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Effects of First Thinning on Growth of Loblolly Pine Plantations in the West Coastal Plain

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EFFECTS OF FIRST THINNING ON GROWTH OF LOBLOLLY PINE PLANTATIONS IN THE WEST GULF COASTAL PLAIN

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The purpose of this research is to analyze thinning response in basal area and height growth of residual loblolly pine trees growing in plantations located in the West Gulf Coastal Plain. Thinning is a well-known silvicultural practice that increases the growing space available to desirable trees by removing competing trees. The response to thinning in residual loblolly pine trees is well-documented, except in the Western Gulf Coastal Plain and especially east Texas. Burrow (2001) investigated thinning response in east Texas loblolly pine plantations on a per acre basis, but not for individual trees. In order to quantify the effects of first thinning on individual planted loblolly pine trees, basal area and height pre- and post-thinning growth was measured on 11 permanent growth and yield plots within 3 years of thinning. These plots are part of the East Texas Pine Plantation Research Project and are located in east Texas and western Louisiana. Treatment plots are 0.23-acre squares (100 by 100 feet) and are located across a range of soil types, soil drainage classes, and site preparation practices that characterize intensively managed plantations in the West Gulf region. Trees were measured for diameter, total height, live crown height, crown class, fusiform rust incidence, and damage. There are a total of 126 of these plots, but only these 11 have been thinned, though the others will eventually receive an operational thinning. The landowners typically schedule a plantation to be thinned when it reaches a stand density index target of one-half of the maximum stocking, which corresponds to a 225 stand density index (SDI). The thinning prescription is an operational geometric (row) and from below (low) thinning where the removed trees are selected by the operator and not marked (operator select). The intent of this research is to document the thinning response in operationally thinned plantations. The growth responses, individual tree basal area (square feet) and total height (feet), were measured on 507 survivor trees in the 11 plots (survivor trees are residual trees in the post-thinned plantation). Based on these measurements, the average pre-thin basal area per acre is 117 sq. ft. and the average post-thin basal area per acre is 68 sq. ft. The average trees per acre is 580 and 226 for pre- and post-thin, respectively. The average dbh in inches is 6.0 and 7.4 for pre- and post-thin, respectively. The average tree height in feet is 41 and 48 for pre- and post-thin, respectively. The average total age in years is 11 and 14 for pre- and post-thin, respectively. These results show that using an operational thinning prescription, the average dbh increased 1.4 inches and the average height increased 7 feet. Thus, operator select did achieve a diameter lift and a removal of the shorter, overtopped trees in the thin. Operator select also achieved on average the target 226 tpa or almost exactly one-half the maximum SDI as well as a basal area per acre of 68 sq. ft. for these 11 plots. We conclude that operator select in these plantations works well to achieve target thinning prescriptions. Analysis shows that thinning response in both basal area and height growth of individual trees is detectable as early as two years after thinning, and separation in response increases as years since thinning (YST) increases. Thus, thinning response is detectable in this small sample in a relatively short time period. Further growth analysis shows that tree basal area increases in response to thinning, but this effect decreases as YST increases, presumably because the thinned plantation will approach its unthinned counterpart over time (Pienaar and Rheney 1995). The data collected for this study are from operationally thinned plantations, and more data will become available as more plots are thinned. Results from this study will be compared to data from a new experimentally designed thinning study. This new study is designed to measure thinning response of first-thinned east Texas loblolly pine plantations at three controlled levels of stocking based on SDI targets, develop a thinning response model for first-thinned loblolly pine plantations in the West Gulf region, and evaluate the new thinning response model with other regional thinning models. We would like to thank Campbell Global, Rayonier, Resource Management Services (RMS), Hancock Forest Management, the McIntire-Stennis program, and Stephen F. Austin State University for their support of this research as well as all the ETPPRP student workers who helped collect the data over the years.

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