

Title: Evaluation of Sm1 Advanced Spring Wheat Lines for Resistance to the Wheat Midge – 2016

Objective: To evaluate spring wheat experimental lines for wheat midge resistance and agronomic performance in environments and cropping systems where the wheat midge is prevalent.

Results:

Four experimental spring wheat lines were evaluated for resistance to the wheat midge in comparison to the midge resistant and susceptible check varieties, Egan and Hank, respectively. This nursery was established at Kalispell and Conrad, MT. Midge populations were low to non-existent at both locations with the susceptible variety, Hank, having an average of only 0.7 and 4.6 larvae per spike at Conrad and Kalispell, respectively. 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.

At Kalispell, significant differences were observed for heading, height, stripe rust, yield, protein, test weight, and number of wheat midge per spike (Table 2). Heading averaged 178 days. Plant height averaged 33.1 inches and ranged from 30.2 inches for MT 1573 to 37.0 inches for Egan. Stripe rust was present in the nursery despite having been treated with a fungicide. Stripe rust infection averaged 13.4% and ranged from 4.3% for Egan to 35.0% for Hank. Tan spot also was present, and was significant at a probability level of 0.054 percent. Tan spot infection averaged 13.8% and ranged from 0.0% for Egan, to 31.7% for MT1573. Yield averaged 91.1 bu/A, and ranged from 82.8 bu/A for Hank to 101.6 bu/A for Egan. Protein averaged 14.15%, and ranged from 13.47% for MT 1570 to 15.59% for Egan. Test weight averaged 59.9 lb/bu and ranged from 58.1 lb/bu for Hank to 61.3 lb/bu for MT 1570. The number of wheat midge per spike averaged 0.8. The susceptible variety Hank had 4.6 wm/spike while the resistant varieties afforded complete mortality.

At Conrad, no significant differences were observed for height, lodging, yield, test weight, protein or the number of larvae per spike (Table 3). Yields averaged 65.9 bu/A, but test weights were low, averaging 55.3 lb/bu. Proteins averaged 14.49 and all entries exceed 14% except for MT 1574. Egan had the highest protein at 15.08 percent.

Summary:

The four experimental lines provided 100% midge control in Kalispell. However, in Conrad there was less than 1% infestation. Additionally, the experimental lines are significantly shorter than Egan in Kalispell but no differences were observed in Conrad. However, they produced lower yields than Egan. Efforts should continue to identify short stature, high yielding, and midge resistant wheat lines.

Table 1. Materials and Methods.

Kalispell			
Seeding Date:	5/2/2016	Harvest Date:	8/26/2016
Julian Date:	123	Julian Date:	239
Seeding Rate:	80 lb/A	Soil Type:	Creston SiL
Previous Crop:	Spring wheat	Soil Test:	99-32-432-40
Tillage:	Conventional	Fertilizer:	235-40-60
Herbicide:	Huskie 11oz/A + Axial 16.4 oz/A + NIS 1qt/100gal + UAN 28%		
Fungicide:	Tilt at 4oz		
Conrad			
Seeding Date:	5/4/2016	Harvest Date:	9/15/2016
Julian Date:	125	Julian Date:	259
Seeding Rate:	N/A	Soil Type:	Silty Clay
Previous Crop:	Spring wheat	Soil Test:	N/A
Tillage:	No-till		
Fertilizer:	100 lb ammonium sulfate, 381 lbs urea, 60 lbs N		
Herbicide:	Preplant: RT3 18 oz/A + Hellfire 1 qt/A. Postplant: 4 oz/ac Rimfire Max, 16 oz/ac Brox M, 4 oz/ac propiconazole		

Table 2. Agronomic data from the evaluation of Sm1 advanced spring wheat lines, Kalispell, MT - 2016.

Cultivar	HD Julian	HT in.	SR %	TS %	LOD %	YLD ¹ bu/A	PRO ² %	TWT ¹ lb/bu	WM no./spk
Egan	179	37.0	4.3	0.0	0.0	101.6	15.59	58.6	0.0
Hank	178	32.4	35.0	3.3	0.0	82.8	13.48	58.1	4.6
MT 1570	178	31.9	14.0	11.7	2.3	94.8	13.47	61.3	0.0
MT 1572	178	32.6	10.0	19.3	0.0	89.5	14.64	60.8	0.0
MT 1573	178	30.2	7.3	31.7	0.0	93.9	13.72	60.9	0.0
MT 1574	179	34.5	10.0	16.7	0.0	83.8	14.02	59.5	0.0
Mean	178	33.1	13.4	13.8	0.4	91.1	14.15	59.9	0.8
CV	0.2	2.0	38.1	80.5	424.3	3.8	1.16	0.3	80.2
LSD	0.7	1.2	9.3	20.2	ns	6.2	0.30	0.4	1.1
Pr>F	0.0042	0.0001	0.0003	0.0538	0.4651	0.0004	0.0001	0.0001	0.0001

HD: heading date, HT: height, SR: stripe rust, TS: tan spot, LOD: lodging, YLD: yield, PRO: protein, TWT: test weight, WM: wheat midge, no./spk: number/spike, ns: nonsignificant.

¹ adjusted to 13% moisture, ² adjusted to 12% moisture.

Table 3. Agronomic data from the evaluation of Sm1 spring wheat lines, Conrad, MT - 2016.

Cultivar	HT in	LOD %	YLD ¹ bu/A	PRO ² %	TWT ¹ lb/bu	WM no./spk
Egan	32.3	3.7	73.8	15.08	56.6	0.0
Hank	31.7	0.5	56.2	14.10	53.4	0.7
MT 1570	30.3	0.5	64.4	14.61	54.2	0.3
MT 1572	32.3	0.5	69.5	14.95	55.6	0.3
MT 1573	28.3	0.5	61.4	14.43	56.6	0.0
MT 1574	31.0	6.8	70.1	13.77	55.2	0.3
Mean	31.0	2.1	65.9	14.49	55.3	0.3
CV	6.1	144.2	13.8	6.07	2.7	182.0
LSD	ns	ns	ns	ns	ns	ns
Pr>F	0.1704	0.1191	0.2673	0.4846	0.1247	0.6113

HT: height, LOD: lodging, YLD: yield, PRO: protein, TWT: test weight, WM: wheat midge, no./spk: number per spike, ns: nonsignificant.

¹ adjusted to 13% moisture, ² adjusted to 12% moisture.