

LONG-TERM TRENDS IN PRODUCTIVITY AND STAND CHARACTERISTICS FOLLOWING THINNING OF A LOBLOLLY PINE STAND IN S.E. OKLAHOMA

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EXTENDED ABSTRACT

A thinning levels study was initiated in Southeastern Oklahoma in the spring of 1984. The study was installed in a 9 year-old loblolly pine (*Pinus taeda* L.) plantation that contained 110 ft²/ac of basal area. Thinning treatments consisted of (1) three control plots (BA-100) that were never thinned and contained an average of 860 trees/acre (tpa) at the beginning of the study (2) three plots that were thinned to approximately 25 percent of the original basal area (BA-25), basal area averaged 34 ft²/ac after thinning and (3) three plots that were thinned to 50 percent (BA-50) of the original basal area, 54 ft²/ac. In 1988 the BA-50 and BA-25 plots were rethinned to a basal area of 50 ft²/ac. No other thinning has been done through age-24.

The control plots have attained a basal area of about 199 ft²/ac and are now declining slightly. The BA-25 and BA-50 plots have basal areas between 140-150 ft²/ac. Mortality has averaged about 34.7 tpa/year from age-10 through age-24 on the control plot, declining from 821 tpa to 335 tpa at age-24. Mortality losses in the BA-25 and BA-50 plots has been only 30-40 tpa over the entire study period. Standing inside bark volume in the control plots at age 24 is 47.9 cunits/ac, about 10 cunits/ac more than is present in the BA-25 and BA-50 treatments. About 5 cunits/ac were removed from the BA-50 treatment in the 1988 thinning. Average diameter at breast height (dbh) in the control plot is 9.8 inches and 33 percent of the trees in this treatment exceed 12 inches in dbh. Average tree size in the BA-25 and BA-50 is 15.9 inches with greater than 95 percent of the trees exceeding 12 inches in dbh. Mean annual increment (MAI) peaked at age 20 in the control plot at 225 cubic ft/ac/yr. MAI of the thinned plots have remained between 150 to 160 ft³/ac/yr between ages 20 to 24 years but has not declined yet. Average ring width of the thinned plots exceeded 0.25 in/yr for four years following thinning, thus wood produced during this period would have less than four rings/inch. Average ring width of the control plot remained less than

0.25 in/yr since age 10 and has grown less than 1/8 in/yr since age-15. Ring specific gravity was not impacted by the thinning treatment and all treatments produced rings with similar latewood percentages. Year-to-year variation in ring specific gravity and latewood has been large and is related to the amount of late season rainfall. Periodic (3-year) annual increment (PAI) of the control plots have declined from a peak of 378 ft³/ac/yr at age 14 to 36 ft³/ac/yr at age 24. PAI of the BA-25 and BA-50 treatments peaked between 250 and 285 ft³/ac/yr at age 17 but has remained at only slightly lower levels through age 24. This growth trend for thinned plots results in high stemwood production rates on large valuable trees. At age 22 the growth of trees in the control plots are supported by live crowns average 22 feet in length. Trees in the BA-25 and BA-50 plots have crown lengths that average 35 feet in length. Leaf area index (LAI) has remained between 3.0 to 4.8 in all treatments after basal area exceeded 130 ft²/ac. Even the control plots that have attained basal areas of 199 ft²/ac have retained LAI's in this range. However, growth efficiency (tons wood/acre/LAI) has declined with age. The decline in GE has been precipitous in the control plots since age 14. Growth efficiency of the thinned plots have declined only slightly from age 16 to age 24. This study concludes that early thinning on a site index 25 year 75 site has resulted in only minor reductions in total volume at age 24. The control plots contain 48.7 cunits that is distributed on 335 trees/acre. The BA-50 plots contains 39.1 cunits distributed on 117 trees/acre. This should have implications related to logging and processing cost. Average tree size is greatly influenced by thinning and thus product opportunities and stand value will be greatly influenced by early rotation thinning. Thinning does increase annual ring width, resulting in slightly less than four rings/inch for a period following the thin. Thus, lumber grade may be impacted. Thinning did not affect specific gravity so pulp yield per unit biomass would not be expected to differ across treatments.