

WWW.SUNGRANT.OKSTATE.EDU



U.S. Department of
Transportation

SunGrant
INITIATIVE
South Central Region



Project Title: *Cellulosic Feedstock Production and Environmental Benefit from Agroforest Systems Established on Marginal Lands*

DR. MATTHEW PELKKI

Project Goal

To develop economically viable agroforest systems for producing cellulosic bioenergy crops that will also enhance water quality and provide wildlife habitat on low productivity agricultural land in the Lower Mississippi Alluvial Valley (LMAV).

The objectives were:

- Provide long-term biomass production estimates for cottonwood grown in mono-cultures or alley cropped with switchgrass.
- Calculate the amount of carbon and nitrogen sequestered by each of the cottonwood-switchgrass systems.
- Relate habitat utilization of small mammals to habitat characteristics associated with the various cottonwood-switchgrass agroforest systems.
- Develop a complete life-cycle analysis, focusing on an energy balance for agroforest systems.

Project Outcomes:

- The marginal nature of the three sites used in this study is reflected in the production and economic data. For example, the costs of producing a ready to harvest ton of oven-dry biomass is \$65 to \$914 for cottonwood and \$13 to \$56 for switchgrass.
- The cost of producing cottonwood may decrease following the initial harvest. Increased cottonwood production and reduced establishment activities are likely to occur after the initial harvest and may lower woody biomass production costs.
- The addition of ecosystem service markets could further improve the economics of biomass production on marginal lands in the LMAV.
- The CN results indicate that switchgrass and cottonwood are better able to retain N on site than the typical row crops grown on marginal soils in the LMAV. Conversion to cottonwood or switchgrass bioenergy crops could reduce N losses to surface waters.
- Habitat characteristics varied greatly among seasons and study sites, which reflects the different success associated with crop establishment and the timing of crop establishment in the CT treatment.
- Carbon life-cycle ratios are positive for all three activities, and switchgrass has the best carbon ratios. More efficient tree harvesting equipment would reduce carbon emissions.



PI: Dr. Matthew Pelkki

University of Arkansas-Monticello
School of Forest Resources

Co-PI: Dr. Charles West

University of Arkansas
Crop, Soil, & Environmental Sciences

Co-PI: Dr. Phillip Tappe

University of Arkansas
Division of Agriculture
Arkansas Forest Resources Center

Co-PI: Dr. Hal Liechty

University of Arkansas
Division of Agriculture
Arkansas Forest Resources Center

Co-PI: Dr. Michael Blazier

Louisiana State University AgCenter
Hill Farm Research Station

Co-PI: Dr. Montgomery Alison

Louisiana State University AgCenter
Macon Ridge Research Station

Funded: \$350,000

Start Date: 07/01/2009

End Date: 06/30/2013