Soybean Tillage and Response to Fertilizer Research

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Soybean tillage study

G. Endres and P. Hendrickson
May 17 soybean planting date
Soybean plant development differences among tillage systems, Carrington, 2005-06 and 2009*.

*Statistically significant (LSD=0.05): emergence=2006 and 2009; maturity (R8)=2009.
Soybean plant stand differences among tillage systems, Carrington, 2005-06 and 2009*.

*Statistically significant (LSD=0.05): 2009.
Carrington, 2009
Spring P soil analysis: 9 ppm
Fertilizer placement treatments:
1. untreated check (ST)
2. spring mid-row band (ST)
3. spring in-furrow (ST)
4. spring 2x2 band (ST, conv till, NT)

2x2 10-34-0 placement in no-till during planting

6 gpa 10-34-0

in-furrow 10-34-0 placement in strip till during planting
Strip till soybean plant development differences among fertilizer placement, Carrington, 2009*.

*Strip till=Oct 31, 2008; soybean planted May 22; 6 gal/A 10-34-0; Statistically significant (LSD=0.05): emergence=1; R8=1.
Strip till soybean stand among fertilizer placement, Carrington, 2009*.

<table>
<thead>
<tr>
<th>Plants/acre (x1000)</th>
<th>untreated</th>
<th>in-furrow</th>
<th>2x2</th>
<th>mid-row</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSD (0.05)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Strip till=Oct 31, 2008; soybean planted May 22; 6 gal/A 10-34-0; Stand counts taken June 10.
Strip till soybean yield among fertilizer placement, Carrington, 2009*.

*Strip till=Oct 31, 2008; Dairyland Seeds'401RR’ planted May 22; 6 gal/A 10-34-0.
Irrigated soybean response to liquid fertilizer (10-34-0), Carrington, 2007*.

<table>
<thead>
<tr>
<th>10-34-0 at 8 gpa</th>
<th>Final stand</th>
<th>Seed yield</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Application method</strong></td>
<td><strong>plt/A</strong></td>
<td><strong>bu/A</strong></td>
</tr>
<tr>
<td>untreated check</td>
<td>116,535</td>
<td>48.6</td>
</tr>
<tr>
<td>broadcast</td>
<td>112,220</td>
<td>47.4</td>
</tr>
<tr>
<td>2x2</td>
<td>111,225</td>
<td>49.3</td>
</tr>
<tr>
<td>in-furrow</td>
<td>103,920</td>
<td>47.8</td>
</tr>
<tr>
<td><strong>LSD 0.05</strong></td>
<td><strong>NS</strong></td>
<td><strong>NS</strong></td>
</tr>
</tbody>
</table>

*Soil P = 11 ppm (med); conventional till; ‘NT-0090 RR’ soybean planted in 30-inch rows on June 6.

G. Endres and P. Hendrickson
Dryland soybean response to liquid fertilizer (10-34-0), Carrington, 2008*.

<table>
<thead>
<tr>
<th>10-34-0 (gal/A)</th>
<th>Final stand</th>
<th>Seed yield</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Application method</strong></td>
<td>1000 plt/A</td>
<td>bu/A</td>
</tr>
<tr>
<td>untreated check</td>
<td>187.5</td>
<td>32.8</td>
</tr>
<tr>
<td>2x2 (4)</td>
<td>188.6</td>
<td>33.5</td>
</tr>
<tr>
<td>in-furrow (4)</td>
<td>33.2</td>
<td>24.5</td>
</tr>
<tr>
<td>in-furrow (8)</td>
<td>20.6</td>
<td>18.9</td>
</tr>
<tr>
<td><strong>LSD 0.05</strong></td>
<td>16.5</td>
<td>4.3</td>
</tr>
</tbody>
</table>

*Soil P = 17 ppm (v. high); ‘DSR0401’ soybean direct planted in 30-inch rows on May 21.
Phosphate Inoculants

• Contain soil fungus which acidifies immediate environment

• Crop response in soils with:
  1. >7 pH
  2. free carbonates (coated or ‘occluded’ P)
  3. > med P

➢ Up to 10 lb/acre P2O5 can be released for use by crop
Phosphate Inoculants

- NDSU research:
  - Soybean: 6 site-yr at Carrington (2002-06) = no yield response
What can we do to profitably increase soybean seed yield and quality besides using best management practices?
Recent CREC research work (2005-09) with special soybean inputs ...

- farmer fertilizer blend
- Quickroots; Liquid sufl/can/soy mix*
- **Headline**
- 9.5-0-0-4+10Zn
- Max-In; Max-In MnNF
- X-tra Power; Sugar Mover
- UAN
- MegaGro; HappyGro
- SeedProd; CropProd
- BTN+; T1
- BioForge; Golden Harvest Plus GA
- NBS
- **CoRon**; zinc
- sugar
- N-Hibit; ProAct

- 6-0-0+9Zn*
- experimental foliar LCO*
- Micro500*; Sure-K*
- Soil Builder; Ag blend
- Winfield Solutions experimentals (5)*

*foliar products used in ’09 trial
Special foliar inputs for soybean, Carrington, 2009.

*(irrigated; 14 trts vs untreated check ; 4 reps)*

**Soil**
- adequate nutrient levels (med or higher) except chloride (low)
- 7.5 pH; 3.8 organic matter; low soluble salts

**Application timing**
- V3 and/or R2-3 soybean stages
  1. Fertilizers
  2. Fungicides
  3. Growth promoters

- Yield of untreated check = 51.2 bu/acre

- no yield increase with any treatment
## Soybean performance with special inputs, Carrington, 2005-09.

<table>
<thead>
<tr>
<th>Year</th>
<th>Environment</th>
<th>Number of treatments</th>
<th>Yield of untreated check</th>
<th>Seed yield</th>
<th>Test weight</th>
<th>Protein</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>bu/A</td>
<td>bu/A</td>
<td>lb/bu</td>
<td>%</td>
</tr>
<tr>
<td>2005</td>
<td>dryland</td>
<td>16</td>
<td>36.7</td>
<td>*</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>2006</td>
<td>dryland</td>
<td>21</td>
<td>26.2</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>2007</td>
<td>irrigated</td>
<td>15</td>
<td>58.0</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>2008</td>
<td>irrigated</td>
<td>16</td>
<td>47.3</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>2009</td>
<td>irrigated</td>
<td>15</td>
<td>51.2</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

\(^1\) *=statistically significant (0.05); NS = no difference in yield compared to utc.

Endres et al.
Soybean special input study, CREC, 2005-09: Seed yield with selected products*.

No statistical difference (LSD 0.05) among products and years.

Endres et al.
Soybean intensive mgmt study, CREC, 2008-09: Seed yield and economics with foliar inputs*.

*V2-3: micro mix + LCO promoter fb R2-3: fungicide

Endres, Kandel et al.
Soybean seed and/or foliar application of nutrients, fungicides, and other special inputs?

- **NDSU research...**
  - Minimal and inconsistent yield/quality response → no recommendations on use
  - Will continue trials in future
- **On-farm test with low acreage and untreated checks**
Questions or Comments?