Effect of rotation and short-term tillage on soil quality after long-term zero tillage

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Abstract

A field study was conducted from 2000 to 2002, near Brandon Manitoba, to determine the effect of low and high intensity of tillage on soil quality. The objective of this research was to measure soil quality under low and high intensities of tillage following 9 years of zero tillage. Tillage intensity affected aggregate size distribution after dry sieving, but had no effect on bulk density, penetration resistance, and wet-stable aggregates. Mineralizable nitrogen measured with the amino-sugar test, was not affected by tillage management or crop. Total organic carbon and nitrogen were also not affected, due to the short period when tillage was imposed. Wet aggregate stability was directly correlated with soil organic carbon, though there was no significant effect of tillage and rotation. Tillage intensity (high and low levels) and preceding crops (peas or canola) had no significant effect on phosphate phosphorus (0-10 cm). However nitrate nitrogen (0-10 cm) was higher in high disturbance tillage and following canola. High levels of nitrate nitrogen and ammonium are attributed to residual nitrogen fertilizer. Results of this study differ from those reported in the literature, due the brief duration of tillage following long-term zero tillage.