Evaluation of Tillage Systems Following Soybeans for Field Corn

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Objectives
To compare population and yield of field corn under four tillage systems following soybeans.

Background

Cooperator: Farm Focus, Inc.
County: Van Wert
Soil Type: Hoytville clay
Drainage: Systematic tile
Previous Crop: Soybeans
Tillage: Variable (see Methods)
Fertilizer: 235 lb./A 6-26-30 2X2 banded at planting
190 lb./A nitrogen sidedressed as 28% UAN (May 28, 2004)
Herbicides:
PRE (April 20): 4 qt./A Fieldmaster + 0.55 lb./A Atrazine 90DF + 22 oz./A Roundup WeatherMax + 17 lb./100 gal. AMS
Insecticide: None applied
Hybrid: Beck’s Hybrids 5322 CB
Row Width: 30 inch
Planting Rate: 29,680 seeds/A
Planting Date: April 19, 2004
Harvest Date: October 12, 2004

Methods

Four tillage systems were replicated four times in a randomized complete block design. The four tillage systems included no-till, fall strip-till, fall deep till followed by spring field cultivate, and a shallow fall disking. Strip-till was performed on October 24, 2003, by using a six row 30 inch Trail Blazer strip till machine 9-10 inches deep. The fall deep till/spring cultivate treatment consisted of using an M&W Earthmaster disk/ripper 12 inches deep on October 24, 2003; followed by a spring field cultivation three inches deep with two passes of a Wilrich C-shank field cultivator on April 19, 2004. A three inch deep shallow disking was performed on October 24, 2003 with an International #37 disk. The study was planted using a John Deere 7000 Maxemerge six row planter. Each individual plot contained 12 rows 1,025 feet in length.

Percent residue was determined post-plant on April 28 by using a USDA-NRCS Crop Residue Management Kit. Early emergence populations (May 11, corn stage V1) and harvest populations (September 30) were estimated by counting the number of plants on each side of a 17.5 feet tape at three different locations in each individual plot. The average number of plants counted per 17.5 feet was converted to plants per acre. Yields were collected from one combine round (12 rows) in each plot. Individual plot weight and moisture was determined using a calibrated AgLeader PF3000 yield monitor in a John Deere 6620 combine. Yields reported in this study have been adjusted to a 15% moisture standard.
Results

Table 1. Crop residue, population, moisture and yield means

<table>
<thead>
<tr>
<th>Tillage Treatment</th>
<th>Crop Residue (%)</th>
<th>Emergence Population (plants/A)</th>
<th>Harvest Population (plants/A)</th>
<th>Harvest Moisture (%)</th>
<th>Yield (bu/A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strip-till</td>
<td>23.6 b</td>
<td>29,900</td>
<td>29,000</td>
<td>15.9</td>
<td>196.7 a</td>
</tr>
<tr>
<td>No-till</td>
<td>32.1 a</td>
<td>29,700</td>
<td>28,800</td>
<td>16.0</td>
<td>192.5 a</td>
</tr>
<tr>
<td>Fall disk</td>
<td>17.9 c</td>
<td>29,600</td>
<td>28,700</td>
<td>15.9</td>
<td>192.8 a</td>
</tr>
<tr>
<td>Fall deep till/spring cultivate</td>
<td>3.4 d</td>
<td>30,000</td>
<td>28,700</td>
<td>15.9</td>
<td>185.9 b</td>
</tr>
</tbody>
</table>

LSD (0.05) 4.5 NS NS NS 5.3
F-test 72.4 <1 <1 <1 7.5
CV(%) 14.8 1.7 2.7 <1 1.7

1Means followed by the same letter in same column are not significantly different
NS = not significant

Table 2. Yield means by year.

<table>
<thead>
<tr>
<th>Tillage Treatment</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strip-till</td>
<td>188.5 ab</td>
<td>101.7 b</td>
<td>167.1 a</td>
<td>196.7 a</td>
</tr>
<tr>
<td>No-till</td>
<td>192.6 a</td>
<td>97.8 c</td>
<td>192.5 a</td>
<td></td>
</tr>
<tr>
<td>Fall disk</td>
<td>185.2 bc</td>
<td>100.0 bc</td>
<td>192.8 a</td>
<td></td>
</tr>
<tr>
<td>Fall deep till/spring cultivate</td>
<td>183.2 c</td>
<td>114.2 a</td>
<td>171.9 a</td>
<td>185.9 b</td>
</tr>
</tbody>
</table>

1Means followed by the same letter in same column are not significantly different

Summary

This is the third year for conducting this tillage trial at Farm Focus. Data from 2004 suggests that there were statistically significant yield differences among the tillage systems compared, with conventional fall deep tillage/spring field cultivation yielding the lowest. In each of the years this trial has been conducted there have been statistical yield differences between some of the tillage treatments. As Table 2 indicates, the treatment with the highest yield differs from year to year with no single treatment always out yielding the others. Observations during the 2002 trial indicated significant dandelion pressure in the strip-till, no-till, and fall disked treatments as a possible reason for yields that were lower than the fall deep tillage/spring field cultivated plots where spring tillage helped control weeds.

The results from these 3 years of four tillage comparisons, plus the comparison of conventional deep tillage to strip-tillage in 2003, would indicate that none of the tillage methods tested provided a consistent yield advantage over the others. Individual results for each year can be accessed on the Farm Focus website (www.farmfocusshow.com/research.htm). The tillage cost savings that may be realized in the no-till and reduced tillage methods (strip-till and fall disking only) as compared to conventional tillage must be weighed against the cost of any additional herbicides needed to control weeds in these tillage systems. This will vary based upon each individual farm’s weed pressures.
Acknowledgement

The authors express appreciation to Van Wert SWCD and NRCS for technical assistance with this study. Also, to Beck’s Hybrids for supplying the seed, and Monsanto for supplying the herbicides used in this trial.

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