

have 130 A in production and spend less than \$10,000/year for gravel.

BILL BEATY: From your discussion of can spacing it seems you are using only half of the prepared area.

GRADY WADSWORTH: No, we use all of it since the previous year's plants occupy the area where this year's crop will be spaced out. By that time, the others will have been sold.

JOHN HOPKINS: What herbicides, if any, do you use?

GRADY WADSWORTH: We use 80% wettable powder simazine at the rate of 20 lb ai/A.

## **PROPAGATION METHODS USED AT HINES WHOLESALE NURSERIES**

STEVEN A. HOTTOVY

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Houston, Texas 77042*

Hines Wholesale Nurseries operates a 200-acre container nursery approximately 20 miles west of Houston, Texas. Construction of this facility has been completed over the past 3 years. Hines Nursery grows 227 cultivars of ornamental landscape plants in several size containers. The nursery averages 170 employees during the year with seasonal fluctuations.

At the hub of the nursery is the propagation department. This branch of the nursery has been developed over the last two years and now occupies 9.6 acres. Propagation is divided into three departments: cutting, potting and liner maintenance. Propagation produced 3 million potted liners for canning and liner sales in 1981. These liners were started as rooted cuttings, seedlings or divisions. In 1982 a grafting and a spore program will be initiated.

### **PROPAGATION**

**Water source.** The heart of all propagation is the water source and the mist system. Hines nursery draws its water from deep-water wells. The mist water is pH adjusted to 6.5 by acid injection and chlorinated before used. The mist system operates at 90 psi. The mist nozzles are a parasol type made by Spraying Systems Co.<sup>1</sup> These nozzles give excellent coverage on a 7- × 7-ft spacing with minimum maintenance. The mist

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<sup>1</sup> Spraying Systems Co., North Ave. at Schmale Rd., Wheaton, Illinois 60187

system is automated by centrally located time stations. Each station has a series of time clocks, which allow for flexible operation of the mist beds. The time clocks can be set to operate in frequencies from one minute to one hour.

**Mist area.** The mist area is divided into 3 sections. A saw-toothed greenhouse is equipped with hot water bottom-heated beds. It is primarily used in the late fall, winter and spring for cuttings of *Ilex*, *Juniperus*, *Nandina*, *Ternstroemia* and *Thuja*. The shade mist is under 73% Saran. The flats are placed on gravel beds. It is used in the spring, summer and fall for cuttings of *Cotoneaster*, *Ilex*, *Elaeagnus*, *Lagerstroemia*, *Ligustrum*, *Raphiolepis* and *Viburnum*. The full-sun mist also has gravel beds and is used in the spring, summer and fall for cuttings of *Leucophyllum*, *Ilex*, *Nerium*, *Photinia* and *Trachelospermum*, listed as *Rhynchospermum* in our catalog.

**Propagation by cuttings.** Propagation by rooted cuttings accounts for 85% of liner production. The plant types produced by this method include most vines, ground covers, conifers, broad-leaved and deciduous shrubs.

All cuttings are produced in the propagation building. The cutting wood is collected from container stock in the fields by the cutting crew or the field pruners. Most of the wood collected is soft or semi hardwood. This wood can be stored several days in the walk-in cooler until needed.

The cutters in propagation process this wood by making a tip cutting of 3 to 5 in, according to the cultivar. The cuttings are put into bundles with a rubber band. Each person on the cutting crew is paid \$4/hour and is required to cut and stick an average of 300 cuttings/hour (2400/day). Each person's daily production is recorded and each cutter exceeding their quota is paid incentive on a piece-rate basis of ½ cent/cutting. The cutters usually average over 3500/day.

The bundles of cuttings are washed in a captan/Benlate/Agri-strep\* solution as a disease preventative treatment. After draining, the cut end of each bundle is quick-dipped in a shallow pan of rooting hormone. IBA solutions are the most commonly used. On certain kinds of plants NAA, the potassium salt of IBA, or talc preparations are used. The different concentrations of IBA are color-coded to prevent mix-ups. The prepared cuttings are rooted either in a standard flat or are stuck directly into individual containers. When the standard flat is used, the cuttings are stuck in a grid pattern, varying the number per flat with the cutting size, 15 × 15 is the most

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\* Agri-strep — streptomycin, Merck  
Benlate — benomyl, duPont  
Captan — Orthocide, Chevron, many others



commonly used. The rooting medium is 90% coarse perlite and 10% peat. Each flat is tagged with the propagation information including cultivar, date, stock number, hormone, number per flat and the cutter's identification number. The cuttings are carted to the appropriate mist area to root. Later as the cutting flats have rooted, they will be moved to a hardening-off area to await potting. Two-thirds of our rooted cuttings are produced in this way.

In the direct-stick method, the cuttings are stuck directly into a 2¼-inch rose pot of potting soil to root. The empty rose pots are placed in standard flats, which are placed on a flat-bed trailer and the potting soil shoveled on and leveled off. It is not packed. The trailer is built up on one layer at a time until it holds 10,000 pots. The trailer is hauled to the appropriate mist bed, where the cutters work directly off the trailer, sticking their cuttings, and setting the flat into the mist bed. The flats are labelled as before. The cuttings are not immediately watered-in as we want to avoid waterlogging in every way possible.

Directly sticking a cutting into a liner pot of soil to root is labor saving since it eliminates the potting process. This method also saves on plant loss and growing time since the plant's growth is not interrupted. Plants that grow quite well by this method include cultivars of *Berberis*, *Euonymus*, *Ilex*, *Lagerstroemia*, *Ligustrum*, *Leucophyllum*, *Nerium*, *Photinia*, and *Rhynchospermum*. In many cases, the new liners can go directly to the liner beds with no need for time in the hardening-off area. One-third of our rooted cuttings are produced by this method.

**Propagation by seed.** Propagation by seed accounts for 8% of liner production. Plants produced by this method include *Quercus*, *Nandina*, *Magnolia*, *Prunus*, *Ternstroemia*, *Pinus*, *Podocarpus* and *Pittosporum*. The seed is ordered from a variety of sources to ensure a source of supply, or it is collected locally. When the seed arrives, it is given the necessary pre-plant treatment such as stratification or scarification and is stored in the cooler for future planting.

The seed is planted by two methods. Large seeds that are easily handled, *Quercus* and *Sophora*, are planted directly into liner pots of the standard potting soil. The majority of the seeds planted are planted in seed flats. The seed flat is built up in a layer cake fashion. At the bottom of a standard flat is an inch of potting soil. Next, an inch of the perlite-peat cutting mix is added and firmed in. The seed is treated with a fungicide and rodenticide, scattered on top of the perlite mix and firmed in. A thin layer of silica sand is sprinkled on top to

cover the seed and prevent algae growth and crusting. Each flat is labeled with the name of the seed, date, source and amount of seed per flat. The seed flats are placed in a quonset or the greenhouse to germinate. The seedlings are potted into liners as needed

**Propagation by division.** Propagation by division accounts for 7% of liner production. Plants produced in this manner include *Acorus*, *Liriope*, *Ophiopogon*, *Hermocallis* and *Yucca*. Stock plants are selected from the field, divided, and potted directly into liners. Dividing of plants is done by the potting crew and requires no time in the mist area.

Three million liners were produced from these rooted cuttings, seedlings, and divisions in 1981. All these liners were finished in 2¼-inch rose pots placed in Cal-flats, using one potting soil for standardization. The potting soil used is a 60% peat:40% sand, with 7 lb/cu yd of 8 to 9 month Osmocote. This is the soil used in the direct-stick propagation method also.

## POTTING

The cuttings are put into the rose pots in the potting shed. Each potter exceeding their quota is paid incentive on a piece-rate basis of ½-cent/liner. Most potters average 4000 liners/day. Each potter is required to pot an average of 300 liners per hour (2400 per day). Their daily production is recorded.

The new potting is loaded directly onto the liner-rack trailer as potted. The potting is watered-in and hauled to the shadehouse or a shaded quonset. After the new liners are established, they can be moved to the full-sun growing areas or the quonset shade can be removed. Shade-grown items remain in the shade house.

## LINER MAINTENANCE

Liner maintenance is the department responsible for growing the liner to a finished size. There are three growing areas, which are the full-sun liner beds, the shade-house liner beds, and the quonsets. The liner beds are staked out so they all hold approximately 8,000 liners. The quonsets hold approximately 55,000 liners.

Watering is done by 40-ft Rain Bird<sup>1</sup> or K-5P Whirly bird<sup>2</sup> sprinklers. The liners are constantly fed 100 ppm nitrogen and 60 ppm potassium in the irrigation water. The liners are pruned by hand using hedge shears or by machine using a

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<sup>1</sup> Rain Bird Sprinkler Mfg Corp., 7045 N Grand Ave., Glendora, CA 91740

<sup>2</sup> Whirlybird sprinklers — AMS, Inc., 1246 Vernon Way, El Cajon, CA 92020

modified lawnmower. The finished liners are held in these areas until needed for canning or for shipping to customers

## QUESTIONS FOR STEVEN HOTTOVY

BILL DOUCHER. What pesticides do you use in your seed culture?

STEVE HOTTOVY: We use thiram<sup>\*</sup> for fungus control and red lead powder for rodents.

GREG AMMON: Could you give us more information on the mist nozzles?

STEVE HOTTOVY: This company manufactures various types of nozzles. It is important to find the one best suited to your needs and order that specific one by exact catalog number. The exact choice and spacing is dependent on your water pressure. We use a parasol nozzle designated as ¼ E 5.8.

VIVIAN MUNDAY. Do you have any problem with quality control when you pay incentive on a piece-rate basis?

STEVE HOTTOVY. We monitor carefully, and our employees know that if quality fails, they will not receive the additional pay

\* Thiram-Arasan, duPont

## THE SPEEDLING SYSTEM

GEORGE TODD, JR

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Speedling means different things to different people. To some, Speedling is the grower of quality transplants, to others a pioneer in the automation of transplant production. To still others, Speedling is the manufacturer of greenhouses, water systems, and flats that enable them to grow their own transplants. Most of our plants are presently marketed in the eastern part of the country.

The containerized transplant has obvious advantages over a bare-root plant. Primarily, these are uniformity in plant height as well as root system and the absence of transplant shock because the roots are not torn apart when the plant is pulled.