

The Effect of Tillage and Crop Rotation on Soybean and Soil Health

Brandon Nystrom

Advisor: Dr. Bill Wiebold

Short Abstract

Decision management choices for soybean production play a critical role in the response of the soil environment in which crops are grown. Few experiments have studied the long term effects (23 years) of management practices on soybean growth and soil health. We chose to analyze this situation by measuring residue, soil organic carbon (SOC), active carbon (AC), CO₂ soil efflux rates and soil moisture/temperature in response to continuous and rotated soybean under tilled and no-tillage practices. Crop rotation and NT produced significantly more residue than continuous soybean and plots receiving a tillage treatment. SOC levels increased with both rotation and NT. Despite this, active carbon was only higher with NT and did not respond significantly to rotation. Soil CO₂ efflux rates were extremely variable throughout 2013 and 2014. NT plots were higher for soil moisture in all four dates of sampling in 2013 and 4 of the seven dates in 2014. Soil temperature was significantly lower in a rotated system for 3 of the 4 dates in 2013 and 3 of the 7 dates in 2014. The effect of tillage on soil temperature was very limited. Emission rates were higher during the peak soybean growth period in 2014.