Tillage & Drainage Effect on Soybean Production

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Objective
To evaluate the effect of tillage system and soil drainage on soybean 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: corn
Variety: Pioneer 92M91
Soil test:

Fertilizer: fall 2010, 200 lb/ac 10-26-26
Planting Date: 6-6-11
Planting Rate: 180,000 seed/ac
Row Width: see below
Herbicides: Envive, 2,4-D ester, Honcho, Roundup weathermax, choice, AMS
Harvest Date: 10-17-11

Methods
The entries were replicated six times in a randomized complete block design. Entries were on drained and undrained ranges. Plot size- 10 feet x 60 feet each entry. Harvest data collected from center 13 feet of 20 feet entries. The same crop was planted on all treatments on the same day, using the same variety, fertility, and herbicide. This plot has been in the same tillage treatments for over 20 years in a corn / soybean rotation. Tillage treatments remain in the same location throughout this time.

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 three identical tillage treatments which were conducted during fall 2010 in corn residue.

1. No-till (Continuous no-till)
2. Chisel Plow (followed by fall power harrow finish tool)
3. Zone Tillage – a 12 to 18 inch deep straight shank subsoiler

Rainfall at this location:

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>long term average (29 year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>June</td>
<td>1.40 in</td>
<td>3.6 in</td>
</tr>
<tr>
<td>July</td>
<td>4.29 in</td>
<td>3.8 in</td>
</tr>
<tr>
<td>August</td>
<td>3.74 in</td>
<td>3.0 in</td>
</tr>
<tr>
<td>Total</td>
<td>9.43 in</td>
<td>10.4 in</td>
</tr>
</tbody>
</table>
RESULTS

2011 Soybean Yields - bushels / acre

<table>
<thead>
<tr>
<th>Drainage</th>
<th>Tillage</th>
<th>Yield</th>
<th>Significance P = (.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drained</td>
<td>No-till</td>
<td>65.8</td>
<td></td>
</tr>
<tr>
<td>Undrained</td>
<td>No-till</td>
<td>65.6</td>
<td>NS</td>
</tr>
<tr>
<td>Drained</td>
<td>Chisel Plow</td>
<td>60.3</td>
<td></td>
</tr>
<tr>
<td>Undrained</td>
<td>Chisel Plow</td>
<td>57.3</td>
<td>NS</td>
</tr>
<tr>
<td>Drained</td>
<td>Zone Tillage</td>
<td>65.4</td>
<td></td>
</tr>
<tr>
<td>Undrained</td>
<td>Zone Tillage</td>
<td>68.6</td>
<td>NS</td>
</tr>
</tbody>
</table>

Summary

In 2011 soybean yield as influenced by drainage was not significantly different when comparing the same tillage system.

Because of an extremely wet May, soybeans were planted later than usual (June 6) and the soil moisture was essentially at field capacity below planting depth. Then rainfall during June was 2.2 inches below normal. A drier growing season tends to negate the usual yield advantage resulting from good subsurface drainage.

Historically, subsurface drainage increased soybean yields about 5%, far less than for corn.

Acknowledgement

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