SURVIVAL AND EARLY GROWTH OF CONTAINERIZED AND BAREROOT SEEDLINGS OF CHERRYBARK OAK

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At the end of the 1972 growing season, bareroot seedlings of cherrybark oak planted in April 1968 had greater survival, height growth and root development than did containerized seedlings planted in July 1968.

The growth and quality of cherrybark oak (Quercus falcata var. *pagodaefolia* Ell.) in natural stands have made it a desirable candidate for plantation management. Yet we know little about its plantability, early growth, or survival in planted stands. In July 1967, containerized seedlings of cherrybark oak were used to test the feasibility of late-season plantings in the Piedmont. In April 1968, a conventional planting was made with bareroot seedlings. The survival and early growth of these plantings are summarized here.

Materials and Methods

Cherrybark oak acorns for containerized planting were supplied by the Tennessee Division of Forestry. The acorns were planted May 5, 1967, in 1by 0.6- by 10-inch kraft paper tubes filled with a 4:2:1 mixture of perlite, sandy loam, and peat moss. The tubes were then placed in wooden crates in partial shade, fertilized, and watered thoroughly whenever the surface of the medium became dry. The containerized seedlings were planted 2 months later on a cleared Oconee River bottomland site on the Scull Shoals Experimental Forest near Athens, Ga. The planting tool was a modified bar made by the Georgia Forestry Commission

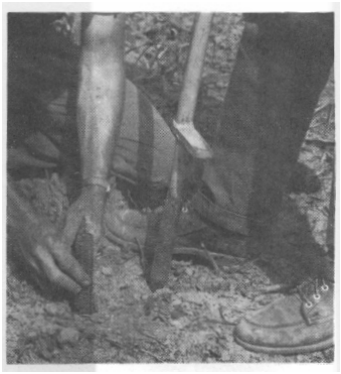

Figure 1. Bar used *for planting containerized seedlings of cherrybark oak.*

(figure 1). The containerized seedlings averaged 0.4 foot in height at the time of planting.

The Tennessee Division of Forestry also supplied the 1-0 bareroot seedlings. These seedlings averaged 1.4 feet in height with a 5- to 6-inch taproot. They were planted with a shovel on April 2, 1968.

Complete randomization was used for the study design. The uniform planting area was divided into six plots; containerized seedlings and bareroot seedlings were randomly assigned three plots each. Each plot had 5 rows of 25 trees spaced 2 by 4 feet. Within each plot, six trees were randomly selected for measurement. The height of these sample trees was measured at the end of each growing season from 1968 through 1970. No

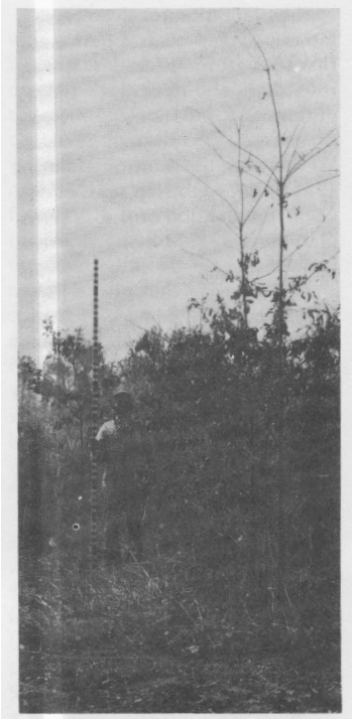

Figure 2. Cherrybark oak plantation *in 1972. Containerized seedlings* were planted *on* the left, *bareroot seedlings on the right.*

measurements were taken in 1971. The 1972 heights and survival counts were based on complete inventories. An analysis of variance was used to test differences between the two types of planting stock.

The plantation received intensive weed control during the first four growing seasons. It was roto-tilled and hoed three times during 1967 and mowed several times from 1968 through 1970. Weeds were not controlled during 1971 or 1972 growing seasons. General condition of the plantation in 1972 is shown in figure 2.

Results

At the end of the 1972 growing season, survival of bareroot seedlings was 95 percent, whereas only 44 percent of the containerized seedlings had survived (figure 3). The surviving seedlings appeared to be well established.

Height growth of all seedlings was slow during 1968 and 1969, then increased rapidly from 1970 through 1972. Average height at the end of 1972 was 9.1 feet for the bareroot seedlings and 6.5 feet for the containerized seedlings. This difference was significant at the 1-percent level. Height growth and survival of the bareroot seedlings in this plantation were similar to those of a cherrybark oak planting in southeastern Louisiana (1).

Three containerized and three bareroot seedlings - one each of below-average, average, and above-average height in each group - were dug after the 1972 growing season in order to

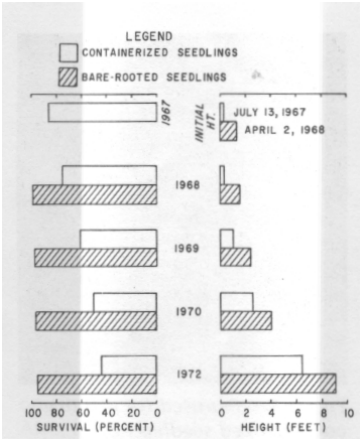

Figure 3. *Survival and* total height *growth of containerized and bareroot seedlings of cherrybark oak through 1972.*

compare root systems. The kraft tubes had decomposed completely by this time. Total root volume of the bareroot seedlings was obviously greater than that of the containerized seedlings (figure 4). The containerized seedlings had carrot-like taproots and short, slender, unbranched lateral roots. Early growth of these root systems could have been restricted by the tube or by the planting bar compacting the sides of the hole. Depth of taproot penetration, which is probably related to existing soil characteristics, was about the same for both types of seedlings.

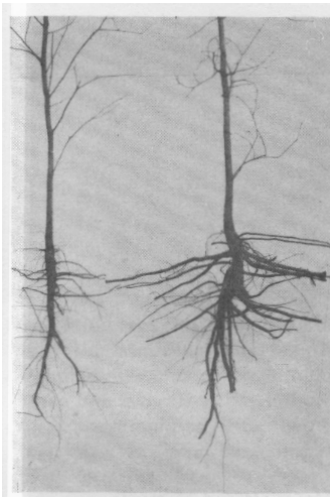

Figure 4. *Containerized seedling of cherrybark oak with small, unbranched lateral roots and carrot-like taproot on left. Bareroot seedling with large, welldeveloped root system on right. Both stems were the same height.*

Discussion

Several factors probably account for the fact that the bareroot seedlings had better survival and growth than the containerized seedlings. The bareroot seedlings used for planting stock were large, whereas the containerized seedlings were small and spindly, primarily because of the short growth period between sowing and outplanting. Several studies with hardwood have shown that

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large seedlings survive and grow better after planting than small seedlings (2,3,5). Time of planting was also a factor. The 1-0 bareroot seedlings were planted in April and therefore had 3 months to develop an alreadyestablished root system before being subjected to the hottest and dryest part of the growing season. On the other hand, the 2month-old containerized seedlings were exposed to stressful growing conditions immediately upon outplanting in July. These severe conditions probably account for most of the early mortality of the containerized seedlings. Observations indicate that later mortality may have been caused by confinement of the roots by the tubes. As the tubes gradually decomposed, root systems were able to develop freely, and mortality decreased.

On the basis of these results, we recommend that cherrybark oak plantations in the Piedmont be established from bareroot seedlings planted during the dormant season. It should be pointed out, however, that many new containers and planting techniques have been developed since this study was installed (4). They deserve consideration and testing as a means of planting hardwoods in late spring and early summer.

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after rooting, but less than 15 percent grew branchlike leaders when they were 7 years old. The low incidence of plagiotropic growth in 7-year-old cuttings occurred because cuttings had been taken only from young

trees. Other investigators sampled cuttings of young and old Douglas-fir (3) and Norway spruce (4) and they reported that the incidence of plagiotropic growth increased with ortet age.

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