

Project Title: Evaluation of spring wheat varieties for resistance to the Orange Wheat Blossom Midge (OWBM).

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Objectives: To evaluate spring wheat varieties for agronomic performance and resistance to the OWBM.

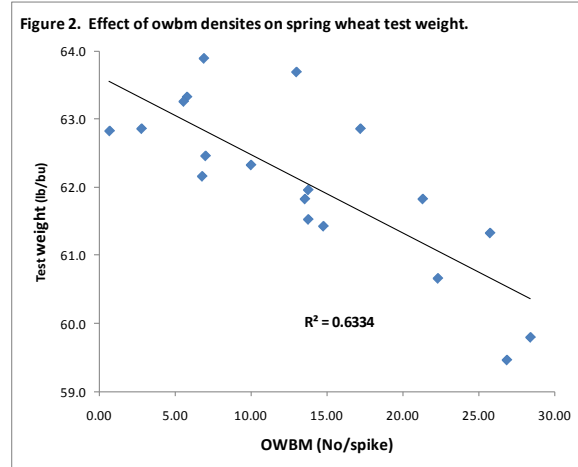
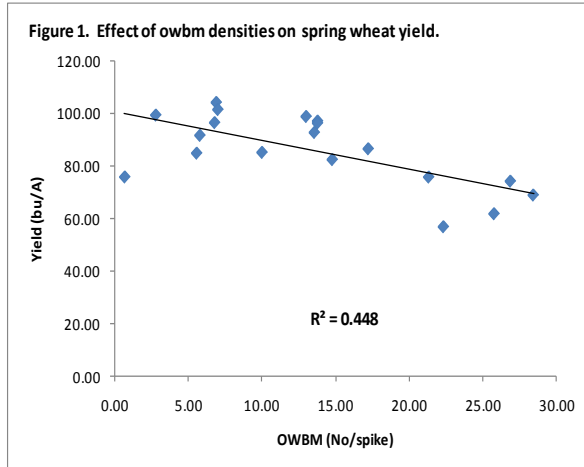
Results:

Nineteen commercially available spring wheat varieties were evaluated as a subset within the Advanced Yield Trial to assess resistance to the OWBM. The previous crop was alfalfa and the field was fertilized with 11-52-80 lb/A of N-P-K, respectively. 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 meq/100g. The experimental design was a randomized complete block with three replications. The spring wheat varieties were planted on May 13, 2009 at a rate of 80 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 was recorded when 50 percent of the plants in a plot had half of the head exposed. Height measurements were recorded on August 7. Three randomly selected spikes were collected on August 5. Each spike was dissected and the number of larvae, damaged kernels and healthy kernels were determined. Plots were harvested on September 2. Grain yield, test weight, protein, and moisture were determined in each plot, while falling numbers were determined from a composite sample of all three replications.

The average Julian heading date was 188, four days earlier than the previous year. Heading date varied by 11 days, with MTHW0771 (June 27) and Volt (July 8) being the first and last entries to head, respectively (Table 1). While plant developmental rates varied among varieties, there was not a strong relationship between plant phenology and OWBM infestation ($R^2 = 0.28$).

Midge densities were very low during 2009. The average density was only 13 larvae per spike, and ranged as high as 28 larvae per spike for Lillian. In comparison, owbm densities during 2008 averaged 85 larvae per spike, with the highest density being 194 larvae per spike for MTHW0471. Nevertheless, spring wheat yields were negatively affected by the owbm, despite the low infestation (Figure 1.)



Spring wheat yields averaged 86 bu/A, ranging from a low of 57 for Thatcher to a high of 104 for MTHW0771 (Table 1). The difference in yields among the entries was partly due to owbm infestation ($R^2 = 0.44$), demonstrating that oviposition preference can be observed even under low selection pressures. There was a moderate relationship between larvae per spike and the number collected as dockage ($R^2 = 0.33$).

Although midge damage decreased grain yields, the insect had a more direct effect on test weights (Figure 2). Overall, test weights decreased as midge densities increased, and the relationship was quite strong ($R^2 = 0.63$). Test weights averaged 62.1 lb/bu, and ranged from a high of 63.9 for MTHW0771 to a low of 59.5 for Outlook.

Protein ranged from a low of 13.9 for Corbin and Kuntz, to a high of 16.6 for Lillian. Lillian also had the highest midge density, illustrating that protein tended to increase as midge densities increased. However the relationship was not strong ($R^2 = 0.14$). Falling numbers varied from a low of 131.7 for Lillian to a high of 294.3 for Corbin. However, there was no relationship between midge densities and falling numbers. Moreover, all entries were well below the minimum standard of 330.

Summary:

Yields and test weights were negatively affected by midge damage despite the low densities. Reeder and Jedd continue to demonstrate reduced oviposition preference, while Outlook and Conan appear to attract females.

Table 1. Agronomic data from the spring wheat AYT off-station subset. Kalispell, MT, 2009

Cultivar	Planted: May 13, 2009					Harvested: September 2, 2009				
	Yield	Test weight	Grain moisture	Protein	Falling numbers	Heading date	Plant height	OWBM dockage ¹	OWBM	Damaged kernels
	bu/A	lb/bu	%	%	sec.	Julian	inches	No/pan	No/spike	%
MTHW0771	104.2	63.9	11.3	14.5	223.7	178.7	27.3	3.0	6.9	10.1
REEDER	101.5	62.5	12.2	14.9	234.7	185.0	33.7	2.3	7.0	15.3
MT0414	99.4	62.9	11.0	15.1	237.7	185.0	32.5	1.3	2.8	4.7
JEDD	98.9	63.7	11.2	14.1	241.0	181.0	25.9	2.7	13.0	17.3
ONEAL	97.2	62.0	13.0	14.7	269.3	185.0	32.0	7.3	13.8	19.0
CHOTEAU	96.6	62.2	10.7	14.9	217.0	182.7	30.6	10.3	6.8	13.7
VIDA	96.4	61.5	11.5	14.9	166.0	183.3	32.0	3.7	13.8	20.6
HANK	92.8	61.8	11.1	14.3	175.0	181.0	30.1	1.0	13.6	14.4
CORBIN	91.7	63.3	11.6	13.9	294.3	182.7	31.8	4.3	5.8	13.4
KUNTZ	86.6	62.9	11.4	13.9	260.3	184.7	28.9	7.3	17.2	24.0
FREYR	85.3	62.3	11.6	15.1	180.0	183.7	33.1	8.0	10.0	17.6
KELBY	85.0	63.3	10.8	15.3	156.3	182.0	28.7	1.7	5.6	9.3
MCNEAL	82.5	61.4	10.5	15.3	256.7	185.0	31.2	7.0	14.8	23.1
FORTUNA	75.9	62.8	11.3	14.9	201.3	183.7	39.8	3.0	0.7	1.4
VOLT	75.9	61.8	11.3	14.1	173.0	189.7	31.5	18.7	21.3	23.6
OUTLOOK	74.3	59.5	10.3	15.6	181.7	185.3	32.5	6.3	26.9	42.1
LILLIAN	69.1	59.8	10.8	16.6	131.7	187.0	39.8	19.0	28.4	43.0
CONAN	62.0	61.3	11.7	15.1	220.3	183.7	30.7	4.7	25.8	24.2
THATCHER	57.0	60.7	10.7	15.4	236.0	188.3	43.4	29.3	22.3	26.3
MEAN	85.9	62.1	11.3	14.9	213.5	184.1	32.4	7.4	13.5	19.1
Pr>F (trt)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C.V.	8.1	0.8	4.0	2.6	14.4	3.3	3.7	81.4	57.8	51.1
LSD (0.05)	11.6	0.8	0.7	0.6	50.9	0.9	2.0	10.0	12.9	16.2

¹Number of orange wheat blossom midge larvae found after processing grain samples with the Carter Day dockage tester.