

Cottonwood Progeny Tests at the Horticulture Station

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An important element of a long-term project on the development of genetically improved cottonwood (*Populus deltoides*) clones for biomass production in the North Central Region of the U.S. is now in progress at the Horticulture Station in plots 11A and 11B. Most of the funding for this overall program came from the Biomass Feedstock Development Program of the USDOE until that program was canceled by the new administration in December 2001. With the loss of that funding, a summer field crew no longer was available to maintain studies for this project at the Moore, McNay, and Kanawha research farms as had been done in previous years. The convenience, availability of on-site help, and protection from deer browsing and rutting made the Horticulture Station a good place to consolidate the testing program beginning in the summer of 2002. Current, maintenance-level funding for the project comes from McIntyre/Stennis funds and the Agriculture Experiment Station Project 3905.

The trees being tested come from controlled crosses made in the Forestry Greenhouse during the winter months. Flowering branches are harvested from parent trees selected for disease resistance, growth rate, and other important traits. Pollen is collected from male selections and used in pollinating female selections that have been grafted onto greenhouse stock plants. Seed matures in about 6 weeks and seedlings are grown as containerized plants in the greenhouse until they reach suitable size for field planting. This takes about 3 months, and the goal is to produce at least 50 trees from each specific cross. If the seedlings are ready in time they are planted in early summer; otherwise they are planted in the fall. For the progeny tests being conducted at the Horticulture Station, the 50 or so trees for each cross are divided into three

replicates and planted in a randomized design with the other families in the trial using a tractor-drawn tree planter and a within-row spacing of approximately 30 cm. This tight spacing gives an early evaluation of how the trees react to competition from other plantation trees and to stem and leaf diseases. Labeled PVC pipes are used to mark the beginning of each family plot within the rows that make up a single test. Competition from other plants is controlled to the extent possible by pre-planting applications of Roundup herbicide and post-planting, grass-only herbicides such as Fusilade. The first plantings were made at the Horticulture Station in July 2002, when 2,678 trees were set out representing 77 different families. Another 651 trees from 26 families were planted in the fall of 2002. In fall 2003, 2,643 trees from 56 families were planted. Beginning in the third growing season (2004) the trees will be evaluated for disease problems and growth in height and diameter. At the end of the fourth growing season, the best trees from the best families in terms of disease resistance and stem volume growth rate will be selected. The trees in the study are cut down at the end of the fourth year with stem samples being taken from the selected trees for wood quality determinations. The stem terminal and upper, vigorous branches of the selected trees are made into 8-cm cuttings, rooted in greenhouse containers, and transplanted to the Iowa DNR Nursery to produce plants for clonal tests, the next stage in verifying which selections are superior enough to go into commercial use. The new selections made in the earlier years of this program have raised productivity levels to at least 7 dry tons/acre/year of wood to support energy, paper, or fiberboard production; up from the 4.5-ton level of planting stock available before the start of the project. The ultimate goal is to reach productivity levels of at least 10 tons. Hopefully, some of the progeny now under test at the Horticulture Station will help meet that goal.