

IMMEDIATE RELEASE NEEDED FOR MAXIMUM GROWTH OF SEEDED LOBLOLLY PINE

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Seeded loblolly pine should be released from overtopping hardwoods early in the first growing season. Delaying release for 1 or 2 years substantially reduces height growth regardless of site or cover conditions, and it may result in seriously depleted stocking. On average or better sites, seeding failures rarely occur when hardwoods are deadened promptly. However, on severe sites, even when seedlings are released, first-year mortality can be high in a dry year. But it is on these sites that early

release is most valuable, because pines can survive harsh conditions better when freed promptly from overstory hardwoods. These are the conclusions from studies made during 3 consecutive years near Alexandria, La.

Background

Many landowners have been reluctant to invest in hardwood control until seedling establishment is certain, or until the end of the critical first growing season. Too little was known about the response of seeded pines to release during the first year, though the early release of planted pines has been generally recommended (Muntz 1950; Shoulders

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1955; Williston and Huckenpahler 1958). Loblolly seedlings can survive under high shade for a decade or more if a severe drought does not occur, but they rarely survive longer than 5 years under the shade of low hardwoods (Chapman 1945). They are comparable to shade-tolerant climax hardwood seedlings in that for about the first 3 months after germination they have juvenile or primary needles and efficient photosynthetic activity at low light intensities (Bormann 1956). However, seedlings lose this capability as their secondary needles develop, and light becomes a critical factor in growth and survival (Oosting and Kramer 1946; Kramer et al. 1952).

Procedure

The three studies were installed in stands of upland hardwoods that contained more than 300 trees per acre. Southern red oak, post oak, blackjack oak, hickory, and sweetgum were the prevalent species. Repellent-treated loblolly pine seed was sown in mid-February on freshly burned 0.4-acre plots.

In all studies the hardwoods were injected with a mixture of 2, 4, 5-T and diesel oil in the spring of the first and second growing seasons. In the last study hardwoods were also injected at the time of sowing. All treatment plots and check plots were replicated. Because the hardwood stands averaged about 7 inches d.b.h. and all trees with a 1 inch d.b.h. and larger were injected, almost complete control was achieved.

In each study site quality was about average for loblolly. Topsoils averaged 8 to 10 inches deep, and were underlain by a clay or sandy clay subsoil. Livestock were fenced out, and town ant colonies and gophers were poisoned.

Seedlings on the central 0.1 acre of each plot were inventoried in May of the first season. Each fall their survival was calculated and their heights were measured.

Results

Growth.--Seedling height was influenced significantly by time of release (table 1, fig. 1). In all studies, 1-year-old seedlings that had been freed from overstory competition were

5 inches tall; unreleased pines were 3 inches tall. The released seedlings were also stouter and greener, and most of them had developed fascicled needles during the first season.

At age 3, seedlings released in May of the first year averaged nearly 1 foot taller than those released in the second year. The mean height of the tallest seedling in each milacre was computed for both groups; that for the seedlings released early was 1.5 feet greater. Seedlings released in the second year responded rapidly, and at 2 years of age they were almost double the height of the unreleased trees.

Two-year growth of seedlings was about the same when hardwoods were treated in February or May of the first growing season. This comparison was made only in the third study. In contrast to the fast and complete kills from injections in May, hardwoods injected in February died slowly and some--hickories and red oaks--survived.

Survival.--Time of release had no significant effect on survival in any of the studies (table 1). At the end of 1, 2, 3, or 4 years, stocking was nearly the same in all treatments. Rainfall was normal.

In the first two studies, 33 percent of the viable seed produced seedlings by May of the first year. At the sowing rate of 1 pound per acre, this is equivalent to 5,000 seedlings per acre--about average initial stocking for commercial stands on comparable sites. By age 3 years, 65 percent of the initial stand was dead, leaving about 1,750 living seedlings per acre. Observation of this trend in stocking, though not an objective of the studies, confirms less detailed observations of commercial direct seeding. It appears unwise to reduce seeding rates too sharply on the basis of high initial stocking.

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TABLE 1.--Effect of time of release on survival and height of seeded loblolly pine

Study and treatment	Survival after--				Height after--			
	1 year	2 years	3 years	4 years	1 year	2 years	3 years	4 years
	<i>Per-</i>	<i>cent</i>	<i>Per-</i>	<i>cent</i>	<i>Per-</i>	<i>cent</i>	<i>Per-</i>	<i>cent</i>
	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>
Seeded February 1959:								
Injected May 1959.....	51	43	35	32	5	13	31	60
Injected April 1960.....	58	45	37	35	3	7	23	51
No release.....	57	46	36	31	3	4	7	11
Seeded February 1960:								
Injected May 1960.....	72	51	39	--	5	17	39	--
Injected April 1961.....	58	48	41	--	3	9	25	--
No release.....	59	50	33	--	3	5	9	--
Seeded February 1961:								
Injected February 1961.....	79	71	--	--	5	15	--	--
Injected May 1961.....	75	61	--	--	5	16	--	--
Injected April 1962.....	78	62	--	--	3	7	--	--
No release.....	88	71	--	--	3	4	--	--

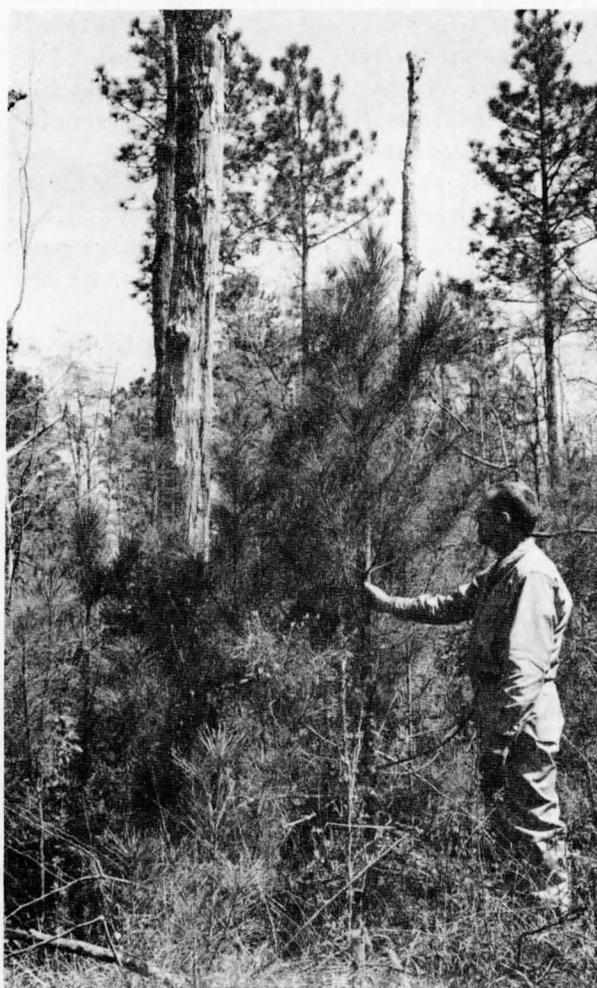


Figure 1.--Immediate release of seeded loblolly pine is needed for rapid height growth. The 4-year-old trees at left were seeded in February, and the hardwoods were injected with herbicide in May of the same year. The trees at right grew from seed sown at the same time, but their release was deferred until April of the following year.

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