THE POTENTIAL OF PRODUCING BIOENERGY CROPS ON CONSERVATION RESERVE PROGRAM LAND IN MISSOURI, IOWA, NEBRASKA, AND KANSAS (MINK REGION) TO MITIGATE CARBON DIOXIDE EMISSIONS: AN INTEGRATED ECONOMICS AND BIOLOGICAL MODELING APPROACH

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ABSTRACT

Concerns about global warming and climate change have generated increasing interest in development of bioenergy crops as a potential source of low-carbon energy. The goal of this research was to quantify environmental and economic effects of using the U.S. CRP land to produce large-scale bioenergy crops. The APEX model was used to evaluate the potential of switchgrass and hybrid poplar production to provide biomass feedstock, sequester soil carbon, and simultaneously provide other environmental co-benefits including improvement of soil and water quality in the MINK region. The environmental results indicate that the level of biomass yields and change in soil organic carbon differ with type of bioenergy crop, soil type, climatic conditions, and cultural management. Converting CRP land into bioenergy crop production and adopting conservation management practices significantly reduced sediment, nitrogen, and phosphorus loading into water bodies relative to traditional food crop production under conventional and conservation tillage practices. Results on economic effects of reverting CRP land into traditional crop production show a decline in prices of major U.S. commodities and federal government saving of nearly $ 1.7 billion annually on CRP rental payments. Putting some cropland currently under tradition crop production to produce conservation buffers has insignificant impact on commodity prices. Quantified information on environmental and economic effects of producing large-scale bioenergy crops assist policymakers develop sustainable and balance of energy-agriculture-environmental policies.