What's the Buzz about Radishes and Brassicas?

Nitrogen Dynamics

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Cover Crop Growth

December 2006
- Oat
- OSR+Rye
- No Cover
- Rye

May 2007
- OSR+Rye
- No Cover
- Rye
- Oat
Bothwell – Cover Crops Plant N

*For each date, bars labeled with the different letters are significantly different.*
Bothwell – Cover Crop Soil N

*For each date, bars labeled with the different letters are significantly different.
Bothwell – Cover Crop PAN

*For each date, bars labeled with the different letters are significantly different.
Bothwell – Cover Crop Summary

- Cover crops were effective at conserving plant available N over the fall and into the spring compared to the no cover control.

- All covers were equally as effective in the spring.
Is there a N credit?
Bothwell – Sweet Corn PAN

Plant available N (PAN) = soil mineral N + sweet corn plant N

*For each date, bars labeled with the different letters are significantly different.
Ridgetown – Sweet Corn PAN

Plant available N (PAN) = soil mineral N + sweet corn plant N

*For each date, bars labeled with the different letters are significantly different.*
Discussion

- Cover crops may be effective at conserving N over the cover crop growing season
- Little evidence that this translated into increased PAN for the sweet corn crop
- These cover crops do not increase or decrease N fertilizer applications to the sweet corn
Impact of cover crops on PSNT soil nitrates (data from Dr. Bill Deen U of Guelph)
If there is no N credit, then why bother?

Soybeans  Fall rye  OSR+rye  No cover  Oats
Economics

Bothwell-2007

![Graph showing profit margins for different cover crop treatments.](chart)

- **Oats + N fertilizer**
- **Rye + N fertilizer**
- **Oilseed radish + rye + N fertilizer**
- **No cover crop + N fertilizer**
- **Oats + 0N**
- **Oilseed radish + rye + 0N**
- **No cover crop + 0N**
- **Rye + 0N**

**Cover Crop**

**Profit Margins ($/ha):**
- Oats + N fertilizer: a
- Rye + N fertilizer: b
- Oilseed radish + rye + N fertilizer: b
- No cover crop + N fertilizer: b
- Oats + 0N: bc
- Oilseed radish + rye + 0N: cd
- No cover crop + 0N: de
- Rye + 0N: e
Economics

Ridgetown-2008

Profit margins ($/ha)

Oilseed radish + N fertilizer
Rye + N fertilizer
Oilseed radish + 0N
Oilseed radish + rye + N fertilizer
Oilseed radish + rye + 0N
No cover crop + N fertilizer
Oats + N fertilizer
Rye + 0N
No cover crop + 0N
Oats + 0N

Cover crop
Summary on N in Brassicas

- Trap N
- No N credit
- Economics may not be a limiting factor
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Cover Crops After Cucumbers

Planting date: August 4

Photo taken: October 21
Cover Crops: Soil N

Soil Nitrate (ppm)

- no cover crop
- oats
- rye + OSR

Soil Sample Date

- July
- Sept
- Oct
Cover crops trap N in the fall

Date (2006)

Soil mineral N (kg N/ha)

- No cover
- Oats
- Rye
- OSR+rye

May  Jul  Sep  Nov  Jan
Cover crops – cucumbers

- Early planted - 1st week in August
- Late planted - 1st week in September

late vs. early peas Oct. 30
late vs. early radish Oct. 30
late vs. early oats Oct. 30
late vs. early vetch Oct. 30

Early planted - 1st week in August
Late planted - 1st week in September
Early v. Late Planting Dates

![Bar chart showing quantity of nitrogen in cover crop aboveground tissues and recoverable residue collected in the fall 2008 and 2009. Different letters indicate a statistically significant difference.]

**Figure 1.** Quantity of nitrogen in cover crop aboveground tissues and recoverable residue collected in the fall 2008 and 2009. Different letters indicate a statistically significant difference.
Cover crops – cucumbers

Income $/ha

- No cover crop
- Oats ON
- OSR ON
- Peas ON
- Vetch ON
- No Cover ON
- Rye ON
- Rye biomass removed ON

Values marked with different letters (a, b, c, d) indicate significant differences.
Cucumber Yield

Table 2.2 Cucumber yield (Mg ha⁻¹) and yield income ($ ha⁻¹)* in 2009. Cover crop treatments with different letters indicate a statistically significant difference.

<table>
<thead>
<tr>
<th>Cover Crop</th>
<th>Cucumber Harvest 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Marketable yield (Mg ha⁻¹)</td>
</tr>
<tr>
<td>No Cover</td>
<td>7.17 cd</td>
</tr>
<tr>
<td>No Cover + N</td>
<td>12.25 a</td>
</tr>
<tr>
<td>OSR</td>
<td>10.10 ab</td>
</tr>
<tr>
<td>Oats</td>
<td>9.19 bc</td>
</tr>
<tr>
<td>Peas</td>
<td>9.89 abc</td>
</tr>
<tr>
<td>Rye</td>
<td>6.13 d</td>
</tr>
<tr>
<td>Rye Removed</td>
<td>7.35 bcd</td>
</tr>
<tr>
<td>Vetch</td>
<td>9.32 bc</td>
</tr>
</tbody>
</table>
Figure 2. Quantity of nitrogen in cover crop aboveground tissues and recoverable residue collected in April, 251 and 291 DAP. Different letters indicate a statistically significant difference.
## Yields

<table>
<thead>
<tr>
<th>N treatment</th>
<th>Bothwell</th>
<th>Ridgetown</th>
<th>Ridgetown</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total yield</td>
<td>Marketable yield</td>
<td>Total yield</td>
</tr>
<tr>
<td></td>
<td>t ha(^{-1})</td>
<td>t ha(^{-1})</td>
<td>t ha(^{-1})</td>
</tr>
<tr>
<td>No cover</td>
<td>6.5 a</td>
<td>11.4 bc</td>
<td>11.4 bcd</td>
</tr>
<tr>
<td>Oat</td>
<td>12.2 cd</td>
<td>15.2 d</td>
<td>14.0 cd</td>
</tr>
<tr>
<td>OSR+rye</td>
<td>6.5 a</td>
<td>11.4 bc</td>
<td>11.4 bcd</td>
</tr>
<tr>
<td>Rye</td>
<td>12.2 cd</td>
<td>15.2 d</td>
<td>14.0 cd</td>
</tr>
<tr>
<td>P value</td>
<td>0.038</td>
<td>0.001</td>
<td>0.001</td>
</tr>
</tbody>
</table>
Bothwell – Cover Crop Growth

December 2006
- Oat
- OSR+Rye
- No Cover
- Rye

May 2007
- OSR+Rye
- No Cover
- Rye
- Oat
Ridgetown - Cover Crop Biomass

*For each date, bars labeled with the different letters are significantly different.
Bothwell - Cover Crop Biomass

*For each date, bars labeled with the different letters are significantly different.
Cover Crop Growth

August 2007
- No Cover
- Rye
- OSR+Rye
- Oat
- OSR

October 2007
- OSR
- Oat
- OSR+Rye
- No Cover
- Rye
Ridgetown – Cover Crop Plant N

*For each date, bars labeled with the different letters are significantly different.
Ridgetown – Cover Crop Soil N

*For each date, bars labeled with the different letters are significantly different.
Ridgetown – Cover Crop PAN

*For each date, bars labeled with the different letters are significantly different.
Ridgetown – Cover Crop Summary

• Cover crops were effective at conserving plant available N over the fall and into the spring compared to the no cover control
• Oat was most effective in the fall due to high plant N content
• All covers were equally as effective in the spring
• Cover crops generally did not affect PAN in the fall or spring compared to the no cover
• Cover crops were less effective at preventing N loss than at Bothwell, possibly due to differences in soil type and precipitation
N Credit?

• Need to compare to NO cover crop control

• Show fall N uptake and lower soil N but does this result in a N credit?
Cover Crops Plant N

Cover crop plant N uptake (lb N/ac)

- 0N
- 100N
- 200N

Cover Crop
- Oats
- 200N
- 100N
- 200N

Rye with Oilseed Radish

Cover Crop N uptake (lb N/ac)