MINNESOTA - Alley-Cropping Bioenergy Crops on Agricultural Floodplains

Joshua Gamble, Craig Sheaffer, University of Minnesota

State and federal mandates for clean energy and renewable fuels will increase demand for bioenergy feedstocks, giving farmers new opportunities to diversify and improve economic return by integrating bioenergy crops. Perennial grasses and fast growing hybrid poplar or willow may provide reasonable cropping alternatives in agricultural floodplains, where occasional flooding and erosive soils create environmental concerns and complicate management for annual cropping systems.

Ongoing University of Minnesota research near Rosemount and Fairmont, MN, is evaluating establishment of bioenergy crops in alley-cropping systems where herbaceous crops are planted between widely spaced rows of trees. Hybrid poplar and willow trees were established in May 2010 in high density rows and will be ready for harvest in fall 2013, after the fourth growing season. In the alley between tree rows, blocks of switchgrass, prairie cordgrass, an alfalfa/intermediate wheatgrass mixture, and a native grass-forb-legume mixture were planted.

Repeated flooding at the Fairmont site has really tested the flood tolerance of the crops. Results from the second growing season show that willow is outperforming poplar in both height and diameter at both sites, but DM estimates will not be available until after harvest in 2013.

At Rosemount, the native mixture produced the greatest DM yield (5.3 ton DM/acre) followed by prairie cordgrass, alfalfa/intermediate wheatgrass, and switchgrass at 4.5, 3.6 and 1.2 ton DM/acre, respectively. At Fairmont, prairie cordgrass yielded the most (3.4 ton DM/acre) followed by the native mixture, switchgrass, and alfalfa/intermediate wheatgrass at 3.2, 2.3, and 0.8 ton DM/acre, respectively. Early results indicate that of the crops tested, hybrid willow, prairie cordgrass and a native mixture may be the best options for biomass production in alley-cropping systems on floodplains.