

A MINNESOTA-BASED *POPULUS* BREEDING AND HYBRID POPLAR DEVELOPMENT PROGRAM

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A *Populus* breeding program located at the Natural Resources Research Institute in Duluth, MN, has been producing and testing intra- and inter-specific hybrid poplar germplasm for the past 13 years (1996-2008). The primary *Populus* species of interest for breeding and testing in Minnesota include *P. deltoides*, *P. nigra*, *P. maximowiczii*, and *P. trichocarpa*. Eastern cottonwood selections from a previous University of Minnesota collection and from other regional *Populus* improvement programs formed the base breeding population. Genetic diversity of the base population has been increased with open-pollinated seed collections from native trees along Minnesota river-systems and from natural populations located outside the North Central region of the United States. Seed collections and parent materials have been exchanged with cooperators working in northwestern United States, Canada, Europe, and Asia to evaluate long-term parent populations under Minnesota climatic conditions. Potential parent selections are archived in dedicated breeding orchards. Operational logistics of each screening phase from the initial nursery progeny trials through the family field, advanced clonal, and yield block evaluations are explained. Following a 1- to 2-year nursery screening phase, hybrid poplar pedigrees are established in replicated field trials imbedded in commercial fiber farm plantations for critical evaluation throughout the entire rotation period. Growth, disease resistance and ease of establishment are among the selection criteria for new clones for advanced clone and yield testing. Results and trends in terms of growth gains, disease incidence, and clone performance from the current field trials will be presented. Yield gains relative to commercial standards and recommendations for efficient field testing of large populations will be discussed along with opportunities for utilizing new biomass research technologies with the current collections of Minnesota-based germplasm.

KEY WORDS: *Populus* genetics, hybrid poplar, tree breeding, clone development, population improvement

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