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Is tillage needed for your soybean crop?

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Is tillage needed for your soybean crop?

Abstract

Every fall and spring, producers are faced with tillage decisions for the next crop year. Generally, tillage—whether for corn or soybean—has shown limited are challenging. As preparations for spring field operations are underway, producers need to stop and think about the choice of tillage system, given the challenges faced with energy prices and the associated cost of conventional tillage operations. Primary tillage, such as with a chisel plow or subsoiler, often requires 1–1.5 gallons of fuel per acre or more. A secondary tillage pass through the field with a field cultivator or disk may use 0.5 to 0.7 gallon of fuel per acre. These additional fuel costs for tillage operations, in addition to other input costs, make conservation tillage and no-tillage, in particular, a far better choice given the insignificant yield differences.

Disciplines

Agronomy and Crop Sciences | Bioresource and Agricultural Engineering



Crop Production

Is tillage needed for your soybean crop?

by Mahdi Al-Kaisi and Mark Licht, Department of Agronomy, and Mark Hanna, Department of Agricultural and Biosystems Engineering

Every fall and spring, producers are faced with tillage decisions for the next crop year. Generally, tillage—whether for corn or soybean—has shown limited advantage in yield and economic returns, except in few cases where drainage and field conditions are challenging. As preparations for spring field operations are underway, producers need to stop and think about the choice of tillage system, given the challenges faced with energy prices and the associated cost of conventional tillage operations. Primary tillage, such as with a chisel plow or subsoiler, often requires 1–1.5 gallons of fuel per acre or more. A secondary tillage pass through the field with a field cultivator or disk may use 0.5 to 0.7 gallon of fuel per acre. These additional fuel costs for tillage operations, in addition to other input costs, make conservation tillage and no-tillage, in particular, a far better choice given the insignificant yield differences.

Observing the amount of tillage conducted last fall on corn stalks in some areas of the state raises a few questions. Are the tillage operations really needed after corn? If the answer to this question is based on yield improvement, then the answer is no. Results from a long-term tillage study established in 2003 on eight research farms across Iowa to evaluate the effect of five tillage systems including no-till, strip-tillage, chisel plow, deep-rip, and moldboard plow with corn–soybean and

corn–corn–soybean rotations showed no significant difference between soybean yields of the five tillage systems with the two crop rotations (Figure 1). The results also showed that the economic return with no-till was greater than those of other tillage systems.

The argument of tilling corn residue to improve organic matter is unsupported by research. Studies have shown that incorporating residue with intensive tillage will do more damage by accelerating the loss of organic matter due to mineralization of organic matter and alteration of microbial activities. The addition of organic matter from incorporating residue is far less than the losses caused by degrading the soil's carbon pool. Additionally, there is greater potential loss of organic matter associated with conventional tillage due to the risk of soil erosion. In a no-tillage system, residue can decompose slowly and release nutrients more efficiently into the soil system for crop use.

Generally, tilling corn residue for the soybean crop year has no advantage in improving soybean yield. There may be some challenges in managing corn residue, but simple modification of the planter by including residue cleaners and other residue management attachments are far more cost effective than the expenses associated with conventional tillage.

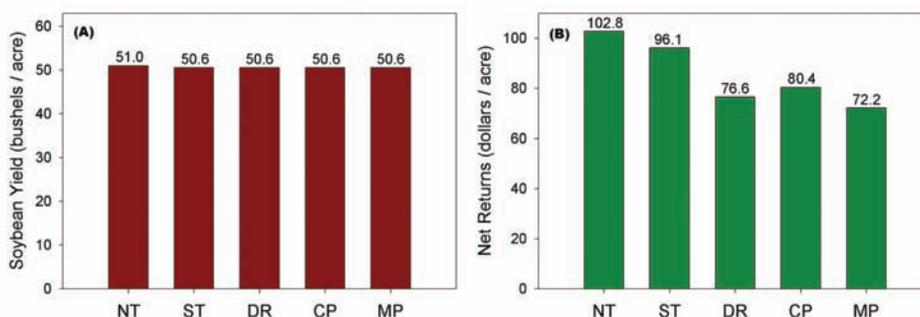


Figure 1. (A) Soybean yields and (B) net return averaged over the three years from 2003–2005 in both corn–soybean and corn–corn–soybean rotations at eight ISU outlying research farms.

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