REGION 2
Eastern WA low to intermediate rainfall

**Project Title**  Stand establishment of winter canola in the low to intermediate rainfall zones of the Pacific Northwest.

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**Objectives**  Determine the optimal seeding date, rate, and method for winter canola in the low and intermediate rainfall regions of the Pacific Northwest in order to improve stand establishment, seedling survival, and crop yield. In addition, to determine the effects of seeding date and variety on oil and meal quality.

**Methods**  Sites were established near Ralston and Okanogan in 2007 and 2008 to explore our objectives. In 2007, winter canola seeding dates were August 21 and September 4 at Okanogan, and August 12, 19, and 26 at Ralston. Seeding rates were 2, 4, and 6 lbs/A at both sites and a modified John Deere HZ deep furrow drill was used to seed the winter canola. The modifications to the drill included a grass-seed box for accurate seeding rates, 13 to 15-in shovels to move dry soil out of the furrow, 55-lb packer wheels to improve seed-to-soil contact, and 28-in row spacing. Rapier winter canola was planted at the Okanogan site and the variety Virginia was planted at the Ralston site. During the three seeding dates at Ralston and the first seeding date at Okanogan, three of the four rows were set at normal depth (½ to ¾ inch into moisture) and the seed failed to emerge. However, the fourth row was planted shallower at < ½” into moisture, and the seeds emerged, established, and grew sufficiently to overwinter. For the September seeding date at Okanogan, the shallower seeding depth was used for all rows and considerably more plants emerged and established. Plants were counted in rows/treatments where sufficient plants emerged. A spring follow-up count revealed that most of the plants survived the winter at both sites, including plants thought to be too small to overwinter. All plots were harvested using a Wintersteiger© plot combine in the fall. Crop yield and seed, oil (for biofuel), and meal (for feed) quality were determined.

In 2008, seeding dates were August 12 and 25 at Okanogan and August 6, 19, 26, and September 30 at Ralston. Seeding rates were 4 and 8 lbs/A at both sites. Roundup Ready (RR) Camas winter canola was planted at the Okanogan site and Rapier was originally planted at the Ralston site. The first Ralston plantings failed and plots were replanted September 30 at rates of 5, 7, and 10 lb/A using the variety Salute. The planting methods and machinery used at these sites were the same as in 2007 with two exceptions. During 2008, 10-in shovels were used rather than 13 or 15-in shovels. Depth adjustment was refined in an effort to avoid the previous problem of uneven row emergence. Additionally, when the Ralston plots were replanted, a conventional double-disk opener drill was used to broadcast.

In addition to the seeding rate and date experiments, research plots were established in fall 2008 at two locations on Wade Troutman’s land near Bridgeport to determine the effect of planting with or without shovels. Site 1 (2,500 ft elevation) was seeded on August 20 at a rate of 7.2 lbs/A, and site 2 (1,500 ft elevation) was seeded August 21 at the same rate. Both sites were planted with the same John Deere HZ deep
furrow drill as the main Okanogan and Ralston sites. Camas RR winter canola was planted at both Troutman sites. Plants were counted fall 2008 and spring follow-up counts will be conducted to determine the winter survival rate (Fig. 1). Plots will be harvested next fall and crop yield and seed, oil (for biofuel), and meal (for feed) quality will be determined.

Fig. 1. Winter canola stand at 2,400 ft. elevation site at Bridgeport, WA; planted August 20, 2008.

**RESULTS**

**Okanogan 2007:** For the August planting date, canola yields were 3059, 2512, and 3291 lb/acre for the 2, 4, and 6 lb/acre planting rates, respectively. Yields were 602, 880, and 875 lb/acre for the respective rates for the September planting date. It must be noted that the August planting date yields are an estimate based on one row sampling and are somewhat high due to the lack of intraspecific competition. Although yields had to be estimated without full replicates it is still useful in determining if planting late would be a feasible option. The farmer’s average yield for canola planted in between these two dates was approximately 1,627 lb/acre based on four 5’ x 100’ areas we harvested with our small plot combine.

The Okanogan site was the only site that was analyzed for meal quality in 2007. Composite samples from Date 1, Date 2, and the farmer’s field were submitted to the Sure-Tech Laboratories (Land O’Lakes, Inc.) in Othello to determine meal quality. Of importance is the percent protein, fat (percent oil), acid detergent fiber (ADF), and neutral detergent fiber (NDF) (Table 1). Protein in our samples was close to the 34% minimum export standard for the U.S. and Canada (Table 1), especially the samples from
Date 1. Other varieties may provide higher oil content than Rapier. The oil content of the meal, expressed as percent fat (derived using an ether extract), was considerably higher (11.7-12.3%) than the standard minimum. This could reflect incomplete oil extraction during crushing although higher meal oil content could improve feed value. Currently most processing plants in Canada add back most of the gums and soapstocks to the meal, which can enhance both the gross energy and metabolizable energy values of the meal (Hickling, 2001; Bell, 1993). Our crude fiber ranged from 0.3-1.73 for ADF and 0.67-3.13 for NDF above the average values. One of the major criticisms of canola meal is its high crude fiber content compared to soybean meal, which results in lower digestible energy content. The high crude fiber content in canola meal (almost three times as much as dehulled soybean meal) is primarily attributed to the increased presence of the hull (as a percentage of seed or meal weight) compared to soybean meal (Lardy). Although dehulling of canola meal reduces the crude fiber content of the meal, the process is currently not used at most of the crushing plants (Lardy). According to Bell (1993) another improvement that could be made to decrease fiber content is to switch to yellow hulled varieties of canola. The yellow hulled seed has a much higher energy digestibility than dark hulled seed.

Table 1. Canola meal analysis from variety “Rapier”, Okanogan trials, 2007.

<table>
<thead>
<tr>
<th>Assay</th>
<th>Farmer’s field</th>
<th>Date 1</th>
<th>Date 2</th>
<th>STANDARD¹ (US &amp; Canada)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture (%)</td>
<td>7.12</td>
<td>7.13</td>
<td>7.16</td>
<td>≤ 12</td>
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<tr>
<td>Protein (%)</td>
<td>30.00</td>
<td>33.68</td>
<td>31.9</td>
<td>≥ 34</td>
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<tr>
<td>Fat (%)</td>
<td>12.28</td>
<td>11.73</td>
<td>11.85</td>
<td>≥ 2</td>
</tr>
<tr>
<td>Crude fiber (%)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>≤ 12</td>
</tr>
<tr>
<td>ADF (%)</td>
<td>18.73</td>
<td>17.30</td>
<td>18.11</td>
<td>*~17</td>
</tr>
<tr>
<td>NDF (%)</td>
<td>24.13</td>
<td>21.67</td>
<td>22.23</td>
<td>*~21</td>
</tr>
<tr>
<td>Glucosinolates (µmol/g)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>≤ 30</td>
</tr>
</tbody>
</table>

¹Standard values adapted from Canola Meal Feed Industry Guide (Hickling, 2001).

*These values were derived from a survey of seven different Western Canadian crushing plants and routine monitoring of the various parameters of canola seed quality by the Grain Research Laboratory in Winnipeg (Bell, 1993).

The average oil content (using a cold press technique) was 39.86% for the seed and 11.95% for the meal. The oil quality specs have not yet been completed.

**Ralston 2007:** Stand establishment at the Ralston site was very uneven. There were very few plots from the three planting dates or rates that had even one complete row emerge and establish. Partial portions of some rows were harvested. The cooperating farmer’s field surrounding our plots was reseeded to winter wheat because of poor winter canola establishment. No meal or oil analysis was conducted on these samples.
CONCLUSIONS & FUTURE PLANS

It appears that the volume of soil flowing back over the furrows is too much and too hot for the germinating canola seedlings to grow through and survive. We learned a lot about what not to do and how to modify and change the drill to improve the chances of canola establishment. These modifications will be set forth in future research for the 2009-2011 time period.

REFERENCES

