usually have 85 to 95% rooting of our conifers. Again, we have found that high humidity units enhance root progression by keeping the cuttings in good shape until temperatures rise. With the addition of bottom heat, we believe rooting would take place even faster.

Throughout the summer and winter propagation seasons, we have had few problems with disease, applying fungicides only as needed.

Despite our success rate we are not completely satisfied with the two units we have now. Since certain cultivars have different rooting responses, the location of the different plants around the unit is important. As an example, one row of flats with × *Cupressocyparis leylandi* cuttings began 3 ft. from the unit and ended 20 ft. from the unit. Within the first 10 ft. we had 90% take on the cuttings, but from there until the end of the row the percentage gradually dropped to a 30 to 40% take. The manufacturer is correcting this problem by pressurizing the hub that the nozzles are attached to and creating a more even mist with smaller droplets.

Overall we believe the high humidity propagation system has aided the success of our operations. The system has allowed us to become more self-sufficient in the propagation phase of our business.

## LITERATURE CITED


1. Milbocker, D.C. 1979. Ventilated high humidity propagation guide. Virginia Tech. Orn. Res. Sta., Virginia Beach.
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# HIGH HUMIDITY PROPAGATION


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At Carroll's Plant Center we are using high humidity for cutting propagation. Three Agritech mist blowers can maintain 100% humidity in our 22 × 98 ft greenhouse. During most of the rooting season (June-October) we keep the humidity from 90% to 100%, adjusting the amount of water, registered in gallons per hour (gph), according to time of day and weather conditions. The mist blowers are set on 24-hour time clocks, which will automatically turn the blowers on and off, but the gph adjustment is made manually throughout the day. The

amount varies from 20 gph during the July to mid-September period to a low of 8 gph midday in the winter.

We have one greenhouse for mist propagation and two greenhouses for hardening-off the rooted cuttings. When necessary the greenhouse can be cleared of some humidity by an exhaust fan. The temperature control is set on 95°F during the summer and 85°F during the fall. Cuttings are placed on raised benches made of treated lumber and expanded metal. This helps provide adequate air circulation. We use a rooting medium of 40% fine pine bark, 50% coarse perlite, and 10% sphagnum peat. The medium is placed in a TLC Polyform Pro-Tray[1], which fits into a flat. The medium is first wet, then drenched with a standard dilution of Banrot[2]. The cuttings are taken in early morning, placed in plastic containers and kept shaded and moist until stuck in the rooting flats. After bottom leaves are stripped, cuttings are soaked in a Chloromone solution. The dilution rate depends on the cultivar, with the majority soaked in a 5:1 solution. The solution also contain Benlate (benomyl-duPont) at the recommended rate. The flats of cuttings are then placed in the propagating house. We find that using the TLC inserts works well with the humidifiers. The inserts hold 72 cuttings, each cutting having its separate cell of rooting medium. This gives a plant spacing that allows proper air circulation. The combination of porous rooting medium and individual cells allows for good drainage. The humidifiers help maintain a proper rooting environment by keeping the humidity high without excessively wetting the cuttings or the rooting medium. These are shifted to 3-inch plastic cell paks as soon as rooted.

We propagate dwarf youpon (*Ilex vomitoria* 'Nana') in 10 weeks without hormone and get 95% or above rooting. This rooting percentage is about average for most of our cultivars. The dwarf youpon cuttings were rooted in 96 cell-paks, 2 cuttings per cell. The time for cuttings to root varies from 3 weeks for gardenias (*Gardenia jasminoides*), to 10 weeks for sasanquas (*Camellia sasanqua*); photinia (*Photinia* × *fraseri*) takes from 4 to 5 weeks. We have found that cuttings taken from plants that are slow grown root better under this system than cuttings taken from plants that are grown fast with new growth that is very succulent. *Ilex* × 'Nellie R. Stevens,' roots are formed in 6 weeks. Hino-crimson azaleas (*Rhododendron* 'Hino-crimson') also root in 6 weeks. Weeping fig (*Ficus benja-*

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[1] TLC Polyform, Inc., 4906 West 35th Street, Minneapolis, MN 55416.

[2] Banrot-Topsin M (thiophanate-methyl) + Truban (Koban, Terrazol, Ethazol), Mallinckrodt.

*mina*) roots in 8 weeks. We stick 2 cuttings directly into a 4-inch pot.

We also root non-woody plants under the humidifiers. Joseph's coat (*Alternanthera bettzickiana*) roots in 3 weeks. After they grow large enough, we can sell these plants in the same cell packs they were rooted in. Dwarf scheffleras (*Schefflera arboricola*) are rooted in 3-inch pots and can be shifted into 6-inch pots within 12 weeks.

After the cuttings have rooted well enough, we shift them into another greenhouse. They are misted by hand 8 to 10 times a day for the first 3 days, 4 to 5 times a day for the next 3 days, then twice a day for a week. They are misted with a coarse spray Fogg-It nozzle. After that they are watered once a day by hand. The liners remain in the greenhouse during the winter. Starting in April the liners are shifted into 2-, 3-, and 5-gal containers. We may also have 1-, 2-, and 3-quart liners, which we plant in July and August. They are protected with plastic-covered greenhouses beginning in mid-November. Many of these will go into 5- and 7-gal containers in the spring. Some of the 1-gal liners of hardier species will be left outside and protected only with shade cloth during the winter. Our wholesale growing area is 10 acres in size; 2½ acres are taken up by our water reservoir; 5 acres are in the container area; and the rest is used for greenhouses, potting area, bark pile, and grinding and soil mixing facilities. We grind and screen the bark on site in order to get the fine grade needed for propagation and liner mixes. We use a Bouldin-Lawson Tumble Mixer with a 2 $yd^3$ mixing capacity for mixing all of our different types of rooting media.

## ROOTING CUTTINGS UNDER A WET TENT[1]

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**Abstract.** A wet tent that maintains high humidity yet allows sufficient light penetration to support photosynthesis in leaves of cuttings has been devised. The system may be used alone or in conjunction with reduced conventional mist. With little or no mist, leaching of metabolites from leaves and overwatering of the media is reduced or eliminated. With less water in the mix, bottom heat is more effective and aeration is increased, thus stimulating more rapid root development and subsequent growth. Rooting of cuttings in the wet tent has been excellent in fall and winter. Summer softwood cuttings have required some mist since the fabrics tested have not allowed sufficient air exchange for cooling and humidification.

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[1] Journal Series #4258 of the Oklahoma Agricultural Experiment Station.