Organic Systems Trial

Transitional Grain Systems
Crop Rotation

- Crop 1: Soybeans/ Spelt
- Crop 2: Spelt/Red Clover
- Crop 3: Corn
- Repeat
- Entry Point 1 starts with soybeans; EP 2 starts with corn
Experimental Design

- Five treatments, 4 replications
- Two entry points:
  - 2005, Entry Point 1—soybeans
  - 2005, Entry Point 2—corn
Approximate total fertility inputs

Conventional corn
- 111-40-40 (N-P-K)

Organic corn
- 168-65-96
- Treatment 1—268-77-156
- Only partially available the first year

Soybeans—none
How were organic systems treated differently in 2005?

- **EP 1**—soybeans
  Systems 1 and 3 received gypsum, 400 #/acre
  Systems 1 and 2 cultivated twice; systems 3 and 4 cultivated three times
  System 4 ridged with ridge-till cultivator

- **EP 2**—corn
  System 1 received extra compost, 10 tons/acre (fresh weight)
  Systems 1 and 3 received gypsum, 400 #/acre
  System 4 ridged with ridge-till cultivator
  Systems 1, 3 and 4 underseeded with rye and spelt
System 1

- This system simulates a farm where the goals are to maximize income via high fertility inputs. Compost is the primary nutrient and organic matter input. Cover crops used to retain N over winter.

- Standard tillage & cultivation tools
System 2

- This system simulates a typical cash grain farm with limited nutrient inputs. No extra fertilizer or cover crops.

- Standard tillage & cultivation tools
System 3

- This system simulates a cash grain farm with limited nutrient inputs but heavier emphasis on weed management. Winter cover crops used to help suppress weeds.

- Standard tillage & enhanced cultivation tools; use of fallows, stale seedbed techniques.
System 4

- This system relies on a ridge tillage and cultivation program. This will allow for reduced heavy tillage and controlled field traffic. Winter cover crops used to enhance soil health.
System 5

- Conventional system using standard tillage, seed treatments, fertilizers, and herbicides. No winter cover crops.

- Same varieties and certified organic seed as other treatments

- These plots are separated from the other treatments by a 50 foot buffer
2005 Results
(So far)
Soybean stand

- Treatment 1: 112,000 c
- Treatment 2: 117,000 bc
- Treatment 3: 121,000 bc
- Treatment 4: 129,000 b
- Treatment 5: 151,000 a

(different letters - statistically different)

Difference between conventional (5) and others was due to mortality during tine weeding in the organic treatments
Soybean yields

- Treatment 1: 38 bu/acre
- Treatment 2: 37
- Treatment 3: 40
- Treatment 4: 35
- Treatment 5: 38

(not statistically different)
Corn stand

- Treatment 1  18,200  b
- Treatment 2  20,900  ab
- Treatment 3  17,500  b
- Treatment 4  17,800  b
- Treatment 5  23,800  a

Difference between conventional (5) and others was due to mortality during tine weeding in the organic treatments
## Corn weed biomass (g/m²)

<table>
<thead>
<tr>
<th>System</th>
<th>Annual seedlings</th>
<th>Broadleaf from root</th>
<th>Yellow Nutsedge</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>13.5</td>
<td>1.3 b</td>
<td>3.2 a</td>
<td>17.9 a</td>
</tr>
<tr>
<td>2</td>
<td>7.1</td>
<td>3.4 ab</td>
<td>5.4 a</td>
<td>15.9 a</td>
</tr>
<tr>
<td>3</td>
<td>0.6</td>
<td>0.4 b</td>
<td>4.2 a</td>
<td>5.2 ab</td>
</tr>
<tr>
<td>4</td>
<td>3.9</td>
<td>23.8 a</td>
<td>2.3 a</td>
<td>30.1 a</td>
</tr>
<tr>
<td>5</td>
<td>2.3</td>
<td>2.6 b</td>
<td>0.0 b</td>
<td>4.9 b</td>
</tr>
</tbody>
</table>
Corn Cover crop Counts, 11.08.05

Plants per Acre

Treatment

1

2

3

4

5

0

100000

200000

300000

400000

500000

600000

b

ab

a

b
Insect Results

- No differences between treatments for aboveground insects in either crop
- Soybean aphids did not exceed threshold—may have been controlled by beneficials
- Corn rootworms were not a problem in any treatment