Reducing Tillage in Organic Grain Systems

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Equipment Considerations
Challenging seedbed conditions for planting equipment

**Spring-tilled soil seedbed**
- Lower bulk density
- Generally lower soil moisture
- Less temperature buffering
- Minimal crop residues, roots, surface mulch

**No-till soil seedbed**
- Harder soil, more compaction
- Variable soil moisture
- Buffered soil temperature, can be cooler
- Thick cereal rye surface mulch
- Extensive, fibrous cereal rye roots

Ryan 2020
Equipment Considerations
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Rolling-crimping equipment

I&J Manufacturing, Gordonville, PA
Custom equipment fabrication
Dawn Equipment, ZRX Roller, Sycamore, IL

Ryan 2020
Equipment Considerations

Opening system

1. Do NOT use row cleaners
2. Adequate downforce on row unit via parallel linkage arms is imperative
3. Dynamic downforce is preferred (e.g. hydraulic)
4. Coulters?
Equipment Considerations

Even seed singulation and seeding depth
No-till Corn
Organic corn no-till planted into hairy vetch terminated with a roller-crimper in Pennsylvania
No-till Corn

• **Cover Crop 1 (Sept 13)**
  - Winter rye (65/90lbs/ac) + Austrian winter peas (45/70lbs/ac)
  - Peas winter-killed
  - April 20 - Medium Red Clover (13lbs/ac)

• **Cover Crop 2**
  - Medium red clover (14 lbs/ac) underseeded with small grain in spring 2018
No-till Corn

• **Field 1 – Termination trial**
  • Cover crop 1
    • Sickle bar mower
    • 2 Roller Crimpers
    • Crimping once vs. Twice
    • Row cleaner – yes or no
  • Cover crop 2
    • Undercut

• **Field 2 – Planter trial**
  (2012 – 2018) Alfalfa
  • Cover crop 1
  • Coulter – yes or no
  • Down pressure – high or low
  • 2 Closing wheels
Army worm and moth
June 6 – Medium Red Clover Undercutting
July 1 – Corn & Medium Red Clover
July 12 – Corn & Medium Red Clover
July 12 – Mowing Between Rows
Interseeded Cover Crops into Corn
Soybeans & Spring Planted Rye

In order to go through reproductive development stages rye needs to « vernalize » = be exposed to low temperatures

- Rye – 2 bu/ac
- Soybeans – 225,000 seed/ac
## Soybeans & Spring Planted Rye

**2019**

<table>
<thead>
<tr>
<th>Crop</th>
<th>5 days</th>
<th>Same day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereal rye</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter wheat</td>
<td></td>
<td>May 31</td>
</tr>
<tr>
<td>Soybean</td>
<td>June 5</td>
<td>June 5</td>
</tr>
<tr>
<td>Tine weeder</td>
<td></td>
<td>June 14 &amp; 21</td>
</tr>
</tbody>
</table>
Soybeans & Spring Planted Rye

2019

Weed Biomass (lbs dm/ac)

- Control Late: 105 b
- Rye Same Day: 116 b
- Wheat Same Day: 392 b
- Control Early: 445 b
- Wheat 5 days: 873 ab
- Rye 5 days: 1913 a
## Soybeans & Spring Planted Rye

### 2019

<table>
<thead>
<tr>
<th>Stand Count (Plant/AC)</th>
<th>Yields (Bu/AC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rye/ Wheat 5 Days</td>
<td>Control Early 54 a</td>
</tr>
<tr>
<td>Rye/ Wheat Same Day</td>
<td>Rye Same Day 52 ab</td>
</tr>
<tr>
<td>Control</td>
<td>Control Late 50 ab</td>
</tr>
<tr>
<td></td>
<td>Wheat Same Day 46 ab</td>
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<tr>
<td></td>
<td>Rye 5 Days 41 ab</td>
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<tr>
<td></td>
<td>Wheat 5 Days 35 b</td>
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</tbody>
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Thank you