

Reaction of winter wheat cultivars and breeding lines to eyespot in Washington, 2013.

Field plots were sown at the Plant Pathology Farm in Pullman, WA in a Thatuna silt loam soil (pH 5.7) on 25 Sep 2012. Seed were sown at the rate of 90 lb/A in four-row plots, 4.0 ft wide by 16.7 ft long, with a 12-in. spacing between rows in a field managed in a 2-yr, wheat-summer fallow rotation. The experimental design was a randomized complete block with each genotype replicated four times. Prior to planting, seed was treated with CruiserMaxx Cereals and Cruiser 5FS, 5.0 and 1.0 fl oz/100 lb seed, respectively. Based on soil test recommendations, 125 lb N, 20 lb P, 13 lb S, and 15 lb Cl/A were applied at seeding. On 12 Oct 2012, Zidua (1 oz/A) was applied over the plot area to control annual ryegrass (*Lolium multiflorum*) with an electric pump sprayer, mounted on a 4-wheel ATV, equipped with 11 TeeJet XRC 8002 nozzles-on a 20-in. spacing, at 12.5 gal/A. On 6 Nov 2012, plots were inoculated with a conidial suspension (1.0×10^5 /ml) containing four isolates of *Oculimacula acuformis* and three isolates of *O. yallundae* using a CO₂-pressurized (50 psi) back pack sprayer equipped with four TeeJet 8010 nozzles-on a 12-in. spacing, at 180 gal/A. Due to incomplete control of annual ryegrass and presence of broadleaf weeds, Goldsky 0.84EC (16 fl oz/A), PowerFlex 0.075DF (3.5 oz/A), Dagger 5.2 lb. MCPA Ester (12 fl oz/A), and McGregor ammonium sulfate (AMS) Premium Blend MAX (1.5 lb/A) was applied as a tank mix on 9 Apr with the 4-wheel ATV equipment described previously. Conditions were conducive for stripe rust (*Puccinia striiformis*) development and Tilt (4.0 fl oz/A) and McGregor Crop Oil M (32 fl oz/A) was applied on 30 May over the plot area with a CO₂-pressurized (40 psi) backpack sprayer equipped with six TeeJet XR 11002 nozzles-on a 17-in. spacing, at 17.6 gal/A to control stripe rust. Approximately 50 stems were sampled from replicates 1 and 2 on 20 Jun and replicates 3 and 4 on 25 Jun and stored in a walk-in cooler at 39°F. Samples ranged from 20 to 50% kernel extension near mid-spike, corresponding with Zadoks 70.2 to 70.5. Eyespot severity was determined by rating stem bases, 1 to 2 internodes above the crown, for symptom severity using a 0 to 4 scale where 0 = no visual symptoms, 1, 2 and 3 = up to 25, 50 and 75% of the stem circumference colonized by a lesion(s), respectively, and a 4 = a stem with a lesion girdling the base. Yield and test weight were determined by harvesting each plot with a small-plot combine between 19 and 20 Aug. A subsample of the grain was cleaned before test weight was determined.

Conditions were favorable for eyespot development during the winter 2012 to 2013 due to intermittent snow cover. Overall eyespot pressure was moderately severe based on the reaction of susceptible cultivars Eltan and Hill 81. Eyespot incidence, severity and index ranged from 58.8 to 98.0%, 2.8 to 3.9 and 42.5 to 95.1, respectively. Nineteen of the entries had a statistically similar disease index (42.5 to 69.9) to Madsen, the resistant control. Thirty-one of the entries had a statistically similar disease index to Eltan and Hill 81, the susceptible controls. Thirteen of the entries had a statistically similar disease index (55.0 to 69.9) that was an intermediate reaction between the resistant and susceptible control cultivars. Yield and test weight ranged from 90.2 to 170.1 (bu/A) and 55.3 to 61.3 (lb/bu), respectively. There was a non significant, negative correlation between disease index and yield and test weight ($r = -0.07143$, $P = 0.3694$) and ($r = -0.05986$, $P = 0.4521$), respectively. The negative correlation is likely due to soil moisture and temperature stress, which were not significant enough to cause a difference in yield response between the susceptible and resistant entries.

Genotype	Eyespot incidence ^{z, y} %	Eyespot severity ^{z, y, x} 0 to 4	Eyespot index ^{z, w} 0 to 100	Yield ^z bu/A	Test weight ^z lb/bu
ARS970230-6C.....	58.8	2.8	42.5	150.2	59.0
OR2071071.....	65.0	2.9	48.7	155.6	55.3
Madsen.....	64.8	2.9	49.2	147.7	58.3
WA8177 (CF100091).....	65.5	3.1	51.3	143.1	58.5
Finch.....	70.0	2.9	51.4	170.1	59.5
WA008151.....	68.0	3.0	52.6	159.0	58.9
OR2080641.....	75.5	2.9	54.6	157.6	58.1
ARS Chrystal.....	70.4	3.1	55.0	136.9	59.5
03PN087-15.....	74.1	2.9	56.2	156.2	59.5
WA008134.....	73.0	3.1	57.4	150.2	59.8
OR2080924.....	75.7	3.0	58.6	165.2	57.2
Cara.....	77.1	3.1	61.9	139.1	58.1
WA8171.....	75.2	3.2	62.1	157.4	59.8
ARS Selbu.....	81.0	3.1	62.6	155.5	61.3
ARS Amber.....	84.0	3.1	65.4	159.3	59.9
WA8155.....	78.2	3.3	65.8	121.9	58.5
WA8172.....	85.0	3.1	66.8	150.0	59.6
OR2070870.....	80.5	3.2	67.7	145.1	59.1
ARS Crescent.....	86.5	3.2	68.9	136.4	58.6
WA008153.....	82.8	3.3	69.9	150.2	59.5
WA8143.....	78.5	3.5	70.6	117.1	58.2
04PN047-7.....	89.5	3.2	71.7	168.7	60.3
Hill 81.....	84.0	3.5	75.5	130.0	59.1
Eltan.....	88.0	3.4	75.6	128.3	58.6
JC1108.....	89.0	3.4	75.6	155.5	58.3
OR08047P94.....	90.0	3.5	80.1	158.4	57.0
07PN013#38.....	93.6	3.4	80.4	155.6	58.8
UI SRG.....	89.5	3.6	80.6	109.0	59.3

Kaseburg (OR2071628)	90.3	3.6	81.0	147.9	57.3
IDO869	93.0	3.5	81.3	149.0	60.1
MT0978	86.7	3.7	81.7	124.1	59.7
JC1103	90.4	3.6	81.8	90.2	59.5
MTW08168	93.5	3.5	82.5	127.5	59.6
MT08172	93.6	3.5	82.8	114.9	58.3
IDO816	92.0	3.6	83.0	107.6	59.3
UI Silver	92.6	3.6	83.9	117.5	59.9
SYN 107	95.6	3.6	85.7	170.0	59.0
DAS002	95.2	3.8	89.9	124.0	59.6
MTS0808	95.9	3.8	92.3	114.8	59.7
DAS001	98.0	3.9	95.1	136.0	57.8
LSD _{0.05}	19.4	0.4	20.7	22.7	1.2
Pr>F	0.0005	<0.0001	<0.0001	<0.0001	<0.0001

^z Fisher's protected ($P = 0.05$) least significant difference (LSD) was used to compare treatment means. Means are based on four replicates.

^y Samples consisting of approximately 50 stems were removed from each plot on 20 Jun (reps 1 and 2) and 25 Jun (reps 3 and 4) and transported to the farm building where the percentage of eyespot infected stems and eyespot severity, as reflected by extent of colonization, was determined by visual inspection of each stem.

^x Eyespot severity was determined by rating stem bases, 1 to 2 internodes above the crown, for symptom severity using a 0 to 4 scale where 0 = no visual symptoms, 1, 2 and 3 = up to 25, 50 and 75% of the stem circumference colonized by a lesion(s), respectively, and a 4 = a stem with a lesion girdling the base.

^w Eyespot index, which ranges from 0 to 100, was calculated by multiplying percent infected stems (eyespot incidence) by eyespot severity of infected stems and dividing by four.