Organic no-till soybeans
Arlington Agricultural Research Station WI
2017 / 2018 Research updates

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OGRAIN Conference, Madison WI, Jan 2019

Site description

Very deep and well drained
65% Silt
27% Clay
8% Sand
4% OM

I. Cover-Crop Based Rotational Tillage System

Fallow | Small grain | Corn silage | Soybeans
---|---|---|---
Roger Schmidt (rwschmidt@wisc.edu)

• Initiated fall 2016
• 4 x 6 acres fields
• 15 x 200 ft per treatment
• Manure as main source of nutrients

No-till soybeans

2017
• Cover crops
  Rye – Aroostook and Spooner
  Triticale – NE426GT and 815
  No cover
• Planting strategy
  Early planted vs. Late planted
• Cover crop termination
  (early planted only)
  At cover-crop anthesis
  At soybean’s V1 stage

2018
• Cover crops
  Rye – Aroostook and Spooner
  Triticale – NE426GT
  Wheat - Emerson
  No cover
• Planting strategy
  Early planted vs. Late planted
  Early planted vs. Early drilled
• Closing wheels (late planted only)
  M-Series Curvetine™ (Dawn equipment)
  6200 Paddle™ (Heter farming equipment)
  Martin Spikes (Martin-Till)
Three closing wheels

6200 Paddle™ (Yetter farm equipment)
Martin Spikes (Martin-Till)
M-Series Curvetine™ (Dawn equipment)

=> No impact on soybean stand count in 2018

Field operations

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th>2018</th>
<th>Specs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cover crop planting</td>
<td>(2016) Sept 19th - triticale Sept 26th - rye</td>
<td>(2017) Oct 2nd</td>
<td>3bu/acre = 2.5 to 3.5 M spa</td>
</tr>
<tr>
<td>Early soybean planting</td>
<td>May 12th – rye &amp; no cover May 20th – triticale</td>
<td>May 24th – rye &amp; no cover May 29th – triticale June 4th – wheat</td>
<td>20 days 13 days</td>
</tr>
<tr>
<td>Late soybean planting</td>
<td>June 1st – rye &amp; no cover June 8th - triticale</td>
<td>June 6st – rye &amp; no cover June 11th - triticale June 14th - wheat</td>
<td>225,000 spa</td>
</tr>
</tbody>
</table>

Crimping winter wheat?

‘Emerson’ wheat
11 days after crimping
June 25th

‘Aroostook’ rye
19 days after crimping
Key results

Rye vs. Triticale vs. No cover. Late planted treatments only.

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomass(lbs DM/ac)</td>
<td>/</td>
<td>11,212</td>
</tr>
<tr>
<td>Stand (plants/ac)</td>
<td>148,000</td>
<td>183,666</td>
</tr>
<tr>
<td>Weed Biomass (lbs DM/ ac)</td>
<td>0</td>
<td>208</td>
</tr>
<tr>
<td>Yields (bu/ac 13% moist.)</td>
<td>48</td>
<td>53</td>
</tr>
<tr>
<td>Volunteer y + 1 (no heads/ ac)</td>
<td>0</td>
<td>13,411</td>
</tr>
</tbody>
</table>

Key results

Early vs. late – no-till Aroostook treatments only

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stand (plants/ac)</td>
<td>82,666</td>
<td>128,917</td>
</tr>
<tr>
<td>Weed Biomass (lbs DM/ ac)</td>
<td>208</td>
<td>35</td>
</tr>
<tr>
<td>Yields (bu/ac 13% moist.)</td>
<td>33</td>
<td>53</td>
</tr>
<tr>
<td>Volunteer y+1 (no heads/ ac)</td>
<td>13,411</td>
<td>/</td>
</tr>
</tbody>
</table>

Key results

Early planted vs. Early drilled – all no-till treatments

<table>
<thead>
<tr>
<th></th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stand (plants/ac)</td>
<td>140,278</td>
</tr>
<tr>
<td>No trifoliate leaf/ plant</td>
<td>16</td>
</tr>
<tr>
<td>Weed Biomass (lbs DM/ ac)</td>
<td>661</td>
</tr>
<tr>
<td>Yields (bu/ac 13% moist.)</td>
<td>42*</td>
</tr>
</tbody>
</table>

*Planted treatment harvested with a 2 row plot combine, drilled treatments with Gleaner combine
Mowing between the rows?

Dawn equipment «row-mow» first prototype’s trial, July 3rd 2018

II. No-till soybean variety trial

3 varieties of soybeans
- O.1706N - Albert Lea Seeds – 1.7 maturity group
- BR 17C2 - Blue River – 1.7 maturity group
- Bluestem 1809N - Bluestem Farm Supply, LLC – 1.8 maturity group

2 cover crops, one control
- ‘Spooner’ rye
- ‘NE426GT’ triticale
- No cover

Dawn ZRX roller/crimper

Roger Schmidt (rwschmidt@wisc.edu)

Variety trial - Results

<table>
<thead>
<tr>
<th>Cover crop planting date</th>
<th>Stand (plants/ac)</th>
<th>Yield (Bu 13% moist.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 15, 2017</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cover crop biomass</th>
<th>AL O.1706N</th>
<th>48 a</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 7,794 lbs DM/ac rye</td>
<td>148,926 a</td>
<td></td>
</tr>
<tr>
<td>- 9,735 lbs DM/ac triticale</td>
<td>150,148 a</td>
<td>48 a</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Soybean planting date</th>
<th>Stand (plants/ac)</th>
<th>Yield (Bu 13% moist.)</th>
<th>Bushels/10,000 plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>- June 1st, 2018 rye &amp; no cover</td>
<td>182,407 a</td>
<td>51 a</td>
<td>2.8</td>
</tr>
<tr>
<td>- June 4th, 2018 triticale</td>
<td>103,111 c</td>
<td>51 a</td>
<td>4.9</td>
</tr>
<tr>
<td>NE426GT</td>
<td>152,629 b</td>
<td>45 b</td>
<td></td>
</tr>
</tbody>
</table>
**Next steps**

**Conservation Innovation Grant** - “Innovations in Cover Crop-Based Organic No-Till Systems to Improve Soil Health and Nutrient Management”

- **3 growing seasons** (2019 – 2021); **2 crops** – corn and soybeans
- **9 locations** - farms and research stations
  - University of Wisconsin – Madison - Dr. Brian Luck & Dr. Erin Silva
  - Arlington and Marshfield agricultural research stations
  - Grand Marsh, Cuba City, Evansville and East Troy
  - Rodale Institute – Pennsylvania - Jeff Moyer
  - Iowa State University - Dr. Kathleen Delate

**Next steps**

**Conservation Innovation Grant** - “Innovations in Cover Crop-Based Organic No-Till Systems to Improve Soil Health and Nutrient Management”

- **Termination trial**
  - Cover crop planting date September vs. October
  - Rodale roller crimper vs. Dawn roller crimper vs. Both vs. Mower + Tedder
  - Roller crimper followed by flame weeder or not
- **Planter trial**
  - Two closing wheels
  - With or without row cleaners
  - Straight vs. wavy coulters
  - Heavy or light down pressure

**North Central Region SARE Grant** – “A Decision Support Tool for Adaptive Management of Cereal Rye in No-till Organic and Conventional Soybeans.”

- University of Illinois/USDA, Purdue, UW-Madison, non-profits and consultants
- Model variability in cereal rye biomass across regions and growing conditions

Thank you for your attention

Contact - vrewecke@wisc.edu
Web - https://ograin.cals.wisc.edu
Early planted | Late planted

<table>
<thead>
<tr>
<th>Variety</th>
<th>Early planted</th>
<th>Late planted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spooner Rye</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aroostook Rye</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emerson Wheat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Cover</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NE426GT Triticale</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Drone view, September 11, 2018 - Roger Schmidt (rwschmidt@wisc.edu)