom is attached to an aluminum frame which travels on rollers along a set of parallel rails attached to cross braces in the greenhouse. One end of a ⅝ inch water hose is connected to the boom strainer assembly and looped through hose trolleys which roll along the rails. The other end is fastened to a 24-volt solenoid valve. A small gear motor turns a cable loop running the length of the house to move the frame along the rails. Another cable with adjustable cable stops trips the switching mechanism that is wired to the main control panel.

A typical installation requires a 24-hour clock for turning the system on and off each day, an interval timer (2 hour) to set desired starts in the mist cycle, and the main control panel. This control panel can be set to operate by the timer, or by manual, or auxiliary modes (Figure 2). Water can be applied as the boom travels down the house only, or both down and back. The boom travel speed can be regulated from 0 to 30 ft per minute by a dial on the panel. Forward, reverse, and stop buttons are included. On setting #8 the boom travels about 30 ft per minute, on #6 about 20 ft per minute, and on #4 about 10 ft per minute. We prefer the #4 setting.

Misting. When cuttings are being stuck the system is set to water one way every 10 minutes with boom speed set at #8. The system is set to be on from 9 a.m. until 5 p.m. during the summer and from 10 a.m. until 4 p.m. during the winter. As cuttings begin to root the starting times are adjusted from 10 minutes to 15 minutes, 20 minutes, 30 minutes, etc., until no mist is being applied. With the many possibilities available concerning time of day on, starting intervals, boom speed, and nozzle size, the propagator can choose an infinite combination of possibilities to suit his crop and conditions.

Watering. After the crop is well rooted and watering is needed, we turn the auxiliary switch on to make the boom operate continuously, flip the switch to water both ways, and slow the boom speed to #4. We leave the system on until the desired wetness is achieved.

Spraying. Foliar feeding and pesticide spraying is easily done with the boom system. We use a gasoline-powered pump with a truck-mounted 200 gallon tank for spraying. The correct amount of fertilizer or chemical is placed in the correct amount of water in the tank. The pressure regulator is set at about 60 psi. A bypass agitator keeps the chemicals, especially wettable powders, mixed properly. The hose is removed from the solenoid valve inside the greenhouse and is connected to the outlet on the sprayer, which is located outside the greenhouse. After turning the sprayer outlet on for a short time to flush out the clear water in the hose and boom, the water switch on the main control

panel is turned off and the forward button is pressed. Setting #8 is generally adequate for a good spraying during one complete forward and reverse cycle. The amount of cycles needed depends on the boom speed, nozzle size, pressure, and the total amount of chemical needed per house to achieve proper results.

Drenching. Drenching is basically the same as spraying, with the following exceptions. The auxiliary switch is turned on to make the boom move continuously until the desired amount of material has been applied and the boom speed is slowed to #4.

When the spraying or drenching in one house is complete, I move on to the next house and repeat the procedure. While the next house is being sprayed, the hose in the previous house is reconnected, and switches returned to the desired settings. I flush the hose and boom with clear water and clean the main strainer and individual nozzle strainers. There have not been any problems with clogged nozzles when wettable powders are used. One big safety advantage to this method of spraying is that the operator doesn't have to be in the greenhouse when spraying is taking place.

Photoperiod. In an experiment and paper I did while a student at North Carolina State University, I found that the tops and roots of two *Ilex crenata* cultivars grew almost twice as fast when 4 hours of light were added from 10 p.m. to 2 a.m., compared to plants receiving only 8 hours of natural light. I do not think that lights will be useful for all cultivars we grow, but I plan to test this further. I plan to root as many cultivars as possible during the summer months, keep the liners just above freezing during the coldest months, and raise the night temperature to 65-70°F and begin cyclic lighting in late February to get a good flush of growth before canning in April. Any results I obtain may be reported later when more data is available.

Light fixtures spaced 20 inches apart with 100 watt incandescent bulbs were mounted to a pipe clamped to the boom frame about 30″ above the lines (Figure 1). A 125′ 14-3 drop cord was then taped to the water hose and back to the area of the controller. A light-sensor-controlled relay turns the system from a watering mode to a lighting mode after dark. An extra set of on-off trippers was added to the 24-hour clock to turn the light on at 10 p.m. and off at 2 a.m. When the lights come on at 10 p.m., or any previously set starting time, the boom travels continuously back and forth, applying cyclic lighting to the crop until the lights are cut off at 2 a.m. We are lighting 10% of the growing area at any one time with from 10 to 60 footcandles. Directly to either side of center under the boom measures about 60 foot candles, reducing to about 10 foot candles 5 feet ahead and 5 feet behind the boom.

Compared to conventional mist systems, the mist boom by

Jaderlon has a greatly reduced amount of plumbing and obstructions, and the mist boom with lights offers similar advantages over stationary wiring arrangements and requires a reduced electrical capacity. The approximate current cost of the time clocks, controller, boom frame, watering boom, solenoid valve, hose, and rails is about $1750 for a 28 ft × 100 ft greenhouse. If cross braces are needed, add $180. The lighting sensor, relay control panel, electrical cord, and light boom cost about $300. The cost of a typical unit for mist, spraying, and lighting would probably be about $2250 at 1980 prices. This may seem expensive for a mist system, but considering the additional uses, I feel the cost is justified I am enthusiastic about the Jaderloon traveling boom for misting, spraying, and photoperiod control for propagation and greenhouse production.

VENTILATED HIGH HUMIDITY PROPAGATION

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Two types of propagation are commonly used by nurserymen: (1) high humidity propagation where cuttings are prevented from wilting by preserving a humid environment, and (2) mist propagation where cuttings are prevented from wilting by restoring the water lost by evaporation from the cuttings. High humidity propagation remains in use because some species of plants propagate quite easily with this method, a few of which are more difficult to propagate by other means. Its greatest weakness is low humidity stress following sudden temperature increases. The effect of this weakness is minimized by taking small cuttings during the cool season and placing them in small enclosures located in shade. Intermittent mist propagation is the product of progress from manual sprinkling to automatic misting. It is popular because cuttings can be successfully propagated and the results repeated due to automatic programming. Its weakness is the difficulty of adjusting the water distribution rate, which must be increased during hot dry weather and decreased during cloudy, wet and cool weather. Consequently, cuttings may be exposed to either or both inadequate and excess moisture. Too much moisture saturates and cools the propagation medium. Excessive cooling and saturation have been overcome to some extent by using coarse, easily-drained media, and supplemental heat.

Most efforts to combine misting with high humidity for propagation have resulted in increased temperatures and greater saturation of the propagation medium because of decreased evapora-