The Influence of Seedling Size and Length of Storage on Longleaf Pine Survival

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In a longleaf pine study in southern Mississippi, only seedlings with a root-collar diameter (RCD) of 0.5 inch or greater had satisfactory survival after storage of 3 weeks. With longer storage, survival drops off. Seedlings of 0.4-inch RCD are marginal for planting.

It has been observed that larger loblolly pine seedlings often survive better following a period of storage than small ones. Also, it has been observed that seedlings lifted at different times in the late fall and winter have different survival rates following outplanting in Mississippi. This report documents an administrative study designed to quantify some of these observed differences in seedling performance. The goal was to arrive at "rules of thumb" for lifting dates and seedling size standards for loblolly pine in the test area.

Methods

For testing, we selected a 67-acre area of ridgetop and side slopes with up to a 12-percent slope. The soil was a fine sandy loam of McLaurin series. Unfortunately, the site was not as well prepared as we like for planting longleaf pine *(Pinus Palustis* Mill.). Instead of shearing, raking, and deep-disking, the area was only chopped and deep-disked. As a result, 21 percent of the seedlings were planted incorrectly and were either too shallow or too deep.

Seedlings were lifted on November 29, January 19, February 4 and 10, and March 20. For each lifting date, some seedlings were machine planted immediately on four ¼ -acre plots and others at about weekly intervals by a regular Forest Service crew.

For the earliest lifting date, seedlings were stored for up to 8 weeks. Because of weather and an oversight, no seedlings from the January 19 lifting were planted for 2 ½ weeks.

Seedlings were taken from regular Ashe Nursery shipments. The packing procedure was to spray the seedlings with a Kaolin slurry, add a few handfuls of moss, and seal about 600 seedlings in a Kraft polyethylene-lined bag. Bags were stacked with spacers in a cooler and kept at 34° F, except for 1 day at 45° F.

From the 23,008 seedlings planted, 5 percent were checked in late May for survival, proper planting, RCD, and cause of mortality if apparent. Any seedling with green needles was considered to be alive. Only trees that were properly planted were used in the analyses. In addition, the 13 percent of the seedlings that died from silting in or washing out were excluded. For easier interpretation, length of storage was considered in 10-day intervals.

Results and Implications

For successful longleaf pine plantations, only seedlings with a root collar diameter of 0.5 inch or larger should be used (fig. 1). These seedlings can be stored for up to 3 weeks without a loss in survival. For seedlings that have an RCD of 0.6 inch or more, it appears that storage can be extended by 5 or 6 weeks. The reduced survival with storage trend is obvious in the 0.4- and 0.5-inch seedlings, and we anticipate that survival would also drop off in 0.6-inch seedlings after extended storage.

It appears marginal to plant 0.4-inch RCD seedlings. Although survival for seedlings stored up to 20 days was 63 percent, this is far below the 90-percent rate of the 0.5-inch RCD seedlings. It is also impor-

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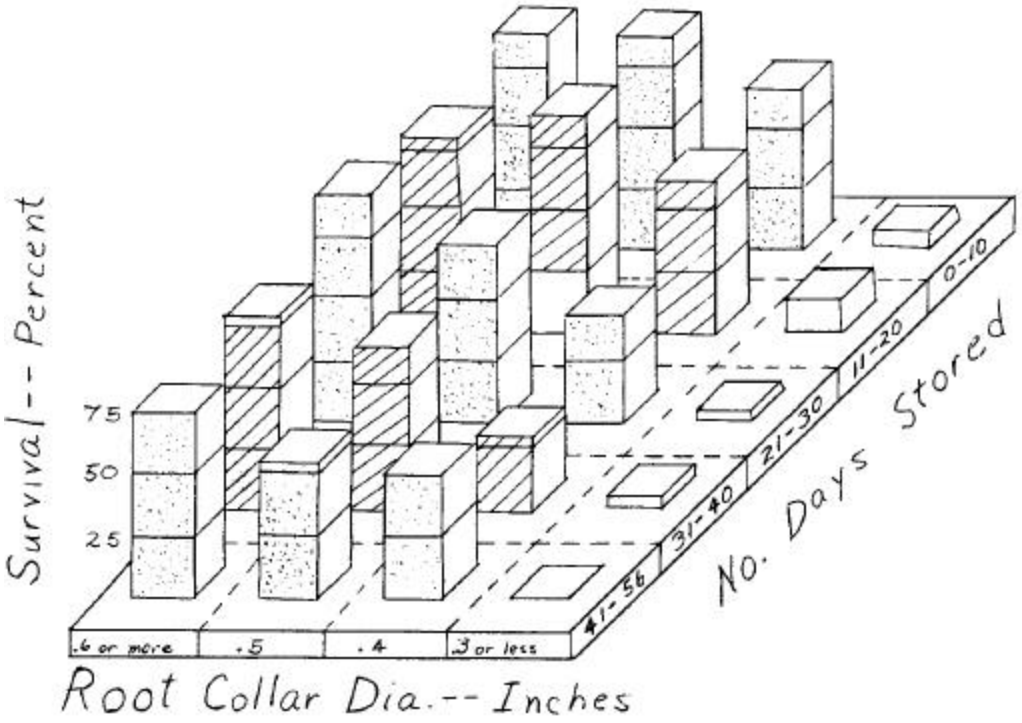

Figure 1.—*Percentage of longleaf pine seedling survival as influenced by root-collar diameter and number of days stored.*

tant to remember that we used only properly planted seedlings. Small additional losses would normally occur because of incorrect planting. At best, it may be possible to tolerate a small percentage of these 0.4-inch RCD seedlings when mixed with larger ones.

There is no doubt that seedlings with 0.3-inch RCD or less should be culled. In this test, they made up 21 percent of the seedlings, compared with 30, 37, and 12 percent for the 0.4-, 0.5-, and 0.6 (or more)-inch seedlings, respectively.

This study indicated that more attention needs to be given to size of longleaf pine seedlings and length of storage. Unlike loblolly (*P. taeda L.)* and slash *(P. elliottii* Engelm. var. *elliottii)* pine seedlings (l), a longleaf seedling may look good when it gets to the field, but with extended storage there is apparently a physiological change that makes it less able to survive. From an operational standpoint, intensive culling to 0.5-inch RCD appears to be a better alternative than increasing planting density. In addition, seedlings should probably be stored no more than 3 weeks.

Literature Cited

1. Williston, H. L. Storage of southern pine seedlings: a review. Tree Planters' Notes 25(4):1-3; 1974.