No-tillage, Strip-tillage, and Chisel Plow Tillage Trial

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Abstract
Farmers in central and north central Iowa are often criticized for low adoption of no-tillage systems. No-tillage is often faulted with cooler, wetter soils and subsequently reduced yields. An alternative to conventional tillage and no-tillage systems is strip-tillage where the benefits of both are combined.

Keywords
RFR A12119

Disciplines
Agricultural Science | Agriculture | Agronomy and Crop Sciences

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No-tillage, Strip-tillage, and Chisel Plow Tillage Trial

RFR-A12119

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Introduction
Farmers in central and north central Iowa are often criticized for low adoption of no-tillage systems. No-tillage is often faulted with cooler, wetter soils and subsequently reduced yields. An alternative to conventional tillage and no-tillage systems is strip-tillage where the benefits of both are combined.

Materials and Methods
This trial was conducted in 2011 with the strip-tillage and chisel plow tillage being applied in the falls of 2010 and 2011. In both the strip-tillage and chisel plow treatments, 200 lb N/acre was applied as anhydrous ammonia at the same time as tillage. Urea ammonium nitrate was applied at the rate of 200 lb N/acre at V5 stage corn for the no-tillage treatment. No additional phosphorus and potassium was applied based on soil test levels for the plot area. Pioneer 33W84 was planted on May 6, 2011 at 34,000 seeds/acre.

On May 14, 2012, Pioneer 1162AM was planted at 36,000 seeds/acre. In both years the prior crop was corn. Each plow was 30 ft wide by 450 ft long.

Yields were collected using a John Deere 9410 with a Harvest Master weigh system. Additional data collection included residue cover at planting, emergence rate index, spring and fall plant population counts, plant height at V6, and grain moisture.

Results and Discussion
The results of this trial indicate spring and fall plant populations were not significantly different between the tillage systems. Early season plant height at the sixth leaf stage indicated better early season growth from the strip-tillage system compared with the no-tillage system in both years.

Any slight advantage that early season growth had for the strip-tillage system did not result in significant grain yield differences between tillage systems in 2011. However, yields were significantly greater for strip-tillage and conventional tillage compared with no-till in 2012.

Table 1. Residue cover, spring and fall plant populations, emergence rate index, early season plant height, grain moisture and grain yield for three tillage systems at the ISU Johnson Farm south of Ames, Iowa in 2011 and 2012.

<table>
<thead>
<tr>
<th>Year</th>
<th>Treatment</th>
<th>Residue cover (%)</th>
<th>Spring plant population (plants/acre)</th>
<th>Emergence rate index</th>
<th>Plant height (in.)</th>
<th>Fall plant population (plants/acre)</th>
<th>Grain moisture (%)</th>
<th>Grain yield (bu./ac)</th>
<th>Pr &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>No-tillage</td>
<td>76 25</td>
<td>31,875</td>
<td>10.6</td>
<td>17.5</td>
<td>30,438</td>
<td>21.9</td>
<td>168.4</td>
<td>0.001</td>
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<tr>
<td></td>
<td>Strip-tillage</td>
<td>71 25</td>
<td>32,625</td>
<td>12.5</td>
<td>21.9</td>
<td>30,750</td>
<td>19.1</td>
<td>165.1</td>
<td>0.89</td>
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<tr>
<td></td>
<td>Conv. tillage</td>
<td>24 25</td>
<td>30,625</td>
<td>10.8</td>
<td>20.0</td>
<td>29,375</td>
<td>19.7</td>
<td>172.6</td>
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<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>2012</td>
<td>No-tillage</td>
<td>48 25</td>
<td>32,380</td>
<td>12.0</td>
<td>18.0</td>
<td>36,000</td>
<td>23.1</td>
<td>154.6</td>
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<tr>
<td></td>
<td>Strip-tillage</td>
<td>27 25</td>
<td>37,000</td>
<td>15.1</td>
<td>22.3</td>
<td>33,500</td>
<td>21.9</td>
<td>172.7</td>
<td>0.89</td>
</tr>
<tr>
<td></td>
<td>Conv. tillage</td>
<td>15 25</td>
<td>35,000</td>
<td>14.2</td>
<td>21.6</td>
<td>33,500</td>
<td>22.3</td>
<td>173.3</td>
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<td>0.050</td>
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