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## No-till is Better Choice for Soybean after Corn

Mahdi Al-Kaisi

Iowa State University, malkaisi@iastate.edu

H. Mark Hanna

Iowa State University, hmhanna@iastate.edu

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# No-till is Better Choice for Soybean after Corn

## **Abstract**

The wet 2008 fall put a hold on tillage operations for many farmers, which may provide them with time to consider the use of no-tillage system for soybean after corn. Conventional tillage, whether for corn or soybean, generally has shown limited advantage in yield and economic returns. The exception is a few cases with corn that involve lack of drainage and wet, cold soil conditions.

## **Keywords**

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## No-till is Better Choice for Soybean after Corn

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

The wet 2008 fall put a hold on tillage operations for many farmers, which may provide them with time to consider the use of no-tillage system for soybean after corn. Conventional tillage, whether for corn or soybean, generally has shown limited advantage in yield and economic returns. The exception is a few cases with corn that involve lack of drainage and wet, cold soil conditions.

As preparations for spring field operations get underway, producers need to stop and think about their tillage system choices. Especially given the costs associated with conventional tillage operations – labor, fuel and equipment just to name few. Primary tillage, such as a chisel plow or deep ripping, often requires 1 to 1.5 gallons of fuel per acre, or more, than a no-till system. 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 no-tillage, a far better choice given the insignificant soybean yield differences across all tillage systems. In addition, demands on farm labor this spring may be greater than normal due to the late 2008 harvest.

### Research shows advantages to changing tillage practices

Producers that didn't complete tillage on corn stalks last fall need to have an important question answered. **Are tillage operations really needed for soybean crop following corn?** If the response to this question is based on yield improvement – the answer is no.

A long-term tillage study that began in 2002 at eight Iowa research farms evaluated 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. The results of the study show no significant difference in soybean yields for the five tillage systems and two crop rotations (Table 1).

**Table 1. Soybean yield with different tillage systems from six locations in Iowa for 2002-2008.** Soybean yields are average of six years for each site. Yield differences will be significant if they are greater than (LSD<sub>(0.05)</sub>) value.

	NW	NC	NE	SW	SC	SE
Tillage System	----- bu/acre -----					
No-till	54.2	51.8	51.4	50.5	56.6	57.6
Strip-till	54.0	50.0	52.5	50.7	55.5	57.6
Deep Rip	54.7	51.4	52.7	52.2	55.2	58.3
Chisel Plow	54.7	51.0	52.3	50.6	54.8	57.4
Moldboard Plow	55.3	51.4	52.8	49.8	57.9	59.5
LSD(0.05)	6.58	5.1	3.1	4.3	5.7	3.5
5-tillage Average	54.6	51.7	52.3	50.7	56.0	58.1

The results show soybean yields are not significantly different for all tillage systems at all the Iowa locations. In addition, the input cost of conventional tillage system for soybean production is approximately \$18 – \$25 per acre more than no-till. We find that the increase in soybean yield in most cases for conventional tillage systems does not exceed 1 bushel per acre over no-till. In addition to the economic and yield advantages for soybean production with no-till over conventional tillage, there is also significant environmental benefits associated with no-till in term of improving soil organic matter, soil quality and water quality.

The argument for tilling corn residue to improve organic matter is unsupported by research. Studies have shown that incorporating residue with intensive tillage will do more damage. This practice accelerates the loss of soil organic matter by mineralizing organic matter and altering microbial activities. The benefits to the soil from incorporating residue are far less than the damages caused by degrading the soil's organic matter. There also is a 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.

In summary, tilling corn residue for the soybean crop year does not improve soybean yield. There may be some challenges in managing corn residue, but simple modification of the planter to include residue cleaners, heavier down pressure springs, or other residue management attachments are far more cost effective than the expense associated with conventional tillage.

*Mahdi Al-Kaisi is an associate professor in agronomy with research and extension responsibilities in soil management and environmental soil science. Mark Hanna is an extension agricultural engineer in agricultural and biosystems engineering with responsibilities in field machinery.*

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