A PROPOSED STUDY ON THE GENETIC CONTROL OF FERTILIZER RESPONSE AND POST-SENESCENCE NUTRIENT CONTENT ASSESSED VIA FOLIAR SAMPLING IN LOBLOLLY PINE

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Loblolly pine (*Pinus taeda* L.) is the most widely planted forest tree species in the Southeast region of the US, deployed in ~80% of all plantations across the entire range. The literature supports that loblolly pine growth is under moderate genetic control and is also highly responsive to silvicultural treatments, especially fertilization. However, fertilization is often neglected because the application of fertilizer is expensive, nutrient uptake rate is low, and tree growth response is uncertain. Although response to fertilizer has been rigorously studied, the genetic mechanisms are largely unknown.

In view of expectations of increasing demand for wood, maximizing the efficiency and productivity of pine plantations is vital. These plantations are, in practice, almost always established with progeny of a small group of elite genotypes with little consideration to site-specific response of a particular genotypes outside of temperature. A comprehensive study to examine these issues would require an immense amount of time and financial resources for sampling and measuring test sites and analysis of foliar samples.

The University of Florida Forest Biology Research Cooperative (FBRC) has established a multi-site trial to evaluate the response of fertilizer treatment to elite families across a range of environments. The Site Specific Interactions of Genetics, Nutrition and Soils (SSIGNS) study is designed with 30 full-sib elite loblolly pine families with 5 treatment levels of macro- and micronutrient fertilizers, replicated three times at each site.

In this pilot study, live foliage from a subsample of trees was analyzed for nutrient content and assessed for genetic parameters, then the same trees will be samples for dead foliage the following year after the needles senesce, but before they fall. Samples were collected from the highest and lowest level of fertilization and will be collected over two years so that foliage from the same cohort is compared directly. In this way we will able to execute the study recursively, making sure that the genetic control of traits exists before the study is extended. The overall objective of this study is to estimate genetic parameters including narrow-sense and broad-sense heritability and dominance of foliar nutrient concentration and retranslocation.

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