Title: Pathology and Diseases of Canola and Camelina

PIs: Scot Hulbert, Timothy Paulitz

Funding term and duration: 2007 - present

Background:
The common practice for planting winter canola after winter wheat in the irrigated region of Odessa is to use burning and plowing to manage residue. The perception is that canola stands cannot be established without these practices. Growers have believed that the wheat stubble is toxic to winter canola. Dr. Bill Schillin has conducted four years of trials at Lind and Odessa, looking at alternatives such as residue removal and direct seeding. Dr. Tim Paulitz has been looking at pathogens in these experiments. In the initial set of irrigated trials at Lind, Rhizoctonia solani AG 2-1 was responsible for reducing stands of canola in plots at Lind. But due to bird problems, the plots were moved to grower fields in Odessa.

Objectives: Assess the effect of diseases in a cropping systems trial to evaluate residue removal, burning, tillage, and no-till practices to establish winter canola after winter wheat.

Methods:

Five winter wheat stubble management treatments were established in mid-to-late August 2013 prior to planting winter canola. These treatments were

i. Stubble burned + disked
ii. Stubble chopped + moldboard plowed
iii. Stubble burned, then direct seeded
iv. Direct seeding into standing and undisturbed stubble.
v. Broadcast into direct stubble.

Plots were surveyed in Fall 2013 and Spring 2014. However, because of the extreme winter, most of the canola was killed. However, surprisingly, the plots with direct seed or broadcast into wheat stubble were completely killed, while most of the other plots survived. This was due to the long hypocotyls from etiolated seedlings coming up in the shady environment of the stubble. Despite the killed plots, soil was still sampled and a bioassay performed in Spring 2014. Soil from each treatment was placed in two-inch pots, four pots/treatment, with four replicate blocks. Pots were planted with 10 canola seeds (cv. Athena). Over the next 3 weeks, emergence and disease (post-emergence damping-off) were assessed. Shoot dry weights were taken at the end of the experiment. The results of diseases are shown in Figure
1. In August 2014, the experiment was planted again, with the identical treatments, and sampled in October 2014. Figure 2 shows the bioassay results.

**Effect of Winter Canola Rotations on Spring Wheat in Intermediate Rainfall Area**

Another project of Schillinger has been conducted over a number of years to compare spring wheat performance after either winter wheat or winter canola. Surprisingly, he found significantly less yield after winter canola compared to winter wheat, contrary to the literature which shows a rotation benefit. Water was ruled out as a factor. We looked at the possibility of disease being a factor in this response. Soil was sampled from the plots and wheat was planted into soil from either the winter canola or winter wheat rotation. Results are shown in Table 1. Surprisingly, we saw the opposite response - plant growth was better after winter canola than after winter wheat. In Spring 2015, we will sample for nematodes, specifically root lesion nematodes (Pratylenchus). One hypothesis is that some canola varieties can be good hosts for this nematode, and result in population buildups that could reduce yield in the subsequent spring wheat crop.

**Blackleg - A Threat to Canola Production in Washington**

A significant outbreak of blackleg was discovered in the Willamette Valley of Oregon in Spring 2014. Paulitz and Hulbert are on the team of researchers from Idaho, Oregon and WA communicating on this problem. In addition, blackleg was discovered in Lewiston, ID in Fall 2014. Paulitz provided contacts in the Univ. of Manitoba to begin looking at race structure of the pathogen (D. Fernando). In collaboration with researchers in ID (Kurt Schroeder) we hope to begin more extensive surveys of ID and WA in 2015.

**Results and Discussion:**

Results of the canola bioassays are shown in Figures 1 and 2. No disease was detected in the field, either in Fall or Spring surveys. There was no significant disease detected in the bioassay. The fumigation in the previous potato crops may be reducing the levels of inoculum, allowing growers to use direct seeding and still get a good crop.

Soft white spring wheat cv. *Louise* planted into soil previously cropped to winter canola showed greater growth than when in soil previously planted with winter wheat, an expected result. Soil will be analyzed to see if N levels may be responsible for the differences.

**Impact/Potential Outcomes:**

Disease pressure from *Rhizoctonia solani* AG 2-1 on winter canola is low, in irrigated circles in the Odessa area following winter wheat, where potatoes are in rotation. The fumigation in the potato rotation may be reducing inoculum of this pathogen. Yields of winter canola direct-seeded into winter wheat stubble were comparable to other treatments with burning and tillage. This indicates that growers can use techniques which will decrease soil erosion, input costs and increase soil organic matter, without sacrificing yield.

**Affiliated projects and funding:**

Presentations and Publications:


Paulitz, T. C. Washington Research - W-3147 Multistate Project Managing Plant Microbe Interactions in Soil to Promote Sustainable Agriculture, Oct. 24, 2014, Riverside, CA.

Proposed Future Research/Extension for 2015/2016:


Tables/Graphs:

Figure 1

Effect of Residue Treatments on Emergence of Canola, Schibel Plot, Sampled May 16, 2014
Table 1. Growth of *Louise* planted into soil from WC/WW experiment of Schillinger on the farm of H. Johnson, Reardan, WA

<table>
<thead>
<tr>
<th>Previous Crop</th>
<th>Plant height (cm)</th>
<th>Dry weight (mg/plant)</th>
<th>Number of Tillers</th>
<th>Length of 1st true leaf (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter Canola</td>
<td>30.0 A</td>
<td>54.7 A</td>
<td>2.9 A</td>
<td>10.9</td>
</tr>
<tr>
<td>Winter Wheat</td>
<td>26.8 B</td>
<td>42.7 B</td>
<td>2.6 B</td>
<td>10.9</td>
</tr>
</tbody>
</table>