LONG-TERM VARIABLE TILLAGE INFLUENCE ON SOIL PHOSPHORUS AND COTTON YIELDS

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Abstract

Tillage and crop residue management practices have been shown to alter soil properties which influence soil quality and ultimately crop production. This long term study was performed to determine the effect of various long term tillage practices on selected soil properties including soil organic carbon (SOC), extractable soil P, and crop yields. An Orelia sandy clay loam soil (hyperthermic Typic Ochraqualf), which received the same cultural practices for the past 25 years, was the test soil. Soil was sampled at 0-3.0", 3.0"-6.0".0, and 6.0".0-12".0 following harvest. Tillage treatments studied were: conventional (CT-6.0" depth), moldboard (MB-12" depth), chisel (CH-12" depth), minimum till (MT- 3.0" depth), and no-till (NT-zero tillage). Soil test recommended rates of N were blanketed across all tillage variables while P was applied at two rates. Both conservation tillage systems (MT, NT) produced the highest surface crop residue. Soil organic carbon decreased with depth sampled, but was highest in NT an MT soil and lowest in soil receiving MB treatment. Extractable soil P was slightly higher in NT soil and lowest in MB tilled soil. NT cotton produced equivalent yields to MT and both produced significantly more than MB and CH (12" depth). Response to applied P varied with tillage system with MT cotton producing the largest response.