COMPARISON OF SOIL PROPERTIES UNDER LONG-TERM CROP ROTATION AND TILLAGE

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Abstract

Shifts in cropping systems from long-term rotations including forages to mostly annual crops has intensified tillage, but has also led to the development of conservation tillage practices such as no-till. There is a shortage of information about the interactive, long-term effects of rotation and tillage on soil quality. The objective of this study was to assess soil chemical and physical properties after 15 years of crop rotation and tillage treatments. Continuous corn (*Zea mays* L.) (CCC), corn-soybean (*Glycine max* [L.] Merr.) (CS), corn-soybean-wheat (*Triticum aestivum* L.) (CSW), and continuous soybean (SSS) sequences were split into conventional tillage (CT) and no-till (NT) subplots at two western Illinois sites and were sampled about15 years after establishment. Bulk density (BD), water aggregate stability (WAS), and soil organic carbon (SOC) were greater under NT than under CT, but tillage had no effect on total nitrogen (TN) or available phosphorus (P). Rotations affected WAS and TN, but not SOC or P. Water aggregate stability was greatest for the CSW rotation, and was lowest for the crop sequences with more frequent soybean (CS and SSS); CCC had intermediate values. A similar pattern was detected for TN with greatest N content in soils under CSW and lowest N content under CS and SSS; CCC had intermediate values. These results indicate that while the use of no-till might provide some benefits to soil quality, benefits from the use of a crop rotation are less clear. While the addition of wheat to a corn-soybean rotation may be beneficial, soil quality under long-term implementation of continuous corn appears to be very similar to under a corn-soybean rotation.

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