In: Proceedings of the 2nd Longleaf Alliance Conference; 1998 November 17-19; Charleston, SC. Longleaf Alliance Report No. 4. Auburn University, AL; Longleaf Alliance: 106-108.

Precommercial thinning intensity in longleaf pine: effect on product volume and value

John S. Kush (School of Forestry, 108 M. White Smith Hall, Auburn University, AL 36849)
William D. Boyer (USDA Forest Service (retired), Southern Research Station, Auburn, AL 36830)
Ralph S. Meldahl (School of Forestry, 108 M. White Smith Hall, Auburn University, AL 36849)
George A. Ward (USDA Forest Service (retired) Southern Research Station, Brewton, AL 36426)

ABSTRACT: The possible benefit of precommercial thinning in longleaf pine was evaluated from a spacing study initiated in 1967 on the Escambia Experimental Forest in Brewton, AL. The study was established in dense, naturally established, seedling stands 9 years from seed. Plots were thinned to densities of 300, 600, 900, 1200, and 1500 trees/acre. Later, the initial range of densities was maintained by periodic thinning to target basal areas of 30, 60, 90, 120, and 150 ft^2/acre. In 1993, plots were installed in unthinned areas of the stand to provide a comparison of volume yields between thinned and unthinned plots. Merchantable pines (>3.5-inches DBH) on each plot were evaluated and placed into one of four product classes: poles, sawlogs, chip and saw, or pulpwood. Precommercial thinning to any of the 5 residual densities did not significantly improve either pine volume or yield over unthinned stands by age 34, even though unthinned stands carried more than 15 ft^2/acre of hardwood basal area that was absent from thinned stands. These plots were re-measured in August 1998 to provide an update to the 1993 data.

INTRODUCTION

Longleaf pine (*Pinus palustris* Mill.) is a very intolerant species that can be easily suppressed by competition from any source. The effect of competition is most pronounced for seedlings, which may spend many years in the stemless grass stage unless released. Longleaf pine is a poor seed producer, so problems with natural regeneration are related to too few rather than too many established seedlings. Occasionally, after one of the rare heavy seed crops, large number of seedlings may be established. Seedlings spend a variable length of time in the grass stage depending on a number of factors. As a result, longleaf seedling stands usually break up rapidly into a range of size classes, avoiding stagnation.

Precommercial thinning can reduce the sometimes-intense competition within a dense seedling/sapling stand. The possible payoff for precommercial thinning could be an increase not only in volume, but also in value, as determined from the mix of products produced. The benefits of precommercial thinning in longleaf pine was evaluated from a natural stand spacing study on the Escambia Experimental Forest in Brewton, AL.

METHODS

A spacing study was established during the winter of 1967-68 within a 40-acre naturally regenerated stand of longleaf pine. The objective was to observe the effect of early thinning to a range of densities on future stand development. The study area held seedling stands averaging about 6,000 trees/acre in 1963.

In 1967, three 1/5-acre plots were thinned to each of five densities, 300, 600, 900, 1,200, and 1,500 residual longleaf pines/acre. All other pines and hardwoods were removed. Development of these stands were followed through remeasurements at 2-year intervals through 1978, then again in 1981, 1985, and at 5-year intervals since. As trees grew, stand density control was converted to basal area/acre, with 30, 60, 90, 120, and 150 square feet/acre replacing the initial range of densities in trees/acre.

The 15 plots in this spacing study were included in the Regional Longleaf Pine Growth Study (RLGS), which is remeasured every 5 years and thinned at that time if basal area exceeds assigned density by more than 7.5 square feet/acre. Records include the identity and size of all trees removed in periodic thinnings. Thinnings were from below, favoring the largest dominant and co-dominant trees.

In 1993, three additional plots were established in undisturbed portions of the same stand. All stems (pine and hardwood) larger than 0.5 inches DBH were recorded by 1-inch diameter classes. All merchantable pine stems (> 3.5-inches DBH) were classified as to the most valuable marketable product. Poles were identified by class, but only those classed as 7-30 and larger were included. Trees in the 11-inch and

larger DBH class that did not qualify as poles were classed as sawlogs. Trees in the 9- and 10-inch DBH classes that were not poles were classed as chip-n-saw. All other merchantable trees were classed as pulpwood.

Values assigned to products were based on the prevailing market prices in 1993 when this study was first conducted. These were sawlogs $200/Mbf and poles $300/Mbf (Scribner), chip-n-saw $43/cord, and pulpwood $24/cord. Since it was not possible to determine if any trees cut in the periodic thinnings would make poles, all thinnings in merchantable size classes (> 3.5-inches DBH) were classed as pulpwood or chip-n-saw, depending on size. The 1993 prices were applied to the thinnings.

RESULTS

Thinning and Stand Structure

The thinning treatments significantly affected stand conditions at age 34 (Table 1). The number of trees, stand density, and volume generally declined and average tree DBH generally increased as prescribed density declined. By age 39, mortality affected the highest density and unthinned stand.

In 1993, pine basal area was the highest on the unthinned plots but is now less than both the 150 and 120 square treatments. Standing merchantable pine volume was also highest on unthinned plots but is now less than the 150, 120, and 90 square foot treatments (Table 1).

Product volume and Value

Precommercial thinning plus the follow-up thinning required to maintain prescribed stand densities significantly impacted the volume of standing timber, and also total yield, when volume of merchantable trees removed is included (Table 2). The value of standing timber is similarly affected by thinning treatments, including the value of total merchantable yield, a difference when compared to the 1993 data. While there was no significant difference in 1993 between the unthinned stands with any other treatment, the unthinned stands are significantly different from any of the thinning treatments.

CONCLUSIONS

In 1993, precommercial thinning, under the conditions observed in this longleaf pine spacing study, did not improve either the volume or value of merchantable timber by age 34. A re-survey of the data in 1998, age 39, showed a significant difference between thinning treatments and no thinning. The value from plots thinned to 60 square feet/acre was significantly different from the other thinning treatments. Natural mortality in the unthinned plots reduced the number of surviving trees, both total and merchantable. The conclusion from the 1993 data indicated that precommercial thinning in longleaf pine did not appear to be worth the cost. However, the 1998 data indicated thinning may be worth the cost and once you start thinning, you need to keep thinning.

ACKNOWLEDGEMENTS

The authors wish to thank the T. R. Miller Mill Company and their cooperation with the USDA Forest Service to maintain the Escambia Experimental Forest. Larry Heaton provided motivation to examine precommercial thinning. D. Sampson assisted with data collection and data entry.