



DEFINING LINKAGES BETWEEN PHYSIOLOGICAL FUNCTIONING, WATER USE, PRODUCTIVITY AND ECOSYSTEM SERVICES FROM SHORT ROTATION WOODY BIOFUEL CROPS IN THE SOUTHEASTERN U.S.

A McIntire - Stennis Supported Project

Short rotation woody crops including Populus and its hybrids grow quickly to provide not only an efficient source of biofuel and bioproducts but also ecosystem services such as carbon sequestration, wildlife habitat, and nitrogen and floodwater mitigation. These crops can provide landowners with the opportunity to derive income from the energy sector and retain it in the local economy; however, a variety of site factors can greatly impact the productivity of Populus species. In particular, Populus hybrids exhibit a variety of water use strategies that impact their own drought tolerance and affect surrounding water resources.

This project seeks to determine the environmental drivers of productivity and water use in terms of soil moisture and atmospheric moisture deficits across Populus taxa and varieties. This information will help landowners determine the best varieties to plant based on site conditions and will allow for better modeling of productivity and water use, maximizing the producer's investment in woody crops grown for biofuel and bioproducts.



COLLABORATION

In addition to Mississippi State, this project includes researchers from the University of Tennessee and Louisiana Tech University. Oregon's GreenWood Resources Inc. is providing access to the company's hybrid poplar cuttings.

ABOUT MCINTIRE-STENNIS

The McIntire-Stennis program, a unique federal-state partnership, cultivates and delivers forestry and natural resource innovations for a better future. By advancing research and education that increases the understanding of emerging challenges and fosters the development of relevant solutions, the McIntire-Stennis program has ensured healthy resilient forests and communities and an exceptional natural resources workforce since 1962.



IMPACTS



Carbon neutral forms of energy including short rotation woody crops can **supply a renewable energy source** without adding additional carbon dioxide to the atmosphere.



The Southeast U.S. is projected to supply about **68 percent of woody biomass for energy** by 2040. Populus yields over seven dry tons per hectare per year of biomass for most productive varieties.



Populus water use efficiency ranged from one to five grams of biomass per kilogram of water used.