Increased Corn Rotation Frequency Cropping System Impacts on Soil Functional Properties

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ABSTRACT

Rotations including higher frequencies of corn have become more common in the southern region of the U.S Corn Belt due to high grain production levels and economic benefits. As a result of increasing corn demand and economic competitiveness to soybean, many producers are altering management practices and implementing crop rotations which include more corn. This increase in corn adoption has raised concerns about long-term sustainability and overall impacts to soil function. The objective of this study was identify the impact of increased corn in rotation on soil function in a long term no-till management system. Soil samples were collected in the spring of 2014, at surface (0 to 5cm) and subsurface (5 to 15cm) depths. Soil function was represented by measurements of physical, chemical, and biological soil properties. As corn increased in rotation, favorable trends in several of the soil properties examined at the surface layer were observed. Soil organic carbon, water filled pore space, organic matter, Beta-Glucosidase, and phospholipid fatty acids all displayed increasing trends while bulk density and electrical conductivity values decreased. In addition, continuous corn had the highest values for total nitrogen and active carbon measurements. Unfavorable effects with increasing corn included decreases to aggregate stability at the subsurface and reduced phosphorus levels at both depths. No differences were observed with increased corn for pH, cation exchange capacity, calcium, or magnesium. Increased corn in rotation indicated the potential for better soil function at the surface, while soil functional capacity at the subsurface was similar among all corn-soybean rotations.