

CHANGES IN TOTAL SOIL ORGANIC CARBON AS AFFECTED BY CROPPING SEQUENCE AND BIO-COVER UNDER NO-TILL PRODUCTION

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ABSTRACT

The rate of soil carbon storage in no-till farmland is uncertain due to still unknown environmental and crop production effects. The objective of this experiment is to compare changes in total soil organic carbon (SOC) due to different cropping systems under no-tillage production. A split-block treatment design with four replications was used at the Research and Education Centers at Milan (RECM) and Spring Hill (MTREC). The whole-block treatment consisted of cropping sequences of corn, soybeans, and cotton. *The split-block was* bio-covers using winter wheat, hairy vetch, poultry litter, and fallow. Cropping sequences are conducted in 4 yr phases (Phase 1, 2002-2005; 2, 2006-2009; 3, 2010-2013). SOC was measured at the surface (0 - 5 cm) and subsurface (5 - 15 cm) in 2002 and after two and four years of experimentation for Phase 1. Overall, both sites showed small but consistent loss in SOC over all treatments during the first two years. After four years, SOC began to recover. Sequences with high frequencies of cotton lost significantly more SOC than others in the surface and subsurface regions. Plots under the poultry litter bio-cover lost less surface SOC (0.58 Mg ha⁻¹) than those under vetch (1.33 Mg ha⁻¹) or fallow 1.8 Mg ha⁻¹). Vetch under sequences high in soybean tended to lose less carbon than in sequences frequently planted with cotton or corn. Soil samples were collected after eight years of cropping sequences/bio-covers (2010); however data analyses have not yet been completed.