

## **Soil improvement related to switchgrass as indicated by subsequent crop yield**

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### **Introduction**

In a study in Alabama, soil carbon increased over a three-year period in land that had been converted from annual row crops to switchgrass that was managed for energy [1]. Increases in soil carbon generally result in improved soil physical properties, water holding capacity and microbial activity. While each of these variables may be of interest and can be measured independently, their collective effect on soil quality can be estimated by their combined influence on plant growth. However, no research has been conducted to determine the effect of switchgrass on soil quality, as measured by its effect on yield of a subsequent crop. Consequently, the objective of this study was to determine the effect of switchgrass grown for six years and managed for biomass, on soil productivity as indicated by subsequent yields of corn, soybeans and cotton, and compared to adjacent no-till plots that were colonized naturally by forbs and grasses.

### **Procedure**

In spring of 1999 and 2000, plots near Montgomery, Alabama, in which switchgrass had been grown for biomass over the previous six years, and adjacent plots which had been colonized naturally by forbs and grasses, were planted to corn, soybeans or cotton following destruction of the switchgrass. These crops were fertilized according to soil test recommendations each year. Corn and soybean grain yield, and cotton yield was determined in both years, while total above ground biomass was also measured in 2000.

### **Results**

Rainfall between April and October was 582mm in 1999, and 322 mm in 2000. These figures are 22% and 57%, respectively, below the long term average of 746mm for this period. Grain yield of corn and soybeans, and cotton yield in plots which had been previously planted with switchgrass were 44%, 26% and 3% greater, respectively, than in adjacent plots which were not planted to switchgrass. Corresponding advantages in 2000 for the plots previously planted in switchgrass were 129% for corn, 48% for soybeans and 50% for cotton. Total biomass yields in 2000 were 34%, 61% and 14% higher for corn, soybeans and cotton, respectively, in plots previously planted in switchgrass.

### **Conclusions**

Plots that had been previously planted in switchgrass generally provided higher yields of grain from corn and soybeans, and higher yields of cotton, than adjacent plots which had not been planted previously in switchgrass. This advantage was greater in the second year than in the first. In addition, in the second year, total biomass for all crops was higher for plots that had been planted previously in switchgrass. However, the relative difference in yields varied among crops and years.

### **References**

[1] Tolbert, V. R., J. D. Joslin, F. C. Thornton, B. R. Bock, D. E. Pettry, W. Bandaranayake, D. Tyler, A. Houston, and S. Schoenholtz. 1999. Biomass crop production: benefits for soil quality and carbon sequestration. Proc. 4<sup>th</sup> Biomass Conf. of the Americas:127-132