

A Water Quality Model Comparison of Potential Impacts from Bioenergy Crop Land Conversions: Switchgrass versus Hardwood

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Abstract. With the emphasis on developing bioenergy feedstock for alternative fuels, there is the potential for significant changes in the agricultural land use, with a significant emphasis on switchgrass and hardwood pine. Because of dynamic nature of this industry, many farmers are changing between switchgrass, hardwood, and hay to meet the market demands. In regions of the United States promoting bioenergy crop production there is a critical need to understand the potential hydrologic and water quality impacts from shifts in bioenergy crop type. The Soil & Water Assessment Tool (SWAT) has been used to model three different watersheds, currently monitored for flow and water quality, located in East Tennessee near the city of Vonore. Model scenario testing was applied to examine differences in annual loads of suspended sediment and nutrients in the stream from hay-pasture land conversions. Subsequent scenarios were run for each model, simulating incremental conversions from hay into switchgrass as well as incremental conversions from hay into hardwood pine. A control model run consisted of hay-pasture land cover with no crop land conversion. The calibration model run will be compared with water quality monitoring data. Models results were compared for long-term annual loads between no land conversion, and conversions to switchgrass and hardwood pine, where land cover of hardwood pine resulted in lower suspended and nutrient loads compared with switchgrass. Implications of these model results suggest hardwood pine as a bioenergy crop may reduce pollutant load and may be an effective management practice for implication of a total maximum daily loads (TMDLs) in 303d listed water bodies.