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GROWTH AND MORTALITY OF RESIDUAL LOBLOLLY PINES AFTER A SEED-TREE CUTTING

Should loblolly pine seed trees be left to grow for many years, or should they be harvested as soon as adequate amounts of reproduction have started? What should be done with the trees too small for sawlogs: should they be cut for pulpwood, or will they develop into high-quality stems? From a study started in 1951 and previously described (4), we now have indicative answers to these questions for old-field loblolly stands on Maryland's Eastern Shore.

Seed Trees

From studies elsewhere, some authors have indicated that loblolly pine seed trees suffer little mortality, have greatly accelerated growth, and may be left for 15 years or longer to produce high-quality products (2, 3, 5, 7). Trousdell (9), however, reported sufficient mortality, chiefly from lightning and wind, so that removal of seed trees within 3 years was recommended.

Results from our study, obtained following a 30-acre seed-tree cutting in the summer and fall of 1951, are similar to those reported by Trousdell. In our study three methods of seedbed preparation were used in experimental plots: (a) a small bulldozer dragging a stump before cutting, and then a late-summer fire after cutting; (b) a late-summer fire after cutting; and (c) plowing with a Ranger Pal plow and small bulldozer. In addition, there was a control plot, which was only logged.

In all plots 10 seed trees per acre were left. Mortality averaged 14 percent greater in the summer-burned plots (including those stump-dragged and those not dragged) than in the unburned plots during the first 19 months.

Thereafter, windthrow and wind breakage caused practically all mortality. By April 1957, 35 percent of the seed trees in the control plot had died; nearly as many died as in the average burned plots (40 percent). The plowing and stump-dragging treatments apparently had little effect on seed-tree mortality. Much of the variation in mortality between treatments was apparently due to spotty wind damage.

Surviving seed trees have grown rapidly in diameter. The average tree in each plot gained 1.1 to 1.2 inches in diameter at breast height between 1953 and 1957. However, this growth has not been sufficient to offset the effects of mortality on net basal areas and board-foot volumes. Consequently, both basal area and volume tend to become progressively smaller (table 1).

Very different results may occur in pulpwood stands, particularly if the seed trees selected are dominants in understocked stands. From McClay's (6) data, such trees would have very good survival and growth.

Table 1.--Changes in number, basal area, and volume of seed trees following cutting in 1951[1]

Seedbed treatment	1953	1957
	Percent	Percent
MORTALITY TO DATE		
Stump-dragged, summer-burned	24	51
Summer-burned	19	29
Plowed	6	23
None	9	35
All treatments	15	35
BASAL-AREA LOSS SINCE 1951		
Stump-dragged, summer-burned	18	36
Summer-burned	15	13
Plowed	2	5
None	6	20
All treatments	10	18
BOARD-FOOT VOLUME LOSS SINCE 1951		
Stump-dragged, summer-burned	16	31
Summer-burned	13	9
Plowed	1	2
None	5	18
All treatments	8	14

[1] MEASURED IN APRIL 1953 AND APRIL 1957. PERCENTAGES ARE BASED ON 1951 RESIDUAL STAND OF SEED TREES.

However, for sawtimber stands of old-field origin such as the one studied, seed trees should be harvested as soon as adequate amounts of reproduction are established (or seedbeds are no longer favorable). Since all treated plots in this study had 6,160 or more pine seedlings per acre during the first summer after cutting (4), their seed trees could have been removed during the following fall or winter (1952-53). Under such conditions, the loss in seed-tree volumes may be 5 percent or less in unburned areas and 15 percent in summer-burned areas. Additional delay would usually result in increased volume losses, and thus increase the cost of reproducing the stand.

Pulpwood Trees

What about formerly intermediate and overtopped pines too small for sawlogs? Will they grow rapidly into high-quality sawtimber trees as Reynolds (8) observed, or will many die as in a North Carolina stand studied by Chaiken (1)?

Small overstory pines in mature old-field stands on the Eastern Shore will apparently behave like those studied by Chaiken. In our study, as in his, these trees usually had very short crowns. When released, many of them died. In April 1953, 125 of these trees that were still living were tagged: 64 in the stump-dragged and summer-burned plot and 61 in the control plot. In the following 4 years, 31 percent of the tagged trees died (27 percent in the treated plot, 36 percent in the control). In each plot the surviving trees, which had an average diameter of 7 inches in 1953, grew only 0.6 inch in diameter during the 4 years. And the net change in the basal area of tagged trees was a loss of 19 percent.

Evidently such pines should be removed for pulpwood when seed-tree cuttings are made, if their volume and that in the tops of sawtimber trees provide a commercially feasible operation.

Conclusions

When mature old-field stands of loblolly pine are harvested by seed-tree cuttings on the Eastern Shore, we recommend that:

- Seed trees be removed just as soon as they have served their purpose. Even then, there will be some loss in volume.
- Small non-sawtimber pines be cut for pulpwood, if feasible, when the seed-tree cutting is made. Leaving them is not advisable, because many die and surviving trees grow slowly.

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