

Project Title: Evaluation of Canadian Spring Wheat Lines for OWBM Resistance

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Objectives: To evaluate Canadian spring wheat experimental lines for agronomic performance and resistance to the Orange Wheat Blossom Midge.

Results:

The nursery was established at the Northwestern Agricultural Research Center located near Kalispell, MT in a field with a previous history of low to moderate midge densities. The soil type was a Creston silt loam (25-50-25) with an organic matter content of 4%, a pH of 7.5, and a CEC of 20. The field was fertilized with 100-30-60-24 lb/A of N, P, K and S, respectively.

Twelve spring wheat entries were evaluated for resistance to the orange wheat blossom midge (OWBM). The entries consisted of 11 experimental lines from Dr. Fox's spring wheat breeding program at Winnipeg, Manitoba, plus the check variety 'Faller'. The Canadian entries were 90:10 mixtures of resistant to susceptible isolines, where the resistant materials contained the *Sm1* gene.

The experimental design was a randomized complete block with three replications. The spring wheat entries were planted on May 16, 2008 at a rate of 78 lb/A to a depth of 1.5 inches. Each plot was 15 foot long and consisted of 7 rows, spaced 6 inches apart. Heading and pollination were recorded when 50 percent of the plants in a plot had reached the corresponding growth stage. Exposure duration (ED) was calculated as the time period between these two events. Height measurements were recorded on July 24, 2008. Three randomly selected heads were collected on August 19. Each head was dissected and the number of larvae, damaged kernels and healthy kernels were determined. Plots were harvested on September 9, 2008. Grain yield, test weight, moisture, and protein were determined.

The 2008 planting season was cooler than normal. By the May 16 planting date, only 180 GDD's (base 40<sup>0</sup> F) had accumulated as compared to 475 on the same date during 2007. Cool temperatures persisted throughout much of the growing season, which delayed heading and anthesis (flowering). Nevertheless, there was good synchronization between adult midge emergence and spring wheat heading. Midge adults were first observed on June 30 (Julian 181) and continued to be detected into the second week of August. Concurrently, heading was first observed on July 7 (Julian 188) and continued to July 13 (Julian 194) (Table 1).

Although cool temperatures may have delayed heading, this same set of conditions appeared to have suppressed foliar diseases and extended the grain filling period, benefiting yields in the

process. Yields averaged 73 bu/A, ranging from a high of 83 bu/A for BW395 to a low of 59 bu/A for BW365. BW395 not only produced the most grain, but also was the shortest entry in the nursery. While most entries were of standard height (mean=100 cm), no lodging was detected. Test weights were good and averaged about 62 lb/bu. Protein averaged 13% and ranged from 12% for BW431 to 14% for BW365.

It's doubtful that yield was affected by OWBM damage. The check variety 'Faller' and BC21B had the highest midge densities recorded, with 6.1 and 5.8 larvae per spike, respectively. All other entries essentially had no infestation, demonstrating excellent resistance to the OWBM. It's worth noting that adjacent nurseries planted on the same day had midge numbers as high as 71 larvae per spike.

In summary, all Canadian entries demonstrated excellent resistance to the OWBM. Yields were good considering the late planting date. Likewise, test weight and protein levels were well within acceptable standards. Although lodging was not observed, plant height might impact the acceptance of these materials since most entries were standard height materials.

Table 1. Evaluation of Canadian spring wheat lines for agronomic performance and resistance to the OWBM grown at Kalispell, MT.

Planted: May 16, 2008 field P2								Harvested: September 9, 2008.				
Cultivar	Yield	Test weight	Grain moist.	Heading	Anthesis	ED <sup>a</sup>	Plant height	Midge larvae	Total kernels	Damaged kernels		Protein
	bu/ac	lb/bu	%	Julian	days	cm	No./spike	No./spike	%			%
BW395	83.6	61.6	12.8	189.7	195.3	5.6	87.0	0.0	30.9	0.0	0.0	12.97
BW431	79.3	62.2	13.6	189.7	195.7	6.0	97.3	0.0	31.1	0.0	0.0	12.17
BW430	77.8	61.7	13.6	189.7	195.7	6.0	113.3	0.0	31.4	0.0	0.0	12.60
BD94B	77.8	62.2	13.5	189.0	194.3	5.3	106.7	0.0	35.7	0.0	0.0	13.03
BW396	77.4	62.5	13.0	189.3	194.0	4.7	94.0	0.0	32.1	0.0	0.0	13.00
Faller	74.8	60.8	13.1	193.7	196.3	2.6	89.7	6.1	32.3	4.1	12.5	13.17
BD99A	74.2	61.2	14.3	193.0	196.7	3.7	95.7	0.0	39.8	0.0	0.0	12.60
BW394	71.1	62.1	13.8	190.7	195.0	4.3	106.0	0.0	31.7	0.0	0.0	12.20
BW415	70.2	61.7	13.0	188.3	193.3	5.0	103.7	0.0	30.8	0.0	0.0	12.97
BW362	69.6	62.3	12.8	189.0	195.7	6.7	105.0	0.2	33.8	0.1	0.4	13.60
BC21B	61.7	61.5	13.3	189.3	194.0	4.7	101.3	5.8	30.1	2.9	10.6	13.73
BW365	59.0	61.4	13.0	188.3	195.0	6.7	106.3	0.0	35.1	0.0	0.0	14.17
<b>Mean</b>	<b>73.0</b>	<b>61.8</b>	<b>13.3</b>	<b>190.0</b>	<b>195.1</b>	<b>5.1</b>	<b>100.5</b>	<b>1.0</b>	<b>32.9</b>	<b>0.6</b>	<b>2.0</b>	<b>13.02</b>
<b>CV</b>	<b>4.67</b>	<b>0.61</b>	<b>1.99</b>	<b>0.37</b>	<b>0.35</b>	<b>15.2</b>	<b>4.01</b>	<b>219.54</b>	<b>6.71</b>	<b>226.3</b>	<b>220.82</b>	<b>5.77</b>
<b>LSD (0.05)</b>	<b>5.77</b>	<b>0.64</b>	<b>0.45</b>	<b>1.19</b>	<b>1.15</b>	<b>1.31</b>	<b>6.82</b>	<b>3.75</b>	<b>3.74</b>	<b>2.27</b>	<b>7.31</b>	<b>1.27 (0.09)</b>

<sup>a</sup> Exposure duration is the time difference between heading and anthesis.