

Project Title: Evaluation of the Sm1 gene for antibiotic resistance to the Orange Wheat Blossom Midge (OWBM) -2011.

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Objectives: To verify the presence of the Sm1 gene and to evaluate the agronomic performance of experimental lines of spring wheat.

Results:

Thirteen experimental lines, along with the commercial varieties Hank and Reeder, were evaluated for resistance to the OWBM at Kalispell during 2011. The study was established in a field which had been in spring wheat for the previous five years and had a history of moderate to high midge densities. The study was conducted using conventional tillage and was fertilized with 150-30-120-24 lb/A of N-P-K-S.

Treatments were seeded at a rate of 75 lb/A in six inch wide rows, to a depth of two inches on May 18, 2011. Individual treatments consisted of seven, 15 foot long rows, with each treatment replicated three times in a randomized complete block design. The nursery was treated with Tilt on June 24 for the control of stripe rust. Plant height measurements were taken the last week of July. Three spikes were sampled from each plot on August 16. Each spike was dissected and the number of larvae and seeds counted. Plots were harvested on September 16 to determine grain yield, protein, test weight, and polyphenol oxidase (PPO).

Midge populations during 2011 were well above the long term average. While the susceptible variety Hank had over 150 larvae per spike, most of the experimental lines had no midge larvae (Table 1). These results illustrate that the resistance gene is extremely durable and that the gene has successfully been crossed into Montana adapted germplasm. The lack of midge resistance in susceptible lines was correspondingly reflected in low yields. Hank and Reeder yielded 13 and 39 bu/A, respectively, while the experimental lines had an average yield of 64 bu/A. Within the experimental lines, yields ranged from a high of 84 bu/A for CAP197-3 to a low of 44 bu/A for CAP172-2. The overall average yield was 59 bu/A.

Test weights averaged 56 lb/bu. Within the experimental lines, CAP197-3 had the highest test weight (58.8) while CAP172-2 had the lowest test weight (56.3). Protein averaged greater than 15 % and ranged from 16.8% for CAP172-2 to 14.6% for CAP34-1. Falling number values were all above 320 except for CAP339-1 which produced a value of 274.

Overall, these preliminary results demonstrate that there are several high yielding experimental lines that have resistance to the midge, while also possessing excellent quality attributes.

Table 1. Evaluation of experimental spring wheat lines for resistance to the midge. Kalispell, 2011.

ID	Yield	Test wt.	Heading	Height	OWBM	Protein	PPO	Moist.	FN
	Bu/A	lb/Bu	Julian	inches	No/head	%		%	sec
CAP34-1	72.5	57.9	196.3	34.4	0.0	14.6	0.223	14.4	366
CAP73-1	49.6	57.3	195.7	38.5	0.0	15.2	0.176	14.6	363
CAP84-1	62.9	56.9	195.7	37.9	0.0	14.8	0.170	14.4	389
CAP84-2	60.1	57.0	195.7	37.0	0.0	15.1	0.196	14.4	380
CAP108-3	66.3	56.5	197.0	36.6	0.0	15.0	0.171	14.1	369
CAP151-3	51.8	57.6	195.0	33.6	3.0	16.0	0.186	14.3	356
CAP172-2	44.7	56.3	195.0	35.6	0.3	16.8	0.184	14.3	377
CAP197-3	84.8	58.8	197.7	39.9	0.3	15.3	0.213	14.7	396
CAP201-2	67.2	58.0	196.0	38.2	0.7	16.4	0.206	14.1	342
CAP219-2	65.3	56.9	195.3	40.2	3.0	15.6	0.220	14.4	379
CAP219-3	65.4	56.7	196.3	38.3	0.0	14.9	0.242	14.0	347
CAP339-1	68.8	57.5	194.0	38.7	0.3	16.2	0.188	14.1	274
CAP400-1	79.6	57.7	198.3	37.0	0.3	16.4	0.207	13.3	395
REEDER	38.8	57.6	196.3	41.5	62.3	16.7	0.220	15.3	368
HANK	13.4	50.8	195.7	34.3	151.3	15.3	0.261	13.9	257
Mean	59.40	56.89	196.00	37.44	14.78	15.62	0.20	14.28	352
LSD (0.05)	9.98	0.96	0.75	2.90	2.43	1.60	NS	0.78	50.7
CV	10.64	1.02	0.23	4.60	93.00	6.09	19.61	3.27	8.67
Prob>F	0.0001	0.0001	0.0001	0.0001	0.0001	0.0314	0.2581	0.0173	0.0001