

## Long-Term Growth Records of a Loblolly Pine Plantation

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**Abstract:** Long-term observations conducted on permanent plots are indispensable for forestry research. Permanent plots serve as a touchstone upon which we test our hypotheses, models, and methods. Long-term observations in forestry are probably among the longest projects in all biology. The longest active study of the effects of thinning and pruning on growth of loblolly pine (*Pinus taeda* L.) has been conducted for 36 years on 45 permanent plots located in southeastern Arkansas. This study was initiated by the Forest Service researcher Dr. James D. Burton, who in 1970 established 40 permanent plots in a typical 12-year-old loblolly pine plantation. During this period the Georgia-Pacific company, presently Plum Creek, provided, in addition to the land, much help in maintaining the plots.

The original design included 40 plots regularly thinned to four levels of basal area (20.7, 16.1, 11.5, and 6.9 m<sup>2</sup>/ha). Within each level the trees were pruned in two stages at 12 and 15 years, finally clearing the bole to the height of 10.0, 8.0, and 6.7 meters and reducing the original crown length to 25, 40, and 50% of the total tree height, respectively. Each thinning-pruning combination has three replications within a randomized complete block design. Four plots were thinned (one for each of the four thinning treatments) but not pruned. Since 1981, the study has been continued by the School of Forest Resources of the University of Arkansas at Monticello. Five control plots (without thinning or pruning) were established at the age of 27 (in the fall of 1984) on the adjacent untreated part of the plantation. The variation in stand density was further enhanced by three severe ice storms that hit the plots at age 16, 21, and 36 years. The height to even-digit upper stem diameters was measured by a Zeiss Teletop (and later by a Criterion 400). As a result, reliable estimates of total and merchantable volumes were obtained using Grosenbaugh's height accumulation method. Tree diameters have been measured 13 times, the last time in the fall of 2005 at age 48. This report summarizes growth trends of main stand variables (diameter, height, and volumes) by thinning and pruning levels and presents results of other projects (mill study, evaluation of ice storm damage) conducted on the plots. Too often long-term observations are locked in file cabinets or in growth databases with restricted access. In contrast, the complete set of our data and related projects are freely available at: <http://www.afrc.uamont.edu/growthyield/monththinprun/index.html>