Conservation Tillage Study

RFR-A1481

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Introduction
The project goal was to compare yields of three different tillage systems on a sloping, moderately well-drained soil (Nira), and on a nearly level, poorly-drained soil (Kalona) in a continuous corn and a corn-soybean system. These plots were started in 1990 and have continued to the present.

Materials and Methods
In the chisel-disk system, the plots previously in corn are chiseled in the fall. Both corn and soybean plots in this system are spring disked and field cultivated.

In the “alternative” tillage system, the continuous corn ground is fall chiseled and then planted in the spring without further tillage. In the corn-soybean rotation, the soybeans are no-till planted in narrow rows and the corn is planted following one spring pass with a field cultivator over the soybean stubble.

No fall or spring tillage was done in the no-till system. For planting in the no-till system, the planter is equipped with a knife and coulter for the fertilizer opener and a fluted coulter and finger row-cleaning wheels for residue clearing.

Nitrogen was spring applied and an N-P-K dry fertilizer was applied with the planter. Soil tests were high to very high so a rate of P and K below crop removal was applied.

Results and Discussion
Table 1 contains the past five-year yields for each tillage system and crop sequence on both the Nira and Kalona soils. Yields prior to 2010 were summarized in previous annual reports.

During the past five years in the continuous corn, the chisel-disk system has out-yielded the no-till system by about 10 bushels/acre on the Kalona soil but only by 2.4 bushels/acre on the Nira soil. On the rotated corn, five-year yield averages have varied by only 2 bushels/acre across tillage systems on the Kalona soil and by 8.6 bushels/acre on the Nira soil.

The largest yield differences between the no-till and chisel-disk systems usually occurred in years with wet springs and perhaps less-than-ideal conditions at planting. These conditions can increase problems with sidewall or planter furrow compaction, causing yield reductions in the no-till planted corn.

Soybean yields between tillage systems were very similar. Five-year averages showed less than a 1 bushel/acre difference across tillage systems on both the Kalona soil and Nira soil. This fits with other observations that soybeans usually do not suffer the sidewall compaction problems of corn and yields are similar between tillage systems. In the past five years, the 10-in. row no-till soybeans have not shown any yield difference from the 30-in. row soybeans.
Table 1. Yield results for Kalona and Nira Soils.

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<th>Kalona soil</th>
<th>Nira soil</th>
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<td>Corn on corn yield - bu/acre</td>
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<td></td>
<td>No-till</td>
<td>Alternative</td>
<td>Chisel-disk</td>
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<td>2010</td>
<td>178</td>
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