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Protect Your Investment by Eliminating Tillage and Keeping Residue

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Protect Your Investment by Eliminating Tillage and Keeping Residue

Abstract

This fall, field observations with significant amounts of intensive tillage and residue removal provide an opportunity to rethink such practices by considering research proven practices such as no-tillage (NT) and strip-tillage (ST), which have demonstrated their effectiveness in many parts of the state and across the Midwest. Many studies from the Midwest and elsewhere have documented the economic benefits of NT and ST for both corn and soybean, where the conventional tillage input cost was greater than that of NT and ST by \$15-25/acre in a study covering 14 years of tillage and crop rotations in Iowa.

Keywords

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Protect Your Investment by Eliminating Tillage and Keeping Residue ICM News

December 7, 2015

This fall, field observations with significant amounts of intensive tillage and residue removal provide an opportunity to rethink such practices by considering research proven practices such as no-tillage (NT) and strip-tillage (ST), which have demonstrated their effectiveness in many parts of the state and across the Midwest.

Many studies from the Midwest and elsewhere have documented the economic benefits of NT and ST for both corn and soybean, where the conventional tillage input cost was greater than that of NT and ST by \$15-25/acre in a study covering 14 years of tillage and crop rotations in Iowa.

The other benefit these two systems provide is the improvement of organic matter. In long-term studies, it was found that soils lost over 50% of its top soil organic matter as a

result of intensive tillage since the establishment in early 1900. It has been widely documented that intensive tillage can contribute significantly to soil erosion and the loss of top soil, notably during rain events and wet spring seasons.

Residue plays an essential and important role in the protection of soils, especially with high weather variability and rain intensity, where soil is exposed to weather conditions after harvest for approximately seven months with no living plant covering the soil surface. Therefore, the removal of residue followed by tilling the ground (Fig. 1), make these two practices very damaging to soil health and sustainability as documented by current research.



Figure 1. Field with residue removed and ground tilled.

In current studies on the effect of tillage and residue removal on soil organic matter and soil quality, it was found that these short-term, perceived-gain practices can cause significant long-term damages to soil. It has been documented in studies conducted in Iowa that the combination of tillage and residue removal caused a decrease in water infiltration (Fig. 2), increase in bulk density (decrease in soil porosity), and a decline in organic matter in both NT and chisel plow (CP).

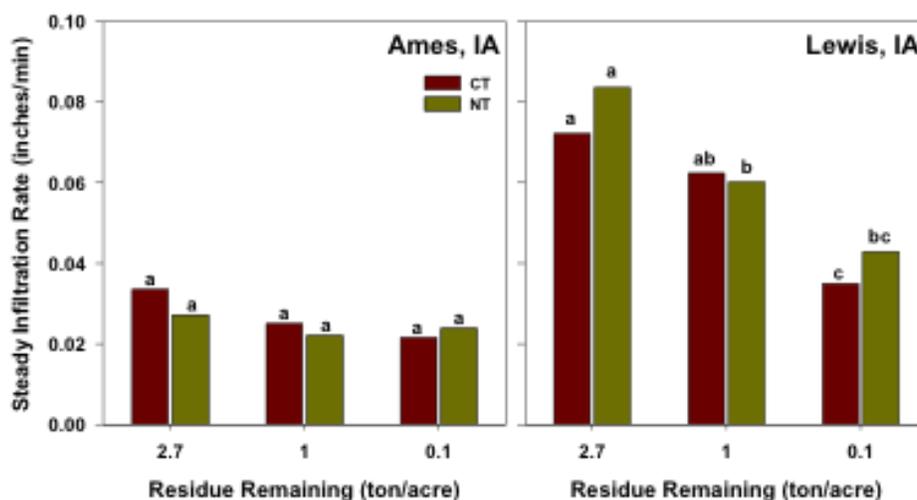


Figure 2. Tillage and residue removal effects on water infiltration.

The basic damage that tillage can cause, such as the loss of organic matter, to soil is a permanent one. Tillage oxidizes organic matter when soil is mechanically disturbed by accelerating microbial activity, leading to the mineralization of organic compounds to mineral forms and the production of NO₃-N, for example, which can contribute to water quality concerns. In addition, the disturbed soil, with a lack of residue cover or cover crop, can contribute to sediment loss and associated nutrient loss such as P.

According to research results mentioned above, NT and ST are economically and environmentally viable options. The improved seed technology and the amount of corn residue may present management challenges, but the availability of technology for residue management and a proved tillage system, such ST, can mitigate such challenges and provide solutions for improving yield and soil health. Also, tilling corn residue for the following soybean crop has been proven to not improve soybean yield and economic return.

For more information on how you can build soil health and sustain productivity, take advantage of the upcoming Inaugural Iowa Soil Health Conference on Feb. 2-3, 2016, in Ames, to learn more about solutions that can help with improving management practices for protecting and building soil health. Visit the conference website for more information: <http://register.extension.iastate.edu/soilhealth>

Category: Soils

Tags: Soil Management Residue Management soil health

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Mahdi Al-Kaisi is a professor of agronomy and extension soil and water specialist at Iowa State University. His current research and extension in soil management and environment focuses on the effects of crop rotation, tillage systems, residue management, and nitrogen input on soil carbon dynamic...

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