Quality Control Through Liner Improvement

Ben F. Davis, II and Brian Chojnacki
American Nursery Products, Inc , P O. Box 768, Tahlequah, Oklahoma 74465

Evaluation of Programs to Improve Quality. In 1992, American Nursery Products, Inc. began work on several programs to make much needed improvements in the quality of the plants that the company produced at its Oklahoma and Alabama nurseries. In addition, the timing of maturity of some crops needed to be changed so that plants reached marketable size at the time when our customers wanted them. In many cases, plants needed a flush of growth in the spring to be of salable quality, which would not normally occur until after the spring shipping season was largely finished. Since quality starts with liner production, we began new programs on several fronts to improve liner quality and crop timing.

Production of 1-Gal Conifers. This paper deals with one particular aspect of our quality improvement program, the production of 1-gal conifers of various *Juniperus* and *Thuja* species. This program was initiated simultaneously at our nurseries in Cherokee County, Alabama, and in Cherokee County, Oklahoma. The Alabama and Oklahoma nurseries are located in the northeast corner of their respective states and are classified in plant hardiness Zones 7 and 6, respectively.

The previous production system was to plant bed-propagated, bareroot liners in Feb. with the goal of producing salable 1-gal conifers in 1 year and 2-gal conifers in 2 years. The 1-gal plants were not as well developed and the market was less accepting of the quality of these plants. As a result, approximately 50% of the plants had to be carried over to the following year and, even the best of the plants that were shipped the first year generated several complaints.

Devising a Plan to Produce 1-Gal Plants in One Year. Since we could not afford financially to avoid the market for 1-year, 1-gal plants, we had to devise a plan to produce a product in 1 year that would be ready to ship in the primary selling season from Oct. through April of the next year.

High Winter Losses. The Oklahoma nursery had previously tried planting the bareroot liners in the fall, but there were unacceptable losses during the winter. Since Ben Davis had successfully fall-planted, bareroot conifer liners in the field for many years, we decided to do another test planting of bareroot liners in 1-gal containers in the Fall of 1992. Two thousand liners of four different cultivars were planted in Sept. in beds of closely spaced (jammed) containers. The liners were well cared for and great precaution was taken to avoid having the roots dry out. All plants were thoroughly soaked with overhead irrigation as soon as planted. Nevertheless, winter losses were approximately 80%.

Sticking Cuttings Directly into Cell Trays. Next, we made the decision to stick all conifer cuttings directly into cell trays instead of sticking into ground beds inside our quonset propagating houses. To convert the quonset houses to cell-tray liner propagation, we leveled the media in the ground beds and covered them with the same type of Supack® mat that is used under asphalt paving. This mat acts as a weed barrier, and when the cell trays are placed on it, acts as a wick to draw excess

moisture from the cells. To facilitate this, we selected a tray with a square top, a cone shaped bottom, and one large drain hole in the center of the bottom. Secondly, we replaced the mist lines so that nozzles were 0.9 m (3 ft) apart instead of 1.5 to 1.8 m (5 to 6 ft) apart. We also changed nozzles and increased water pressure to produce a finer mist with more even distribution.

Taking and Sticking Cuttings. The procedures for taking and sticking cuttings remained the same as for bareroot liner propagation. Cuttings were taken in late Dec. and in Jan. and were treated with a quick-dip rooting hormone solution. Hard-to-root cultivars were dipped into a solution containing 5000 ppm IBA and 2500 ppm NAA. Easier-to-root cultivars were dipped into a solution that contained 2500 ppm IBA and 1250 ppm NAA. Cuttings were then stuck directly into the cell trays after the trays were filled and set in the houses. The propagation mix in the trays was 6 fine pine bark : 2 horticultural perlite : 1 peat moss : 1 sand (by volume). To this was added: 2.9 kg m^{-3} (5 lb yd^{-3}) pelletized gypsum, 1.2 kg m^{-3} (2 lb yd^{-3}) magnesium oxide, 7.4 kg m^{-3} (12.5 lb yd^{-3}) Osmocote® 18-6-12, and 0.9 kg m^{-3} (1.5 lb yd^{-3}) of a pre-formulated micronutrient product. The unheated houses were covered with clear polyethylene film. The misting cycle was set to stay on for 12 sec, every 10 min to 3 h, depending on the weather conditions.

Cultural Practices for Rooted Liners. As rooting progressed, liners were gradually hardened off and the top parts of the houses were uncovered by cutting away the poly film, while leaving the poly in place on the sides up to about 1.8 m (6 ft). As the liners became thoroughly rooted in the cells, the trays were raised off of the ground to allow for air pruning of the roots. This was accomplished by using old plastic flats that we had in surplus. The flats were turned upside down on the floor of the house and the cell trays were set on top of them. The liners were then sheared and liquid fertilized throughout the spring and summer to assure bushy tops and heavy root systems. In Sept., we began pulling the liners from the cell trays, top pruning them to a height of about 4 inches, and packing the liners in poultry boxes for delivery to the planting machines. We found that it is better to have the liners pulled and processed by the Propagation Department staff so that we have better control on liner count, quality of liners planted, and care of the liners that are repotted. This also makes planting more efficient, since the planting crew does not have to be concerned with grading.

Procedures for Poorly Rooted Liners. Some of the liners were not rooted well enough to maintain an intact root ball when removed from the cell. These liners were immediately re-potted back into the cell trays and placed back in the propagation houses. They remained there until planted into 2-gal pots in the spring. Since our production program for 2-gal conifers is a 2-year program, spring planting is acceptable.

Liners can be planted from Sept. through Oct., but planting should be completed as early as possible to allow new roots to be established in the 1-gal container during the warm fall days. We prefer to start planting the day after Labor Day and complete 1-gal planting by Oct. 1st. The planting mix used is: 8 fine ground pine bark : 2 concrete sand (v/v). To this is added: 5.9 kg m^{-3} (10 lb yd^{-3})pelletized, dolomitic lime, 2.9 kg/m^{-3} (5 lb yd^{-3}) of custom blended, semi-slow release, 12-6-6 fertilizer, 5.9 kg m^{-3} (10 lb yd^{-3}) of 23N-6P-12K, 9-month encapsulated slow-release

fertilizer, and 0.9 kg m^{-3} (1.5 lb yd^{-3}) of a pre-formulated micronutrient product. This mix provided nutrition to the liners until cold weather and by then release of fertilizer was greatly curtailed.

Overwintering of 1-gal Containers. The 1-gal containers were left can-tight over the winter and protected along the edges by a wind barrier of 18-inch tall felt roofing backed up by a layer of fluffed up wheat straw. In the spring, the felt roofing and straw were removed, but the plants remained can tight until late June or early July. During this period, the tops are mowed with a shearing machine and any long runners are cut back to the edge of the container. Beginning about the 1st of July, the plants are spaced to approximately 12-inch centers and are top dressed with fertilizer immediately after spacing. Top dressing was done with a 22N-4P-8K plus minor elements, encapsulated, slow-release fertilizer at 12 g per 1-gal container. At the same time, an additional side pruning is done, forcing plant growth back to the edge of the container. In the case of upright *Thuja* cultivars, the tops were sheared again with a shearing machine. In September, the plants are given another top dress of 12N-6P-6K semi-slow-release fertilizer at 12 g per container. This helps maintain an acceptable foliage color into the fall and winter.

CONCLUSION

The old production program, using bareroot liners planted in Feb., did not produce an acceptable 1-gal plant until 14 months later, when the prime selling season was mostly over. Thus, plants had to be carried over for another summer, taking up production space, requiring an extra season of care, and increasing production costs. The new production program, using cell-tray liners planted in Sept. or Oct., produced plants in 12 months that are equally as good as the 20-month-old plants produced with the old program. More importantly, they are ready to be sold when the market demands them.