

LOBLOLLY SEEDLINGS SURVIVE WELL ON THE OKLAHOMA PRAIRIE

Clark W. Lantz¹

Tree Improvement Specialist
Forest Service, U.S. Department of Agriculture

Faced with a surplus of open-pollinated progeny test seedlings from our loblolly seed orchard last winter (1974-5), we decided to try a field experiment. The only land available for planting was located off wet, muddy roads with no access for site preparation equipment. The planting site was located about 10 miles west of Stillwater, Okla., on a typical mixed prairie site underlain by sandstone.

The area receives an average of 31 inches of annual rainfall and supports a heavy sod of witchgrass and switchgrass (*Panicum spp.*), big and little bluestem (*Andropogon spp.*), and indiagrass (*Sorghastrum nutans*), with scattered staghorn sumac (*Rhus typhina*). Post and blackjack oaks (*Quercus stellata* and *Q. marilandica*) occur on the deeper soils in a savannah type of stand structure. This area is about 200 miles northwest of the edge of the natural range of loblolly pine (*Pinus taeda*) and about 100 miles west of the edge of the natural range of shortleaf pine (*P. echinata*).

Procedures

Fortunately, forestry students are energetic and anxious to work. Armed with fire rakes, they chopped 2-foot diameter circles in the sod at intervals of 6 by 8 feet. Barerooted 1-0 seedlings were then hand planted in March 1975 in the center of each spot. A randomized complete block-planting design was used with three replications. Row plots contained 15 seedlings of each source, as follows: lob-

lolly pine, open pollinated from the Oklahoma State University seed orchard; Virginia pine (*P. virginiana*), open pollinated from the Kimberly-Clark (Alabama) seed orchard; pinaster pine (*P. pinaster*), Portugal and France; brutia pine (*P. brutia*), Turkey; and nursery-run loblolly and shortleaf from the Oklahoma State nursery. All seedlings were grown at the Oklahoma Forestry Division nursery at Broken Bow.

Results

The survival and growth of the loblolly seed orchard seedlings have been surprisingly good for a prairie site. Eighty percent of these seedlings had survived at the end of the first growing season, compared to 64 percent of the nursery-run loblolly seedlings (table 1). Among the seed orchard seedlings, five of the six loblolly families had 80 percent or better survival rates, with only one family below the nursery-run average. These five families all survived significantly better (at the 5 percent level) than the nursery-run seedlings.

The loblolly seed orchard seedlings also performed well in height compared to the nursery-run material. All of the open pollinated families except one were taller than the nursery-run loblolly seedlings, and the best family (78) averaged 63 percent taller. Individual seedlings from families 78, 79, 80, and 81 were taller than 1 foot at the end of the first growing season, with one seedling (78) recorded at 1.8 feet.

The Virginia pine seedlings were above the study average in survival but

Fire rakes were used to prepare planting spots in heavy sod. First-year survival of genetically improved loblolly pine seedlings averaged 80 percent, and seedling heights were up to 1.8 feet.

Table 1.—Seedling survival and height at the end of the first growing season

Species—Source	Survival (percent)	Mean Height (feet)
loblolly: Family 81	91	.79
loblolly: Family 78	87	.83
loblolly: Family 89	84	.54
loblolly: Family 79	80	.76
loblolly: Family 83	80	.64
loblolly: Family 80	58	.67
loblolly: nursery-run	64	.58
shortleaf nursery-run	60	.51
Virginia: Alabama	78	.56
Pinaster: Portugal-France	40	.48
Brutia: Turkey	0	0
Study Mean:	63	.66

below average in height. Neither of the Mediterranean species performed well. Pinaster seedlings averaged 40 percent in survival and just under 6 inches in height, while none of the brutia seedlings survived.

Conclusions

The good first-year survival of these loblolly pine seedlings indicates that the fire rake chopping provided adequate sod control for the first growing season. The survival and growth of these seedlings in later years will be dependent primarily on soil moisture availability. A prolonged drought period may cause substantial mortality.

Loblolly pines planted in this same area in about 1939 are now 40

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¹The work was done when the author was Associate Professor of Forestry at Oklahoma State University.

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to 60 feet tall and 10 to 18 inches d.b.h. These trees have survived at least two severe drought periods (3). They have produced frequent cone crops and are currently surrounded by abundant natural regeneration ranging from seedlings to vigorous pole-sized trees.

Numerous other successful loblolly plantations in Oklahoma have increased our confidence in the potential of this species for timber production far west of its natural range (2). In Oklahoma alone, 6.2 million acres of the "cross-timbers" type may have a commercial timber growing potential for short-rotation loblolly plantations (1). As land use pressures continue to increase, these marginal sites represent a more attractive alternative for timber growth. Genetically improved sources of Loblolly pine may prove to be sufficiently productive to give these sites commercial status.

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