Environmental Implications of Increased Bioenergy Production on Midwest Soil Landscapes

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Prairie soil landscapes encompass over 16 million acres in Missouri and surrounding states. Much of this area has been degraded by erosion but is still used for grain production. Erosion has caused variable topsoil depth within fields which in turn has resulted in greater within-field variability of crop yield, magnified the drought-prone nature of these soils, and lowered the overall soil productivity and ecosystem function. In recent years, pressure on these sensitive soils has risen due to higher demand for grain production, in part for ethanol and biodiesel. In some areas, highly erodible fields which were historically managed as CRP and pasture are being turned into grain crop acres. Thus as new and fluctuating feed and bioenergy markets develop, land management practices will also shift, resulting in changes in soil and water quality of watersheds. This presentation will explore the likely environmental implications of different types of bioenergy production on the soil resource. Further, the positive benefits of potential changes in land use will be in explored. For example, one alternative for sensitive soils is production of perennial grass as a feedstock for coal co-burning plants and for potential future use in cellulosic ethanol production. Perennial grass yields are likely to be less variable than grain yields, both year-to-year and within fields, primarily because of greater resistance to drought. Grass production systems also provide environmental services not obtained from annual grain crops. We will also discuss our work on developing ways to target the most appropriate places in the landscape for grain or perennial production so as to enhance ecosystem services and improve soil and water quality.