

Crop Rotation and Tillage Effects on Soil Properties after Ten Years

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Introduction

In the eastern Great Plains, winter wheat is often rotated with other crops, such as soybean, corn, and grain sorghum, to diversify cropping systems. Wheat typically is planted with reduced tillage, although the acreage of wheat planted no-till has increased significantly in recent years. Double-crop soybeans are often planted no-till after wheat, giving 3 crops in a 2-yr rotation. The objective of this long-term research was to investigate the combined effects of crop rotation and tillage on selected soil properties after ten years.

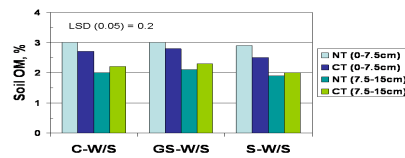
Experimental Procedure

A 10-yr field study was conducted in southeastern Kansas to evaluate the effects of three crop rotations - 1) corn - wheat / double-crop soybean, 2) grain sorghum - wheat / double-crop soybean, and 3) soybean - wheat / double-crop soybean and two tillage systems (no-till and conventional) on selected soil properties in a 2-yr crop rotation. Five crop rotation cycles were completed during the 10-yr study on two adjacent sites. Soil type was a Parsons silt loam with a dense clay-pan subsoil.

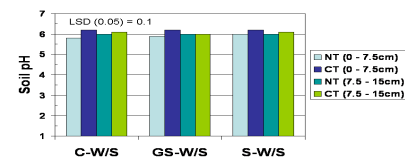
Average Grain Yields (Mg/ha)

Crop rotation	Tillage	1 st yr (C, GS, or S)		2 nd yr	
		Wheat	GS / Soy	Wheat	Soy
C - W/S	CT	9.14	3.59	2.20	
C - W/S	NT	8.26	3.61	2.08	
GS - W/S	CT	7.53	3.43	2.22	
GS - W/S	NT	7.40	3.51	2.09	
S - W/S	CT	2.28	3.68	1.87	
S - W/S	NT	2.42	3.55	1.71	

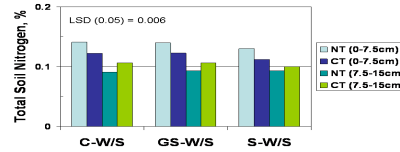
Effects of Crop Rotation and Tillage on Soil Organic Matter after Ten Years



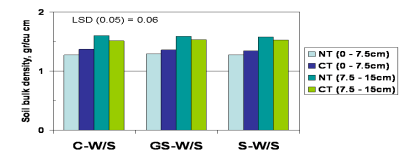
Effects of Crop Rotation and Tillage on Soil pH after Ten Years



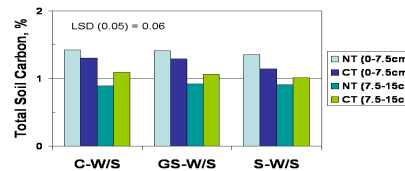
Effects of Crop Rotation and Tillage on Total Soil Nitrogen after Ten Years



Effects of Crop Rotation and Tillage on Soil Bulk Density after Ten Years



Effects of Crop Rotation and Tillage on Total Soil Carbon after Ten Years



Conclusions

- After 10 years, changes in soil properties were most significant in the 0 to 7.5 cm soil depth.
- Soil organic matter, soil carbon, and soil nitrogen were greater with NT in all rotations at the 0 to 7.5 cm depth, but at the 7.5 to 15 cm depth, all values were greater with CT.
- Soil organic matter and total soil carbon and nitrogen were greater when high-residue crops (corn and grain sorghum) were included in the rotation compared to low-residue soybean.
- Soil pH and soil bulk density were lower in the 0 to 7.5 cm depth with NT than with CT.
- Results show that both crop rotation and tillage can influence soil properties within a 10-yr period, although effects were primarily in the 7.5 cm depth.