Title: Evaluation of Sm1 experimental spring wheat lines for resistance to the Orange Wheat Blossom Midge (OWBM).

Objective: To evaluate insect resistance and agronomic performance of experimental spring wheat lines in different environments.

Report:

Forty three experimental lines containing the Sm1 gene for resistance to the OWBM were established in non-replicated, observation nurseries at Bozeman, Conrad, and Kalispell, MT. Susceptible (Hank) and resistant (Egan) check varieties were also included for comparison.

Midge populations were low to non-existent at all three locations. As a result, it was not possible to assess the level of resistance expressed in the experimental lines. However, the agronomic performance of the entries was determined.

The following data values are representative averages across all locations. Mean Julian calendar heading date was 180 days (June 29) and ranged from 178 (June 27) to 183 (July 2), compared to Hank at 180 and Egan at 182 days. Heights averaged 32.0 inches and ranged from 28.7 to 38.2 inches in comparison to Hank and Egan at average heights of 31.8 and 33.5 inches respectively. Yields averaged 96.1 bu/A and ranged from 63.7 to 117.3 bu/A compared to Hank with an average yield of 95.6 bu/A and Egan averaging at 90.7 bu/A. Protein averaged 14.8% and ranged from 13.7 to 16.7 % while protein values averaged 14.6% and 15.9% for Hank and Egan, respectively. Test weight averaged 59.2 lb/bu and ranged from 55.3 to 62.7 lb/bu, while Hank and Egan averaged 57.0 and 58.7 lb/bu respectively. Two orange wheat blossom midge larvae detected were on experimental line 12400592 at Conrad.

Table 1. Materials and Methods - OWBM resistance screening - 2014

Seeding Date:	5/1/2014	Harvest Date:	8/29/2014
Julian Date:	121	Julian Date:	241
Seeding Rate:	80 lb/A	Soil Type:	Creston Sil
Previous Crop:	Fallow	Soil Test:	431-40-258
Tillage:	Conventional-Till	Fertilizer:	200-30-100
Irrigation:	N/A	Herbicide:	Huskie 11 floz/A and Axial XL 16.4 floz/A
		Fungicide:	Headline 9 floz/A

Table 2. Multi location agronomic data for SM1 experimental lines - 2014.

	Heading date Julian				Height inches			
ID	Kalispell	Bozeman	Conrad	Average	Kalispell	Bozeman	Conrad	Average
12400015	182	182	182	182	31.0	32.3	31.0	31.4
12400016	175	181	182	179	32.0	32.5	32.0	32.2
12400016	178	180	.	179	35.0	32.5	36.0	34.5
12400016	178	182	.	180	33.0	32.7	35.0	33.6
12400038	175	178	181	178	32.0	30.7	26.0	29.6
12400038	179	179	.	179	31.0	31.3	38.0	33.4
12400038	177	180	181	179	33.0	31.5	30.0	31.5
12400038	178	180	181	180	33.0	30.7	28.0	30.6
12400052	175	182	183	180	30.0	30.9	27.0	29.3
12400467	178	182	182	181	32.0	31.9	32.0	32.0
12400592	178	182	181	180	32.0	30.5	39.0	33.8
12400725	176	183	182	180	33.0	32.3	30.0	31.8
12400817	178	181	182	180	35.0	30.9	31.0	32.3
12400817	177	182	184	181	30.0	31.5	29.0	30.2
12400877	180	178	181	180	39.0	33.7	30.0	34.2
12400967	179	179	181	180	32.0	31.3	29.0	30.8
12400976	176	182	182	180	30.0	32.9	29.0	30.6
12400986	177	180	182	180	33.0	31.9	28.0	31.0
12401032	181	180	182	181	35.0	32.9	31.0	33.0
12401047	178	182	182	181	35.0	32.1	33.0	33.4
12401117	180	178	180	179	34.0	35.2	30.0	33.1
12401161	181	178	181	180	34.0	32.9	31.0	32.6
12401161	178	178	181	179	32.0	33.5	31.0	32.2
12401182	178	182	182	181	34.0	31.1	27.0	30.7
12401182	177	181	183	180	35.0	31.1	30.0	32.0
12401183	178	180	182	180	33.0	30.9	28.0	30.6
12401190	179	183	182	181	34.0	30.5	30.0	31.5
12401218	177	181	181	180	35.0	31.1	32.0	32.7
12401218	180	182	182	181	33.0	31.3	31.0	31.8
12401227	178	181	182	180	35.0	31.7	27.0	31.2
12401228	178	180	182	180	32.0	30.5	28.0	30.2
12401236	178	181	183	181	36.0	31.9	29.0	32.3
12401277	178	181	182	180	34.0	31.7	29.0	31.6
12401288	180	182	183	182	33.0	32.1	33.0	32.7
12401322	178	180	181	180	33.0	36.6	31.0	33.5
12401372	177	180	180	179	35.0	33.1	30.0	32.7
12401406	178	182	183	181	32.0	31.9	28.0	30.6
12401424	178	180	181	180	35.0	30.1	30.0	31.7
12401502	178	182	183	181	33.0	33.1	31.0	32.4
12401518	178	181	182	180	34.0	30.9	30.0	31.6
12401687	177	179	181	179	35.0	30.1	28.0	31.0
12401935	181	178	181	180	34.0	31.3	28.0	31.1
12401988	180	180	182	181	33.0	31.5	30.0	31.5
HANK	177	178	182	179	32.0	31.3	32.0	31.8
HANK	182	178	181	180	32.0	33.1	30.0	31.7
HANK	177	178	182	179	33.0	32.9	31.0	32.3
HANK	182	178	181	180	32.0	32.7	30.0	31.6
CAP400	183	183	183	183	36.0	33.5	31.0	33.5
CAP400	178	183	182	181	36.0	33.9	30.0	33.3
CAP400	177	183	183	181	35.0	35.4	32.0	34.1
CAP400	183	183	183	183	34.3	32.6	32.0	33.0
MEAN	178	181	182	180	33.4	32.1	30.5	32.0
MIN	175	178	180	178	30.0	30.1	26.0	28.7
MAX	183	183	183	183	39.0	36.6	39.0	38.2

Table 2 continued.

	Yield bu/A				Protein %			
ID	Kalispell	Bozeman	Conrad	Average	Kalispell	Bozeman	Conrad	Average
12400015	96.9	91.5	82.5	90.3	14.2	14.7	.	14.4
12400016	102.0	95.5	83.2	93.6	15.0	15.3	.	15.2
12400016	108.2	88.9	79.6	92.2	14.0	15.1	.	14.6
12400016	112.4	83.0	80.3	91.9	13.5	14.5	.	14.0
12400038	95.2	96.1	85.9	92.4	14.8	14.4	.	14.6
12400038	100.0	88.5	97.5	95.3	15.0	14.3	.	14.6
12400038	104.9	79.1	85.9	90.0	14.2	14.6	.	14.4
12400038	112.8	91.6	92.0	98.8	14.4	14.8	.	14.6
12400052	107.5	101.4	82.5	97.1	14.4	15.3	.	14.9
12400467	109.8	79.1	77.7	88.8	14.1	15.6	.	14.8
12400592	114.0	93.9	107.7	105.2	14.1	14.8	.	14.4
12400725	121.0	92.7	78.3	97.3	13.8	16.2	.	15.0
12400817	115.7	82.2	116.5	104.8	14.0	14.9	.	14.5
12400817	117.6	78.5	38.5	78.2	13.9	15.7	.	14.8
12400877	117.8	99.7	119.9	112.5	16.1	14.6	.	15.3
12400967	108.7	76.4	90.1	91.7	13.7	15.6	.	14.7
12400976	115.7	90.2	90.2	98.7	13.7	15.1	.	14.4
12400986	127.3	82.3	89.9	99.8	14.2	15.2	.	14.7
12401032	108.1	84.2	86.5	93.0	14.7	14.8	.	14.8
12401047	113.7	84.7	93.3	97.3	14.2	16.0	.	15.1
12401117	100.6	96.5	89.5	95.5	13.9	14.8	.	14.4
12401161	115.8	97.4	120.3	111.1	16.4	14.1	.	15.2
12401161	116.5	96.2	116.6	109.8	14.5	14.3	.	14.4
12401182	125.8	63.6	69.6	86.3	14.4	14.7	.	14.6
12401182	103.8	80.3	94.5	92.9	14.8	15.2	.	15.0
12401183	113.7	88.1	98.1	100.0	14.4	14.9	.	14.7
12401190	113.5	85.9	86.4	95.3	14.5	14.8	.	14.7
12401218	119.5	96.8	115.6	110.6	14.4	14.8	.	14.6
12401218	111.0	87.9	82.9	93.9	14.5	15.0	.	14.8
12401227	119.7	86.3	78.3	94.8	13.8	14.0	.	13.9
12401228	116.0	86.6	83.3	95.3	14.0	15.0	.	14.5
12401236	119.7	92.2	80.4	97.5	15.1	15.2	.	15.1
12401277	109.1	104.4	90.3	101.2	14.3	15.4	.	14.9
12401288	111.6	97.9	99.3	102.9	15.0	15.3	.	15.2
12401322	113.0	101.7	85.6	100.1	14.6	15.3	.	14.9
12401372	113.5	80.2	86.4	93.4	14.5	15.2	.	14.8
12401406	108.7	94.2	79.7	94.2	14.7	15.2	.	14.9
12401424	102.4	95.7	102.5	100.2	14.6	15.3	.	15.0
12401502	109.5	97.4	104.3	103.7	14.7	14.8	.	14.7
12401518	111.6	78.6	96.0	95.4	13.8	15.8	.	14.8
12401687	89.2	73.5	86.2	83.0	14.4	14.7	.	14.5
12401935	114.3	100.4	92.0	102.2	14.0	15.2	.	14.6
12401988	91.0	96.7	75.4	87.7	15.3	15.1	.	15.2
HANK	115.8	98.5	79.0	97.8	14.3	14.6	.	14.4
HANK	107.2	99.0	83.5	96.6	14.5	14.4	.	14.4
HANK	105.6	95.3	85.8	95.6	14.2	15.3	.	14.8
HANK	99.6	90.7	86.7	92.3	15.3	14.6	.	15.0
EGAN	108.9	76.3	70.8	85.4	16.3	16.4	.	16.3
EGAN	110.3	88.6	80.0	93.0	15.6	16.8	.	16.2
EGAN	104.9	85.7	82.9	91.2	14.6	17.1	.	15.9
EGAN	109.3	90.9	79.8	93.3	14.8	15.4	.	15.1
MEAN	110.2	89.5	88.6	96.1	14.5	15.1	.	14.8
MIN	89.2	63.6	38.5	63.7	13.5	14.0	.	13.7
MAX	127.3	104.4	120.3	117.3	16.4	17.1	.	16.7

Table 2 continued.

	Test weight lb/bu				OWBM numbers/spike			
ID	Kalispell	Bozeman	Conrad	Average	Kalispell	Bozeman	Conrad	Average
12400015	59.1	59.7	59.3	59.4	0.0	.	0.0	0.0
12400016	58.5	61.9	58.5	59.6	0.0	.	0.0	0.0
12400016	58.8	60.6	59.0	59.4	0.0	.	0.0	0.0
12400016	60.7	60.8	58.6	60.0	0.0	.	0.0	0.0
12400038	58.8	62.3	59.8	60.3	0.0	.	0.0	0.0
12400038	57.0	61.5	60.1	59.6	0.0	.	0.0	0.0
12400038	58.6	61.2	61.1	60.3	0.0	.	0.0	0.0
12400038	58.9	62.1	60.0	60.3	0.0	.	0.0	0.0
12400052	58.7	57.6	58.4	58.2	0.0	.	0.0	0.0
12400467	59.1	58.4	58.5	58.7	0.0	.	0.0	0.0
12400592	57.9	58.9	59.6	58.8	0.0	.	2.33	1.2
12400725	59.6	56.8	58.8	58.4	0.0	.	0.0	0.0
12400817	59.3	61.0	63.6	61.3	0.0	.	0.0	0.0
12400817	58.4	60.8	58.4	59.2	0.0	.	0.0	0.0
12400877	58.6	61.5	61.8	60.7	0.0	.	0.0	0.0
12400967	57.9	58.7	59.8	58.8	0.0	.	0.0	0.0
12400976	59.5	60.2	57.3	59.0	0.0	.	0.0	0.0
12400986	56.9	60.8	58.8	58.8	0.0	.	0.0	0.0
12401032	59.0	60.0	59.3	59.4	0.0	.	0.0	0.0
12401047	57.1	60.1	58.4	58.5	0.0	.	0.0	0.0
12401117	57.6	62.3	58.1	59.3	0.0	.	0.0	0.0
12401161	59.2	60.8	61.6	60.5	0.0	.	0.0	0.0
12401161	58.4	61.1	58.1	59.2	0.0	.	0.0	0.0
12401182	59.3	60.4	57.5	59.1	0.0	.	0.0	0.0
12401182	56.9	60.9	61.7	59.8	0.0	.	0.0	0.0
12401183	57.2	61.8	61.4	60.1	0.0	.	0.0	0.0
12401190	56.4	61.8	62.1	60.1	0.0	.	0.0	0.0
12401218	62.3	61.0	61.6	61.7	0.0	.	0.0	0.0
12401218	59.5	60.7	57.6	59.3	0.0	.	0.0	0.0
12401227	61.0	59.7	56.7	59.1	0.0	.	0.0	0.0
12401228	59.4	60.1	58.5	59.3	0.0	.	0.0	0.0
12401236	58.3	60.0	55.3	57.9	0.0	.	0.0	0.0
12401277	58.4	59.7	60.4	59.5	0.0	.	0.0	0.0
12401288	58.7	61.0	61.9	60.5	0.0	.	0.0	0.0
12401322	55.9	61.4	59.9	59.1	0.0	.	0.0	0.0
12401372	55.6	58.4	58.7	57.5	0.0	.	0.0	0.0
12401406	58.2	59.7	59.2	59.0	0.0	.	0.0	0.0
12401424	58.9	60.0	60.1	59.7	0.0	.	0.0	0.0
12401502	59.8	59.8	60.2	59.9	0.0	.	0.0	0.0
12401518	57.7	58.7	59.3	58.6	0.0	.	0.0	0.0
12401687	57.8	59.6	60.5	59.3	0.0	.	0.0	0.0
12401935	61.7	61.4	61.1	61.4	0.0	.	0.0	0.0
12401988	56.0	59.5	59.4	58.3	0.0	.	0.0	0.0
HANK	58.6	57.3	55.5	57.1	0.0	.	0.0	0.0
HANK	54.6	57.6	56.7	56.3	0.0	.	0.0	0.0
HANK	58.0	56.1	56.9	57.0	0.0	.	0.0	0.0
HANK	57.1	57.1	58.7	57.7	0.0	.	0.0	0.0
EGAN	58.8	57.5	57.7	58.0	0.0	.	0.0	0.0
EGAN	60.7	58.5	58.4	59.2	0.0	.	0.0	0.0
EGAN	60.3	57.5	58.7	58.8	0.0	.	0.0	0.0
EGAN	58.2	58.6	59.2	58.7	0.0	.	0.0	0.0
MEAN	58.5	59.9	59.3	59.2	0.0	.	0.05	0.0
MIN	54.6	56.1	55.3	55.3	0.0	.	0.0	0.0
MAX	62.3	62.3	63.6	62.7	0.0	.	2.3	1.2