

## What Do We Do to Improve Wood Properties in a Breeding Program?

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The Cooperative breeding programs in southern US have achieved considerable improvement in growth, stem form, and fusiform rust resistance over two cycles of selection and testing efforts in the last 49 years. Genetic improvement and intensive cultural treatment have improved productivity and reduced rotation ages, but wood quality traits have not been formally incorporated into most breeding programs. As a part of strategy to improve juvenile wood properties in plantation loblolly pine, a research project has been carried out to characterize the genetic variation in wood quality within the elite breeding populations based on the 2<sup>nd</sup>-generation progeny tests. The purpose is to develop efficient breeding methods for genetic improvement of wood quality traits and for operational deployment of these elite parents for desirable wood quality traits.

The genetic variation among genetically improved materials in wood properties was recently accessed for 179 elite parent trees that have best breeding values for growth, stem straightness, and fusiform rust resistance in the North Carolina State University-Industry Cooperative Tree Improvement Program for loblolly pine. Three best full-sib families were selected for each elite parent. Wood increment cores from five progeny were sampled. A total of 3000 trees were samples from Coastal, Piedmont and Northern breeding populations.

Breeding values for some juvenile wood properties were estimated, including cellulose, lignin content, fiber length and coarseness, and wood density. These are key wood properties that could be improved through selecting and breeding. Based on the phenotypic data, genetic variation and genetic correlations among traits were calculated. Different selection options are evaluated for improving growth and wood properties simultaneously.

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