

Project title: Effects of seed color on spring wheat resistance to the orange wheat blossom midge (owbm) – 2011.

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Objectives: Determine if spring wheat resistance to the owbm varies by market class.

Results:

The *Sm1* gene is responsible for the production of two phenolic compounds, coumaric acid and ferulic acid. Phenolics are widely distributed throughout the plant and perform a number of important functions. Among other things, phenolics are key constituents, and are associated with seed color. Experiments were established to evaluate the above mentioned trait for resistance to the orange wheat blossom midge.

Ten hard red and ten soft white spring wheat varieties were evaluated for resistance to the owbm as well as for agronomic performance. Midge densities varied depending on variety, ranging from a low of 1.0/spike for Treasure, to a high of 341/spike for Solano (Table 1). Market class did influence infestation levels in 2011, with the soft whites having slightly lower densities. Larval densities were higher than normal and averaged 144/spike among the soft white varieties and 192/spike with the hard reds. However, the numerical advantage associated with the soft whites was largely attributed to the low densities found with the variety Treasure.

Midge densities had a negative effect on yield. The soft white varieties had slightly higher yields compared to the hard reds, averaging 34 bu/A and 22 bu/A, respectively. As of last year, Treasure and Eden were the highest and lowest yielding soft white wheats. However, yield rankings for the hard reds changed in 2012, with Volt and Choteau having the highest and lowest yields for the hard red class.

Not surprisingly, grain quality was negatively affected by the midge damage. Test weights were low and averaged 55 lb/bu and 53 lb/bu for the soft white and hard red classes, respectively. Protein also varied between market classes since yield is inversely related to protein. The soft white and hard red varieties averaged 14.68 and 17.41 percent protein, respectively. Protein levels for the hard reds varied from a high of 18.7 for Solano to a low of 15 for Faller. In contrast, soft whites varied from a high of 16 for Alpowa to a low of 12.17 for Treasure.

Falling numbers was another quality trait of interest. There were no differences in falling numbers among the two market classes, with the soft whites averaging 274 and the hard reds averaging 268. Falling numbers for the hard reds varied from a high of 323 for Amidon to a low of 177 for Solano, while the soft whites varied from a high of 357 for Jubilee to a low of 172 for Louise. Although no difference in falling numbers could be detected, there was a trend for falling numbers to decrease as midge densities increased.

Overall, the results demonstrate that while midge densities vary among varieties, there are no differences in oviposition preference between hard red and soft white varieties.

Table 1. Effect of wheat market class on OWBM densities. Kalispell, MT 2011.

Variety	Yield	OWBM	Test wt.	Protein	FN	Heading	Height
	BU	avg	lb/bu	%	sec	julian	inches
<i>soft white</i>							
Alpowa	23.9	146.3	56.1	16.00	266	205.0	40
Alturas	29.8	147.7	55.6	15.13	283	200.7	38
Calorwa	44.0	150.0	54.9	14.47	306	198.7	35
Cataldo	27.9	145.3	55.0	14.80	274	195.7	36
Eden	11.8	272.0	53.2	15.67	235	199.7	37
Jubilee	40.2	139.7	56.4	13.37	357	202.0	40
Louise	32.0	203.3	53.5	15.83	172	199.3	41
Nick	37.2	83.3	55.1	14.63	267	197.3	35
Pettit	14.6	147.7	51.9	14.77	250	196.0	34
Treasure	78.9	1.0	57.9	12.17	327	202.7	38
mean	34.0	143.6	55.0	14.68	274	199.7	37
<i>hard red</i>							
Amidon	16.4	183.0	54.4	18.27	323	198.3	44
Choteau	7.8	214.0	51.9	18.40	245	197.0	36
Faller	43.7	108.3	53.3	15.03	367	198.3	39
Fortuna	10.0	159.7	53.2	17.70	295	199.3	44
Hank	9.3	321.3	48.9	17.47	199	196.3	35
McNeal	15.9	269.0	51.3	17.93	303	198.7	39
Reeder	37.8	81.7	58.4	17.30	272	197.0	40
Solano	12.7	341.0	50.6	18.70	177	199.0	30
Vida	10.3	145.7	53.1	18.17	188	198.0	39
Volt	55.6	96.7	57.9	15.17	306	202.3	37
mean	21.9	192.0	53.3	17.41	268	198.4	38
<i>white vs red</i>							
LSD (P=.05)	9.23	46.15	1.30	0.63	NS	1.25	NS
CV	63.84	53.17	4.61	7.69	23.82	1.22	9.48
MC Pr>F	0.0114	0.0402	0.0159	0.0001	0.7125	0.0484	0.3072
<i>among varieties</i>							
LSD (P=.05)	5	77.1	1.303	0.49	62.09	1.07	2.83
CV	10.84	27.84	1.46	1.83	13.9	0.33	4.52
TRT Pr>F	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001