

# Field Survival of Loblolly and Slash Pine Seedlings Grown in Trays and Ray Leach Containers

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*Loblolly and slash pine seedlings grown in Ray Leach seedling containers had 85 percent field survival, as compared to 64 percent for seedlings transplanted (with all growth media removed from roots) from 20-tree trays filled with a mixture of soil, sand, and peat moss.*

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The USDA Forest Service Resistance Screening Center, Asheville, N.C., was established in 1973 to test selected pine seedlings for fusiform rust resistance under controlled greenhouse conditions (1). In a standard test, six trays of 20 seedlings from each seedlot are inoculated. These trays contain a growing medium of soil, sand, and peat moss. Because of the labor required to carry out this process, variations in soil fertility, and poor seedling survival following outplanting, an evaluation of the Ray Leach container was undertaken. This article describes the results for the field survival part of the evaluation.

## Methods

Considering the 20-tree design at the Resistance Screening Center; the need to handle each tree for fusiform analysis; and the need to fertilize, germinate, transplant, water, and perform other cultural procedures, the super cell Ray Leach tubes were selected. This

selection was based only on examination of the containers. A study was then designed to make a side-by-side comparison of the trays currently being used at the Resistance Screening Center and Ray Leach super cell containers.

**Currently used trays.** The trays are 13<sup>1</sup>/<sub>2</sub> by 5<sup>1</sup>/<sub>2</sub> by 4 inches deep. They were filled to within 1 inch of the top with a 3:2:1 mixture of sterilized soil, sand, and peat. The slash and loblolly pine seeds used in the evaluation were treated with 20-percent hydrogen peroxide for 10 minutes and rinsed in tapwater. The seeds were then placed in germination trays of vermiculite and watered for 15 minutes three times a day. After the seeds germinated but before the seedcoats were shed, 20 germinated seeds were transplanted into each tray. A specially designed planting dowel, with 20 evenly spaced holes, was used to ensure uniform seedling spacing. The trays were fertilized with Miracle-Gro at the rate recommended on the label before transplanting and at 8, 16, and 24 weeks.

**Ray Leach super cell containers.** The tubes were filled with a 5:4:1 mixture of peat moss, vermiculite, and perlite to within 1<sup>1</sup>/<sub>2</sub> inches of the top. This growing medium was watered, and one seed was placed directly into the top of each tube. The medium was watered daily until the seed germinated and then as needed. The tubes received one-half of the concentration of

Miracle-Gro recommended on the label 1 week after germination and a full concentration each month thereafter.

All trays and tubes were maintained in the greenhouse where temperatures varied from 50° (night) to 90° (day) F. The 740 slash and 740 loblolly pine seedlings were inoculated with the fusiform rust spores and grown for 6 months (slash pine) and 9 months (loblolly pine). The complete evaluation was replicated three times, 1 month apart. The seedlings were evaluated for fusiform rust infection to see if the container performed as well or better than the trays at the Resistance Screening Center. The healthy survivors were placed in a shadehouse for 30 days before outplanting.

The trays and containers with healthy seedlings (12 to 18 inches tall) were transported to the Savannah River Plant at Aiken S.C., in July, August, and September 1979 and outplanted. The tray trees had the soil mix removed from the roots on the site and were planted with a planting bar. The tube trees were removed from the tubes and planted using the same bar. The locations were randomized by family and type of container on the sandy loam soil to minimize the effects of site differences. The survival percentage was determined in November 1980 and again in November 1981.

## Results

The average survival for slash and loblolly pine in containers (table 1) was about 85 percent, while the survival for tray-grown trees was 64 percent (table 1). In July and September, the tray trees survived as well as container-grown trees; but in the August planting, there was a substantial difference.

## Conclusions

Overall, seedlings grown at the Resistance Screening Center in Ray Leach tubes survived outplanting better than the tray-grown trees, particularly when outplanted under hot, dry conditions.

It would seem safe to conclude that the tubes provide increased, or at least equal, survival of trees outplanted from the Resistance Screening Center.

## Literature Cited

1. Hubbard, S. D.; Anderson, R. L. The Resistance Screening Center-- Screening for fusiform rust resistance as a service for tree improvement programs. Gen. Rep. SA-GR 16. Atlanta, GA: U.S. Department of Agriculture, Southeastern Area, State and Private Forestry; 1980.

**Table 1**—*Field survival of loblolly and slash pine seedlings grown at the Resistance Screening Center in trays and containers*

Planting date	Survival of slash pine		Survival of loblolly pine	
	Trays	Containers	Trays	Containers
	%			
July	79 (3.7) <sup>1</sup>	80 (3.7)	67 (4.3)	79 (3.7)
August	47 (4.6)	88 (3.0)	59 (4.5)	81 (3.6)
September	59 (4.5)	66 (4.3)	91 (2.6)	95 (2.0)
Average	64 (2.5)	86 (1.8)	64 (2.5)	85 (1.9)

<sup>1</sup>Standard error is in parentheses next to each percentage.