**Perennial Biofuel Crops Use Water at Levels Similar to Corn**

The prospect of converting large tracts of the Midwest’s marginal farming land to perennial biofuel crops carries with it some key unknowns, including how such a change could affect the balance of water between rainfall inputs, evaporation losses, and movement of soil water to the groundwater. In humid climates such as the U.S. Midwest, evaporation returns more than half of the annual precipitation to the atmosphere, with the remainder available to recharge groundwater and maintain stream flow and lake levels. To begin addressing that unknown, a recent study from the Great Lakes Bioenergy Research Center looks at how efficiently “second generation” biofuel crops—perennial, non-food crops such as switchgrass or native grasslands—use rainwater and how these crops affect overall water balance. The study is the first multi-year effort to compare the water use of conventional corn crops to the perennial cropping systems of switchgrass, miscanthus, native grasses, restored prairies, and hybrid poplar trees. Researchers used soil-water sensors to measure the rate of evapotranspiration occurring within each cropping system over the last few years. Evapotranspiration refers to the sum total of water lost while the plant is growing, either from evaporation through the plant stem itself or from water evaporated off of the plant’s leaves or the ground. By measuring the amount of precipitation that has fallen against actual soil water content, it’s possible to quantify the water lost to evapotranspiration while each crop is growing. In a finding that contrasts sharply with earlier modeling studies that found particularly high perennial water use in areas with high water tables, the group reports that the evapotranspiration from the perennial cropping systems did not differ greatly from corn, suggesting that in many settings, perennials may not use more water. For well drained soils in the upper Midwest at least, and probably for eastern North America in general, these results most likely apply, and water balance would not be adversely affected. Researchers also measured the water use efficiency (WUE) of each crop, calculating which plants grew the most biomass with the least amount of evapotranspiration. Miscanthus had the highest WUE, then corn, followed by poplar, native grasses, and prairie. Since the evapotranspiration rates of the study’s cropping systems held steady across several years of varying precipitation levels, the study also suggests that grassland evapotranspiration rates may not be as sensitive to climate change as is currently assumed.

**References:** Hamilton, S.K. et. al. 2015*. Comparative water use by maize, perennial crops, restored prairie, and poplar trees in the US Midwest.* **Environmental Research Letters**, doi: 10.1088/1748-9326/10/6/064015.

**Contact**: Dr. N. Kent Peters, SC-23.2, (301) 903-5549