

Responsiveness to Fertilization of Diverse Families from two Provenances of Loblolly Pine

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The **SouthEast Tree Research and Education Site–2** study (SETRES-2) was established in Scotland County, North Carolina adjacent to the USDA Forest Service / NC State University SETRES site in 1993. The objective of this study is to evaluate the response to nutrient stress of two very different provenances of loblolly pine, one from the “Lost Pines” region of Texas (LPT) and one from the Atlantic Coastal Plain of North Carolina and South Carolina (ACP). Five open-pollinated families from each provenance were used. A split-split-plot design was used with the two nutrient treatments as main plots, provenances as sub-plots, and families within provenances as sub-sub-plots. Fertilizer (including micronutrients) has been applied annually to maintain a balanced supply of all nutrients in the fertilized plots. All trees were measured annually for height and starting in year 4 for diameter at breast height.

Growth responses to fertilization were very large and significant at year 12. Through age twelve, height was 75% greater in the fertilized plots and stem volume per hectare was 173% greater, compared to the non-fertilized plots. Nutrient amendments dramatically increased uniformity within the 64-tree family plots. The average within-plot CV for 12-year height was 13.56% for the control plots and 6.06% for the fertilized plots. In the fertilized treatment, the LPT trees had higher volumes and basal areas than the ACP trees. Families within provenances also differed for growth traits. The family means at age twelve for the ACP families varied from 60 m³/ha to 133 m³/ha in the control plots and from 185 m³/ha to 262 m³/ha in the fertilized plots. The LPT families also differed in the control plots (55 m³/ha to 103 m³/ha) and in the fertilized plots (168 m³/ha to 306 m³/ha). Statistical differences were only found at the treatment level and replicate by treatment by provenance interaction for growth traits (ρ -value=0.05).

While many families have high growth rates, some of them have a high incidence of stem and branch deformities causing serious problem at wood quality level. For this reason, results from evaluations of straightness, sweep, rust, branch, fork, and stem and branch sinuosity will be also presented in this paper.