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 evaporation. Thus, the weaknesses of each system were combined. Nevertheless, some restrictions to evaporation, if no more than wind protection, are used on most misting systems. Fully enclosed and unventilated mist systems maintaining 100 percent humidity are seldom found. The objective of this research was to develop a method of combining the best qualities of mist (automatic programming) and high humidity (no saturation). Unlike typical high humidity systems, high temperatures were controlled with ventilation, and unlike mist systems, water droplets humidified the air and were not intended for wetting leaf surfaces. Thus, by controlling both temperature and saturation, a better environment for cuttings was accomplished.

Saturation of the propagation medium was minimized by reducing droplet sizes. Droplets greater than 50 microns in diameter descend rapidly, wetting the foliage of cuttings and the surface of the propagation medium. Droplets smaller than 10 microns are termed aerosols and remain in suspension, even in calm air. These droplets require large amounts of energy for their generation and are therefore questionably feasible for economic reasons. Intermediate-sized droplets, between 10 and 50 microns, were small enough to be carried on air currents yet large enough to be economically produced. Based on the formula for droplet volumes, droplets of this size generated from equal quantities of water outnumber heavier droplets by more than 8 to 1. These

Figure 1. Humidifier to supply high humidity for propagation.

smaller and lighter droplets expose much greater total water surface to the air. By locating a fan behind the humidifier generating the droplets, a flow of droplet-laden air was produced. Evaporation further reduced droplet sizes to those of aerosols as they traveled from the fan, and evaporated moisture humidified the air satisfactorily for preventing wilt stress of cuttings.

Solar heating takes place at points of light absorption, which, in this case, are the cuttings and propagation medium In a high humidity environment very little evaporation or evaporative col-ing occurs from the cuttings and propagation medium. The resultant rise in temperature of a few degrees served as a type of natural bottom heating. Excess heat was transferred to the air flow and carried through the exhaust vent The area of coverage was increased by suspending the fan and humidifier by an oscillator, which moved the air flow through an approximate 90 degree horizontal arc. (Figure 1).

Both temperature and saturation of the propagation medium were controlled with this system. The temperature was determined by the intensity of sunlight and rate of ventilation. The light was reduced approximately 50% by shading during midsummer. Convective venting further reduced the temperature since air moved more rapidly through the exhaust vents as the temperature rose. Therefore, one size of opening functioned effectively throughout daily temperature fluctuations. Reducing or increasing the size of the inlet vent provided manual control of the temperature. The cross sectional area of this vent measured approximately 1% of the floor area during hot weather and was reduced until closed during winter weather.

The humidifier was suspended between the inlet vent and the cuttings to assure humidification of dryer ambient air Saturation of the propagation medium was controlled by the rate of humidification, which was easily changed at the flow meter on the humidifier. Low rates caused some wilting of cuttings most distant from the humidifier High rates saturated the medium near the humidifier from the descent of heavier droplets formed from collisions of smaller droplets. Useful rates were quite flexible and ranged between 1 and 2 gal per hour per 100 sq ft of floor area covered. All cuttings had to be confined to the airflow pattern of the fan and its oscillator The arc of the pattern was approximately 90° and extended 30 to 40 ft Within this pattern suspended moisture evaporated and prevented wilting on sunny days. On cool cloudy days, most of the moisture remained in suspension and was carried out through the exhaust vents. By using this system, it is possible to adjust the water flow rate and the air intake rate to produce highly favorable conditions for propagation.