

Tree breeding in the southern US: genetic gain equals productivity and profitability for landowners

*Steve McKeand, J.B. Jett, Trevor Walker, Austin Heine, Daniel Genung
Tori Brooks, April Meeks, Ross Whetten, and Fikret Isik*

North Carolina State University, Department of Forestry and Environmental Resources, Raleigh,
North Carolina, United States

Abstract: Tree improvement is logistically complex, time-consuming, and expensive. The NCSU Cooperative Tree Improvement Program continuously seeks innovative ways to accelerate breeding while reducing costs in our loblolly pine (*Pinus taeda* L.) breeding program. For the fourth-cycle breeding strategy, we have implemented the MateSelect algorithm to balance diversity and genetic gain. To reduce the progeny testing effort and increase progeny testing efficiency, the program has been implementing alpha cyclic incomplete block row-column designs. We will summarize some of the operational and research innovations, including the incorporation of genomic data into our fourth-cycle strategy.

The conduit from the breeding program to the deployment program is via seed orchards and nurseries. Seed orchard managers have reaped tremendous benefits from three cycles of breeding and have established the best selections into advanced-generation seed orchards. The vast majority of seedlings sold by nurseries are specific families derive from these orchards. About 84% of loblolly pine plantations are now established with open-pollinated families, 8% with full-sib families, 2% with clonal varieties, and the remainder with mixtures of seedlings from seed collected from seed orchards. Landowners now have a wide range of options when choosing the loblolly pine genetics to plant on each hectare being regenerated. Many landowners elect to plant the highest quality genetics available, and the return on their investment is substantial. On a regional basis, when the genetic gain per year is increased to any extent, the financial impacts are worth hundreds of millions of dollars. Details of the economic analyses will be presented.

Bio: Steve McKeand has been a Professor of Forestry and Environmental Resources for over 30 years and is Director of the Cooperative Tree Improvement Program at NC State University. In addition to directing the program, Steve conducts research in support of the Tree Improvement Cooperative, teaches graduate and undergraduate courses in forest genetics, directs graduate students, and conducts outreach and extension programs for the 34 company and government agency members of the Cooperative as well as for foresters and forest landowners throughout the southern US. Steve received his BS in Forestry from Purdue University in 1976 and his MS in Forest Genetics in 1978, also from Purdue. In 1983, he completed his PhD in Forest Genetics at NC State University.

Further information: For information on the Cooperative, visit <http://treeimprovement.org/>