

Measuring the Biological and Economic Effects of Wildlife Herbivory on Afforested Carbon Sequestration Sites in the Lower Mississippi Alluvial Valley

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Abstract: It has been suggested that afforestation of marginal or abandoned agricultural lands in the Lower Mississippi Alluvial Valley (LMAV) with bottomland hardwoods offers the greatest opportunity for significant net carbon storage in the southern United States. In February 2006, Mississippi State University and Entergy began a carbon sequestration study in the LMAV by afforesting 36 acres of retired agricultural land in western Mississippi. One of the primary causal factors of failed and delayed reforestation attempts in the LMAV is mammalian herbivory. Herbivory of seedlings generally reduces growth and often leads to seedling mortality. A study was designed to determine the biological and economic impacts of mammalian herbivory on these afforested sites. The experiment is a completely randomized 6 x 2 x 2 factorial design, in which seedlings were planted using six species mixes with two fertilizer treatments (fertilized or unfertilized) and two competition treatments (herbicide or no herbicide). Seedlings from each species mix and fertilizer/herbicide combination were randomly selected for monitoring throughout the first growing season. Growth, survival, and herbivory data were recorded for each selected seedling. Utilizing this biological data as well as known establishment and treatment costs, land expectation values (LEV) will be compared to determine the feasibility of each planting mix and treatment combination. Through this research, we hope to identify a cost-effective species mix that can be utilized in the LMAV to promote carbon sequestration and withstand the potential negative impacts associated with browsing by mammalian herbivores.

Keywords: Bottomland hardwoods, browsing, herbivory, Lower Mississippi Alluvial Valley, Mississippi Delta, regeneration delay

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