Drainage and Tillage Effect on Corn Production

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Objective

To evaluate the effect of soil drainage and tillage on corn production.

Background

Cooperator: O.A.R.D.C. NW Branch
County: Wood
Nearest Town: Hoytville
Drainage: see below
Soil type: Hoytville, clay
Tillage: see below
Previous Crop: soybean
Variety: Pioneer PO518XR
Soil test:

Fertilizer: 150 # 18-46-0, sidedress 28% N @ 50 Gal/ac
Planting Date: 4-21-10
Planting Rate: 30,000
Row Width: 30 in
Herbicides: Lexar, Princep, 2,4-D, Glyphosate, AMS
Harvest Date: 9-27-10

Methods

The entries were replicated eight times in a randomized complete block design. Plot size- 10 feet x 60 feet each entry. Harvest data collected from center rows. The same crop was planted on all treatments on the same day, using the same variety, fertility, and herbicide.

Drained plots have subsurface tile drainage spaced 20 feet apart compared to undrained plots which do not have subsurface drainage. Both sets of drainage plots contain four identical tillage treatments.

1. Continuous no-till
2. Fall Strip Tillage – a 6 in deep mole knife with mounding coulters
3. Fall Zone Tillage – a 12 to 18 inch deep straight shank subsoiler, no further tillage
4. Fall chisel plow – followed by fall rotterra finish tillage

Rainfall at this location:

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>long term average</th>
</tr>
</thead>
<tbody>
<tr>
<td>June</td>
<td>3.96 in</td>
<td>3.7 in</td>
</tr>
<tr>
<td>July</td>
<td>2.37 in</td>
<td>3.8 in</td>
</tr>
<tr>
<td>August</td>
<td>1.68 in</td>
<td>3.0 in</td>
</tr>
<tr>
<td>Total</td>
<td>8.01</td>
<td>10.5</td>
</tr>
</tbody>
</table>
## RESULTS

### 2010 Corn Yields bushels / acre

<table>
<thead>
<tr>
<th>Drainage</th>
<th>Tillage</th>
<th>Yield</th>
<th>Significance</th>
<th>LSD (0.10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drained</td>
<td>No-till</td>
<td>135.6</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Undrained</td>
<td>No-Till</td>
<td>108.9</td>
<td>B</td>
<td>(9.0)</td>
</tr>
<tr>
<td>Drained</td>
<td>Strip-till</td>
<td>140.0</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Undrained</td>
<td>Strip-till</td>
<td>110.1</td>
<td>B</td>
<td>(5.5)</td>
</tr>
<tr>
<td>Drained</td>
<td>Zone-till</td>
<td>135.7</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>Undrained</td>
<td>Zone-till</td>
<td>125.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drained</td>
<td>Chisel Plow</td>
<td>128.5</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Undrained</td>
<td>Chisel Plow</td>
<td>92.4</td>
<td>B</td>
<td>(15.9)</td>
</tr>
</tbody>
</table>

### Summary

This experiment has been conducted for over 20 years. The corn was planted timely (April 21) and an extremely wet month of May showed the importance of good drainage in corn production. In 2010 corn yield was significantly better with drainage in the No-till, Strip-till, and chisel plow treatments compared to undrained. The undrained zone till treatments allowed the soil to also have a loose soil structure which enhances drainage.

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