MIST PROPAGATION

R. E. Widmer

Mist propagation is the practice of reproducing plants in a highly humid atmosphere. This principle has been practiced by amateur and commercial horticulturists for over 100 years, but the application of mist to commercial floricultural crops has come to

the fore since the end of World War II. The mist is usually provided by special nozzles set in a water line.

There are numerous advantages to mist propagation including the following: (1) Wilting of cuttings is avoided; (2) No shade is needed and more photosynthesis (food manufacturing) is carried on in the cutting; (3) Temperature under the mist is much lower in hot summer weather; (4) Propagation can be carried on out-of-doors or in the greenhouse; (5) Trouble with disease is rare as the spores are constantly washed off the plants, and (6) Less skill and attention is needed.

The net result of all these advantages is that quicker and better rooting is obtained. It should also be kept in mind, however, that wherever you employ automatic equipment, failure of the equipment, if unnoted for a brief period, may result in a loss of plants.

Equipment

A variety of nozzles is available for mist installations. Low delivery ($\frac{1}{2}$ to $1\frac{1}{2}$ gallons per hour) oil burner nozzles can be used, but they drip a lot and clog rather freely in areas such as Minnesota where the water supply contains considerable alkali. A self-cleaning oil-burner nozzle, which has a pin that pushes through the opening whenever the water is turned off, has given nine months of trouble-free service at the University of Massachusetts. These nozzles (type A6 "Humidomist" are available from Supreme Electric Products Company, 194 Vassar Street, Rochester 7, New York, at $4.00 each) atomize $1\frac{1}{2}$ gallons of water per hour under a water pressure of 50 pounds, but will also function at a pressure as low as 20 to 25 pounds. The higher the pressure, the finer the mist.

Cornell University reports that the most satisfactory nozzle they have found is one made by the Supreme Electric Company which has two heads on one tee. The orifice is a small slit instead of a round hole and produces a flat fan-like mist. These nozzles are cheap and easy to clean.

Still another type of nozzle forces a stream of water against a pin, breaking it into a fine circular spray. Such nozzles must be perfectly level when installed, to avoid drip and uneven distribution of the mist, are subject to wear and must be adjusted periodically.

Although there is no "best" nozzle, the University of Maryland and the University of Illinois reported good results when using No. 550A "Fog Mist Nozzle" from Sprayers and Nozzles, Inc., 2575-28th Avenue North, St. Petersburg 4, Florida. This type of nozzle, also called the Florida T, delivers larger quantities of water, operates on low water pressure and tends to resist clogging.

George Ball prefers a nozzle listed as $\frac{1}{4}$TTN4W available from the Spraying Systems Company, 3201 Randolph Street, Bellwood, Illinois. This nozzle which sells for $2.90, is spaced at 30-inch intervals in the water line.

Spacing of nozzles will vary from 18 inches to four feet depending on type of nozzle and water pressure. Manufacturer's directions and experimentation will be necessary to determine the best spacing in your own establishment. In most instances a minimum water pressure of 50 pounds is recommended. If the mist is too fine, air currents will carry the mist away from portions of the bench necessitating a screen of cheesecloth, transparent plastic or similar material. On relatively narrow benches one line of nozzles is adequate but on benches three and one half to four feet wide, two lines are usually necessary. Height of the nozzle line above the bench top ranges from two to four feet.

Nozzles are ordinarily installed in one-half or three-eighths inch galvanized pipe used with a one-inch feeder line. Copper tubing has also proved to be satisfactory. Bear in mind that the installation should be level for efficient operation. Most nozzles are equipped with strainers, but an additional strainer at the solenoid valve is advisable as a safety factor against clogging.

A few years ago the mist was kept in constant operation, but most investigators now agree that an interrupted mist is preferable. Several good methods of control are used including the following:

(1) A time clock turns on the system early in the day and shuts it off in the evening, while an interval timer turns the mist on for four or five seconds of each minute. It might be advisable to keep the nozzles operating all night on extremely hot nights, especially in outdoor installations.

(2) The electronic leaf, which is merely a piece of plastic with an electrode at each end, has come into wide use in the last year. When there is a film of water between the electrodes the mist is turned off. When the film of water evaporates the mist is turned on. The electronic leaf has the distinct advantage of varying the supply of mist with weather conditions and more closely approximates the needs of the plants. Accumulation of salts (from the water) between the electrodes will affect the sensitivity of the leaf, but this difficulty can be overcome by scraping the plastic leaf with a knife at regular intervals. The electronic leaf and control unit sell for $30.00 and are available from the Electronic Mist Control Company, Turkey Hill Road, R.D. 2, Ithaca, New York.

(3) A photoelectric timer developed at Cornell University and available from the Supreme Electric Company may also be used. Light intensity is the controlling factor in turning on the mist with the photoelectric timer.

A solenoid valve is necessary in all installations where interrupted mist is used for "opening and closing" the water supply when the need is indicated by one of the aforementioned controls.

Cuttings

The usual types of rooting media may be used for mist propagation, but good drainage is essential. Sand is most commonly used and the medium must not be packed. Cuttings should be taken from clean stock plants only. Although disease problems are less common under mist, the introduction of diseased cuttings will result in plant loss. Cuttings should not be kept under mist once they are rooted as they may become excessively tall and spindly. Applications of a soluble nitrogen fertilizer are recommended a few days before removal of the cuttings from the propagating bench. Before rooted cuttings are removed, the mist should be gradually reduced for several days to harden the cuttings. Provision should be made so that the nozzles may be turned off separately over various sections of the propagating bench.

Cuttings of roses, carnations, azaleas, hydrangeas, daylilies, gardenias, geraniums and chrysanthemums as well as many woody shrubs have been successfully rooted with this system.

Poinsettia cuttings stuck in soil in two and one-half inch pots and placed under mist were successfully rooted at the University of Maryland during the past summer. A soil mixture of one-half sandy loam and one-half peat moss was used. After callusing, the cuttings were fertilized twice a week with a soluble (25-10-10)

fertilizer at the rate of three pounds per 100 gallons because of the heavy leaching under the mist nozzles. Following this method, cuttings were established in two and one-half inch pots in the same time and with the same labor required for producing rooted cuttings in sand. Cuttings propagated in this manner on September 20 were panned on October 15 with no check in growth.

Seed Germination

George J. Ball, Inc., has found that mist is also helpful in seed germination. Seed bed preparation is the same as for hand watering. Fine seeds are not covered and it is possible that large seed may not need covering. The mist is turned off as soon as the cotyledons (seed leaves) open. The seedlings tend to draw up too rapidly if kept under mist beyond this point. Pansies sown on Monday were up on Thursday. Plants in the experiment conducted at the George Ball greenhouses included snapdragons, petunias, pansies, begonias and marigolds.

Starting Roses

Cornell University has shown that greenhouse roses started under mist in the summer grow faster than plants started in winter or spring without mist. In addition, fewer plants fail to start when they are grown under mist. Starting plants in the summer allows the old plants to remain in the bench during the profitable spring season.

Conclusion

Mist propagation is unquestionably a superior means of propagating during the summer. The use of mist during the remainder of the year must be given further study before definite recommendations can be made. Growers who contemplate the installation of mist propagation equipment should try it out on a relatively small scale at first until they have developed a system which is satisfactory in their own establishment.

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