Cover Crops Before Sweet Corn: Does This Mean Fewer Weeds?
Kelsey A. O'Reilly¹, Laura L. Van Eerd¹ and Darren E. Robinson²
Department of Land Resource Science¹ and Department of Plant Agriculture², University of Guelph, Ridgetown Campus

Introduction
There has been increased pressure on vegetable growers from consumers and policy makers to reduce pesticide inputs and improve sustainable production practices. The inclusion of cover crops in a management system may lead to the suppression of weeds through competition for resources, physical obstruction of weed emergence, and allelopathy. The objective of this study was to determine if cover crops reduce the presence of weeds in sweet corn production.

Methodology
- Field experiments were established in 2006 and 2007 in pea – cover crop – sweet corn rotation in Bothwell and Ridgetown, Ontario.
- Crops included: 1) peas “Encore” and 2) sweet corn “Temptation”.
- Cover crop treatments included: 1) oats, 2) fall rye, 3) oilseed radish + rye (OSR+rye), 4) oilseed radish (OSR) and 5) no cover control.
- Cover crops were planted on Aug. 4, 2006 and July 19, 2007 at Bothwell and Ridgetown, respectively.
- Cover crop biomass was quantified in the fall and spring.
- Weed populations were measured as follows:
  - Fall – total weed biomass (Ridgetown site only).
  - Spring – weed density and biomass by species (Table 1).
- Summer – weed biomass and density by species in the sweet corn at 28 and 56 days after herbicide treatment (DAT).
- Sweet corn was treated with:
  - Accent with Agral on June 19, and Basagran Forte on June 26, 2007 at Bothwell.
  - Dual II Magnum on May 29, and Accent with Agral 90 on 13 June 2008 at Ridgetown.
- Marketable and total sweet corn yields were determined in both weedy and non-weedy treatments.

References

Cover Crop Biomass Production
- Overall, all four of the cover crops established well and produced significant biomass to provide protection from wind and water erosion (Fig. 1 & 2).
- Over the entire growing season, cover crop biomass production ranged from 830 to 4700 and 1690 to 17255 kg ha⁻¹ at Bothwell and Ridgetown, respectively.

Discussion
- All cover crops established well and produced significant biomass.
- Cover crops did not positively or negatively affect sweet corn yields, compared to the no cover control.
- The effectiveness of the cover crops to control weeds was variable in the spring before sweet corn planting and minimal in the summer during the growing season.
- After growing cover crops for 1 year, the cover crops tested do not provide significant weed suppression or problems during the sweet corn growing season.
- However, in the fall, cover crops with OSR were effective at reducing weed biomass compared to a no cover control. The long term effects of OSR on spring and summer weed populations is not known, and was not studied in this experiment.

Figure 1. Cover treatments in May 2007 at Bothwell.

Figure 2. Cover treatments in October 2007 at Ridgetown.

Table 2. Marketable yields for each cover crop and weed treatment.

<table>
<thead>
<tr>
<th>Cover Crop</th>
<th>Bothwell</th>
<th>Ridgetown</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Cover</td>
<td>7.8 a</td>
<td>9.2 a</td>
</tr>
<tr>
<td>Oat</td>
<td>11.0 a</td>
<td>13.8 a</td>
</tr>
<tr>
<td>OSR</td>
<td>--</td>
<td>14.4 a</td>
</tr>
<tr>
<td>OSR+Rye</td>
<td>8.8 a</td>
<td>10.0 a</td>
</tr>
<tr>
<td>Rye</td>
<td>9.0 a</td>
<td>8.9 a</td>
</tr>
</tbody>
</table>

Figure 3. Fall biomass production (g m⁻²) of weeds at Ridgetown (2007-2008). Bars labeled with the same letter for each site were not significantly different.

Table 1. Weed biomass in the spring and summer following different cover crops, at Bothwell (2006-2007) and Ridgetown (2007-2008). Within columns, means followed by the same letter were not significantly different except for summer weed biomass at Bothwell where means are compared between both sample dates.

<table>
<thead>
<tr>
<th>Cover Crop</th>
<th>Spring</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bothwell</td>
<td>Ridgetown</td>
</tr>
<tr>
<td>No cover</td>
<td>23.3 a</td>
<td>23.2 a</td>
</tr>
<tr>
<td>Oat</td>
<td>0.8 a</td>
<td>2.0 a</td>
</tr>
<tr>
<td>OSR</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>OSR+Rye</td>
<td>0.3 a</td>
<td>2.3 a</td>
</tr>
<tr>
<td>Rye</td>
<td>0.6 a</td>
<td>1.0 a</td>
</tr>
</tbody>
</table>

Acknowledgements
Funding for this project was provided in part by Ontario Ministry of Agriculture, Food and Rural Affairs, Agriculture and Agri-Food Canada through the Agricultural Adaptation Council CORD IV program, Fresh Vegetable Growers of Ontario, Ontario Processing Vegetable Growers, and Ontario Food Processors Association, as well as in-kind analysis from Agri-Food Laboratories Ltd., and A&L Laboratories Inc. Thanks is extended to Mike Zink, Elaine Roddy and Anne Verhallen for their technical expertise and to the Ridgetown Campus soils crew for their tireless efforts in the field.