

SOIL HEALTH UNDER CONVENTIONAL AND MINIMUM-TILLAGE PRACTICE: SOIL CARBON STORAGE AND NUTRIENT USE

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Abstract

Tillage is a fundamental soil practice that impacts various soil characteristics. However, the impact of tillage on soil health is complex and context-specific. Our study aimed to evaluate the soil carbon sequestration and nutrient use of two different tillage practices: conventional and minimum-tillage, at various depths ranging from 0 to 30 cm, using a chernozem soil type. The results of our study are consistent with the hypothesis that, over time, minimum-tillage typically boosts soil health in the 0-10 cm soil layer. Compared to the conventional practice (19.36 t C ha⁻¹), there was a significant accumulation of soil organic carbon (0-30 cm) in the minimum-tillage practice (23.21 t C ha⁻¹). Below 10 cm depth, the soil organic carbon stocks are close to those of the conventional layer (0-30 cm). Total nitrogen (TN), available potassium (AK), and phosphorus (AP) content in 0-10 cm depth under minimum-tillage practice were 19.5%, 2%, and 3%, respectively, compared to the conventional treatment. Overall, the values of TN, AP and AK decreased with depth within the soil profiles as a consequence of soil practice and minimum disturbance. The data indicate that minimum tillage is a sustainable and effective management practice that maintains soil health, promotes soil carbon increase, and facilitates efficient nutrient use.

Keywords: soil health, tillage, soil carbon, soil nutrients
