

Project Title: Screening of Spring Wheat Varieties for Resistance to the Orange Wheat Blossom Midge

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Objective: Evaluate commercially available spring wheat varieties for potential resistance to the Orange Wheat Blossom Midge

Results:

Spring wheat cultivars from the 2007 Advanced Yield Trial (AYT) were evaluated for resistance to the orange wheat blossom midge. Five spikes were randomly selected from each plot in the first replication in order to quantify midge infestation and kernel damage. Midge densities were less in 2007 as compared to the previous year, with average midge numbers per spike being 19 and 6 during 2006 and 2007, respectively. The highest midge infestations were observed with MT 0607 and Patwin, both of which had densities of 40 larvae per spike. In contrast, larvae were absent from MT 0413, MT 0658, MT 0667, and Reeder (Table 1).

A subset of 30 spring wheat cultivars from the 2006 and 2007 AYT were compared in order to assess the consistency of cultivar performance over years (Table 2). On average, MT0413 had the lowest midge infestation, followed by MT 0405, Choteau, and MT 0516. Fortuna, Norpro, and Reeder were intermediate in terms of larvae numbers, while Ernest, McNeal, and Thatcher had some of the highest larvae counts. Most entries appeared to respond in a like manner during each year, but exceptions were noted. For example, Corbin and Hank each had high larvae numbers during 2006, but very low numbers during 2007.

An even smaller subset of 14 cultivars was identified within the Advanced Yield Trial and the Midge Screening Nursery. Data from the 2006 and 2007 AYT was compared with that of the first two plantings of the 2007 Midge Screening Nursery to provide greater insights as to cultivar susceptibilities to the midge (Table 3). Midge infestations for a given cultivar varied widely during 2007 depending on the nursery and planting date. For example, infestations in Hank ranged from as low as 1 to as high as 245. Other inconsistencies also were observed. For example, Choteau had less than 10 larvae per spike in the 2006 and 2007 AYT, but greater than 100 larvae per spike in the Midge Nursery. Despite the wide swings in larvae numbers, certain trends were evident. MT0414, MT0415 and Reeder each appeared to demonstrate a degree of resistance, whereas McNeal and Hank appeared to be very susceptible to the midge.

Summary:

Although high midge numbers never materialized in the 2007 Advanced Yield Trial, the larvae numbers observed in the Midge Screening Trial eclipsed even that of the 2006 Advanced Yield Trial. A comparison of common entries among different nurseries suggests that MT0414, MT0415 and Reeder have some form of resistance against the midge.

Future Plans:

Continue spring wheat evaluations for the purpose of identifying cultivars with resistance to the orange wheat blossom midge

Table 1. Midge damage and agronomic performance from spring wheat entries in the Advanced Yield Trial grown at Kalispell, MT in 2007.

Cultivar/Line	Larvae per spike		% Damaged kernels		Yield bu/ac	Test weight lb/bu	Heading Julian
	Mean	S.E.	Mean	S.E.			
MT 0413	0.0	0.0	0.0	0.0	55.3	57.3	170.0
MT 0658	0.0	0.0	0.0	0.0	56.0	57.4	170.0
MT 0667	0.0	0.0	0.0	0.0	58.4	58.0	169.0
Reeder	0.0	0.0	0.0	0.0	62.8	57.0	173.0
Clear White	0.2	0.2	0.5	0.5	54.2	55.7	169.0
Fortuna	0.4	0.4	0.8	0.8	51.5	57.5	172.0
MT 0516	0.4	0.2	0.6	0.6	58.7	57.4	169.0
MT 0657	0.6	0.6	0.5	0.5	60.1	55.2	174.0
Kelby	0.6	0.6	0.7	0.7	46.7	59.3	168.0
MT 0414	0.8	0.8	0.6	0.6	60.8	56.9	169.0
Hank	1.0	0.6	0.8	0.5	55.8	55.2	169.0
MT 0663	1.0	0.5	2.9	1.3	62.5	57.6	173.0
Corbin	1.2	0.8	1.8	1.3	53.0	58.0	171.0
MT 0628	1.4	1.2	2.0	1.3	56.8	56.5	172.0
MT 0674	1.4	0.9	4.0	2.9	54.9	57.7	169.0
MT 0415	1.6	1.6	3.0	3.0	64.1	59.1	170.0
MT 0405	1.8	1.8	3.0	3.0	56.6	58.1	170.0
MT 0659	1.8	1.1	2.9	1.8	52.4	56.7	174.0
MT 0640	2.0	1.4	3.2	2.1	54.0	58.5	167.0
AP604 CL	2.0	1.5	3.7	3.1	54.0	58.6	169.0
Conan	2.2	0.8	3.5	1.4	46.2	58.0	172.0
MT 0605	2.2	1.3	2.7	1.4	56.8	53.9	175.0
MT 0632	2.2	0.7	4.6	1.3	58.2	57.3	174.0
MT 0664	2.2	1.2	3.3	2.0	57.3	56.5	171.0
MT 0519	2.4	0.7	3.4	0.6	58.6	59.9	168.0
MT 0608	2.8	1.2	3.8	1.6	60.2	57.8	169.0
MT 0614	2.8	2.8	3.6	3.6	52.3	59.6	170.0
MT 0643	3.0	1.3	5.5	2.6	47.2	57.7	172.0
Kuntz	3.0	1.1	2.5	1.1	51.4	58.7	174.0
BZ9M1024	3.0	1.2	3.1	1.6	54.6	58.0	170.0
MT 0606	3.4	2.0	5.1	3.0	58.3	55.4	173.0
MT 0638	3.4	1.8	3.4	1.7	57.1	58.0	171.0
MT 0666	3.4	1.2	7.9	3.4	55.4	55.6	174.0
Choteau	3.6	2.4	6.4	3.9	47.2	58.3	169.0
MT 0617	3.8	3.1	5.4	4.3	67.5	58.5	168.0

Table 1 (continued). Midge damage and agronomic performance from spring wheat entries in the Advanced Yield Trial grown at Kalispell, MT in 2007.

Cultivar/Line	Larvae per spike		% Damaged kernels		Yield bu/ac	Test weight lb/bu	Heading Julian
	Mean	S.E.	Mean	S.E.			
MT 0624	3.8	1.7	5.2	2.3	58.5	55.7	173.0
MT 0416	4.4	3.0	6.3	4.6	60.0	58.3	171.0
MT 0550	4.8	3.2	10.8	7.5	47.7	59.3	167.0
MT 0336	5.0	2.3	12.4	5.8	53.9	58.1	174.0
WPB Germany	5.0	2.3	5.3	2.4	59.0	60.4	175.0
MT 0613	5.2	2.8	8.6	4.8	58.4	56.4	173.0
MT 0623	5.2	1.7	7.0	3.0	52.9	55.1	176.0
MT 0631	5.2	2.4	7.0	2.9	49.5	56.8	170.0
Jedd	5.2	1.8	7.3	2.9	54.6	60.4	169.0
Vida	5.4	3.3	6.0	3.0	64.3	58.0	173.0
MT 0627	5.8	3.9	6.1	3.3	54.3	51.1	172.0
MT 0515	6.0	3.6	10.8	6.2	55.0	58.9	170.0
MT 0602	6.2	4.2	6.2	4.1	56.7	56.8	172.0
Freyr	6.6	4.3	9.1	6.2	54.1	59.5	170.0
Outlook	6.8	1.9	10.3	3.5	55.8	55.2	176.0
MT 0539	6.8	3.0	10.4	4.5	54.4	53.6	174.0
MT 0626	6.8	1.7	13.6	4.1	57.0	57.3	173.0
BZ999592	8.8	2.7	6.7	2.1	55.1	56.9	175.0
MT 0562	10.0	2.7	11.0	2.6	45.6	58.0	174.0
Thatcher	10.6	3.8	10.8	3.7	40.8	54.9	177.0
McNeal	11.6	8.0	9.3	5.0	52.8	56.2	175.0
Ernest	13.2	7.8	5.1	2.8	45.7	58.8	175.0
MT 0669	13.4	6.6	11.3	6.3	54.9	59.1	174.0
BZ902413	14.0	8.6	18.1	8.9	51.0	58.8	169.0
MTHW0471	17.4	6.6	14.7	4.2	45.6	59.4	175.0
MT 0645	18.8	8.9	17.3	9.1	45.6	58.6	174.0
Norpro	20.8	11.5	15.0	8.0	48.4	57.8	173.0
MT 0607	40.0	37.8	21.1	17.9	57.2	55.4	173.0
Patwin	40.0	7.8	32.7	6.2	39.6	52.4	176.0
Means	5.9		6.4		54.5	57.3	171.8

Table 2. Midge damage and agronomic performance of common entries in the 2006 and 2007 Advanced Yield Trial grown at Kalispell, MT.

Cultivar/Line	Larvae per spike		% Damaged kernels		Yield bu/ac		Heading Julian	
	2006	2007	2006	2007	2006	2007	2006	2007
MT 0413	3.6	0.0	6.6	0.0	92.9	55.3	177.0	170.0
MT 0405	7.2	1.8	11.8	3.0	86.6	56.6	176.0	170.0
Choteau	7.4	3.6	9.2	6.4	74.2	47.2	179.0	169.0
MT 0516	11.2	0.4	8.4	0.6	93.2	58.7	178.0	169.0
Fortuna	12.2	0.4	17.6	0.8	41.4	51.5	180.0	172.0
MT 0416	12.4	4.4	15.4	6.3	76.4	60.0	178.0	171.0
MT 0539	13.0	6.8	19.8	10.4	67.2	54.4	179.0	174.0
MT 0414	13.2	0.8	9.5	0.6	74.6	60.8	178.0	169.0
MT 0336	17.0	5.0	25.9	12.4	65.8	53.9	179.0	174.0
Norpro	20.2	20.8	27.8	15.0	70.7	48.4	180.0	173.0
MT 0519	20.6	2.4	25.5	3.0	68.2	58.6	178.0	168.0
MT 0415	20.6	1.6	31.8	3.4	79.6	64.1	178.0	169.0
Reeder	22.6	0.0	27.9	0.0	75.1	62.8	178.0	173.0
Kelby	23.2	0.6	27.0	0.7	77.9	46.7	178.0	168.0
MT 0550	23.4	4.8	43.5	10.8	79.2	47.7	177.0	167.0
Conan	24.6	2.2	22.6	3.5	56.5	46.2	179.0	172.0
MT 0515	24.8	6.0	38.4	10.8	81.1	55.0	179.0	170.0
Outlook	27.8	6.8	35.4	10.3	63.0	55.8	183.0	176.0
Freyr	30.4	6.6	44.0	9.1	68.5	54.1	178.0	170.0
WPB Germany	31.4	5.0	37.9	5.3	85.2	59.0	183.0	175.0
Corbin	40.6	1.2	47.8	1.8	44.8	53.0	179.0	171.0
BZ9M1024	42.0	3.0	29.9	3.1	53.2	54.6	178.0	170.0
Ernest	49.8	13.2	33.0	5.1	50.2	45.7	179.0	175.0
McNeal	56.6	11.6	33.7	9.3	51.3	52.8	182.0	175.0
Hank	56.8	1.0	48.3	0.8	74.0	55.8	178.0	169.0
BZ999592	63.2	8.8	52.1	6.7	58.8	55.1	181.0	175.0
BZ902413	65.6	14.0	59.1	18.1	49.0	51.0	178.0	169.0
Thatcher	66.4	10.6	46.8	10.8	22.3	40.8	184.0	177.0
MT 0562	78.8	10.0	66.4	11.0	52.9	45.6	180.0	174.0
MTHW0471	99.6	17.4	53.8	14.7	32.4	45.6	182.0	175.0
Means	32.9	5.7	31.9	6.5	65.5	53.2	179.2	171.6

Table 3. Advanced Yield Trial (AYT) and Midge Screening Trial (Midge) subset comparison of midge damage in spring wheat at Kalispell, MT.

Cultivar/Line	Larvae per spike					Percent damaged kernels					Heading date (Julian)			
	Mean	AYT		Midge		Mean	AYT		Midge		AYT		Midge	
		2006	2007	2007 ^{p1}	2007 ^{p2}		2006	2007	2007 ^{p1}	2007 ^{p2}	2006	2007	2007 ^{p1}	2007 ^{p2}
MT 0414	15	13	1	14	32	15	6	1	16	37	178	169	179	183
MT 0415	18	21	2	23	26	24	12	3	46	36	178	169	180	183
Reeder	31	23	0	20	79	22	5	0	32	51	178	173	179	183
Norpro	40	20	21	74	45	35	10	17	72	39	180	173	180	184
Fortuna	43	12	0	62	99	37	4	1	62	79	180	172	180	183
MT 0515	49	25	6	85	82	36	10	10	66	56	179	170	180	185
Freyr	51	30	7	72	93	38	10	9	65	66	178	170	179	183
Ernest	53	50	13	84	65	36	9	5	68	64	179	175	181	183
Corbin	57	41	1	41	147	37	20	2	45	80	179	171	178	182
Choteau	66	7	4	107	145	39	5	5	75	72	179	169	178	182
Conan	68	25	2	90	157	37	8	3	63	74	179	172	179	184
Outlook	70	28	7	115	130	46	12	10	83	79	183	176	181	185
McNeal	84	57	12	128	142	47	15	10	83	79	182	175	181	185
Hank	110	57	1	137	245	45	13	1	77	88	178	169	177	184
Mean	54	29	5	75	106	35	10	5	61	64	179	172	179	185

The 2006 AYT was planted April 28. The 2007 AYT was planted April 16. P1 and P2 represent planting dates of May 1 and May 9, 2007, respectively.