ANALYSIS OF WOOD PROPERTIES IN COASTAL AND PIEDMONT POLLEN MIX TESTS

Andrew Sims[1], Graham Ford[2], Austin Heine[1], Fikret Isik[1], and Steve McKeand[1]

Wood density and bending strength are among the most important properties related to the value of wood products. Traditional sampling procedures for these traits require time-consuming and expensive lab work, both of which are major impediments to incorporating these traits into tree breeding programs. Fortunately, there are now efficient and rapid procedures to sample these wood properties. The Fakopp TreeSonic measures acoustic stress-wave velocity, which has a strong genetic correlation with wood bending strength. The IML Resistograph is a micro-drilling tool that measures drilling resistance across the cross-sectional profile of a tree and is strongly correlated with wood specific gravity. Use of these non-destructive techniques have been promising for reducing the time and cost of selecting genotypes with superior wood properties.

The first phase of the study was to validate the efficiency of the new Resistograph version IML Resi PD400 series for correlating with volumetric specific gravity. Additionally, acoustic stress-wave velocity from Fakkop TreeSonic tool was used as an estimate of modulus of elasticity. Here, we found that genetic correlation between Resistograph drilling amplitude and specific gravity was high ($r_G = 0.90$). This phase represented two test sites from the Coastal Pollen Mix 1 series, inculding 70 half-sibling families and two checklots. The second phase of the study extended these measurement and analysis protocols to a wider range of Coastal and Piedmont families, representing ten sites in 5 different series. We found moderate to high heritabilities for wood property traits with family mean heritabilities ranging from $h\_fm^2 = 0.44$ to 0.76 for stress-wave velocity and $h\_fm^2 = 0.50$ to 0.78 for relative amplitude.   These findings indicate that the Cooperative can use these rapid screening methods to effectively characterize families for wood properties. To date, we have used these rapid screening tools to estimate breeding values for the surrogates of wood density and bending strength for 280 Coastal families and 74 Piedmont families.

[1] NCSU Cooperative Tree Improvement Program, Department of Forestry and Environmental Resources, North Carolina State University, Raleigh, NC.
[2] Plum Creek Inc., Brunswick, GA