

Reaction of winter wheat cultivars and breeding lines to eyespot in Washington, 2012.

Field plots were sown at the Plant Pathology Farm in Pullman, WA in a Thatuna silt loam soil (pH 6.4) on 28 Sep 2011. Seed were sown at the rate of 90 lb/A in four-row plots, 3.0 ft wide by 17.4 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, seeds were treated with CruiserMaxx Cereals and Cruiser 5FS, 5.0 and 1.0 fl oz/100 lb seed, respectively. Based on soil test recommendations, 85 lb N, 20 lb P, 13 lb S, and 15 lb Cl/A were applied at seeding. On 20 Oct 2011, 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 2 Nov 2011, plots were inoculated with a conidial suspension (1.0×10^5 /ml) containing two isolates each of *Oculimacula acuformis* and *O. yallundae* using a CO₂-pressurized (50 psi) back pack sprayer equipped with four TeeJet 8010 nozzles, on a 12-in. spacing, at 100 gal/A. Due to average to slightly above average temperatures and above-average precipitation in Mar and Apr, conditions were moderately conducive for stripe rust (*Puccinia striiformis*) development and warranted fungicide applications. On 18 May, four replicate plots of Eltan and Hill 81 were assessed for eyespot symptoms. Sixty-eight of 103 (66%) and 46 of 86 (46%) stems of Eltan and Hill 81, respectively exhibited symptoms of eyespot. On 1 and 19 Jun, Tilt (4.0 fl oz/A) and NuChem 90-NF NIS (0.125% v/v) was applied over the plot area with a CO₂-pressurized (40 psi) backpack sprayer equipped with six TeeJet XR 11003 nozzles, on a 17-in. spacing, at 22 gal/A to control stripe rust (*Puccinia striiformis*). Fungicide applications made after Zadoks growth stage 31 (1st node detectable) have no effect on eyespot disease development. Approximately 50 plants were sampled from individual replicates on 5, 6, 11 & 12 Jul and stored in a walk-in cooler at 39°F. Samples ranged from late kernel extension to early milk development, off-white liquid present, corresponding with Zadoks 71 to 73. 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 on 21 Aug. A subsample of the grain was cleaned before test weight was determined.

Conditions were favorable for eyespot development during the winter 2011 to 2012, due to intermittent snow cover. Overall eyespot pressure was severe based on the reaction of susceptible cultivars Eltan and Hill 81. Eyespot incidence, severity and index ranged from 66.1 to 99.0%, 2.6 to 3.8 and 45.1 to 93.5, respectively. Breeding lines OR2071071 and SYN SWW-2 exhibited significantly lower disease indexes than the resistant control Madsen. Fifty and 50% of the entries had a statistically similar disease index (52.7 to 82.0) and (78.8 to 93.5) to the resistant Madsen and susceptible Eltan and Hill 81 controls, respectively. Twelve and one half percent of the entries had a statistically similar disease index (78.8 to 82.0) that overlapped between the resistant and susceptible control cultivars. Yield and test weight ranged from 66.5 to 154.7 (bu/A) and 58.0 to 63.8 (lb/bu), respectively. Even though precipitation was above average for Mar-Jun, *Oculimacula acuformis* and *O. yallundae* had a significant impact on yield and test weight. Yield and test weight were negatively correlated with disease index ($r = -0.40143$, $P = <0.0001$) and ($r = -0.18264$, $P = <0.0208$), respectively.

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
OR2071071.....	66.1	2.6	45.1	145.2	58.0
SYN SWW-2.....	71.1	2.8	50.7	125.0	61.4
WA8134.....	76.2	2.7	52.7	142.5	60.9
02-10606A.....	76.2	2.8	53.3	154.7	60.5
ARS970161-3L.....	83.6	2.6	55.9	127.2	61.4
ARS990077-1C.....	83.0	2.8	59.7	131.8	59.8
ARS010746-2C.....	80.4	3.0	60.7	131.1	61.3
WA8135.....	79.6	3.2	63.7	114.7	61.8
ARS010780-3C.....	83.0	3.0	63.7	124.2	60.3
Finch.....	87.6	3.0	66.1	128.2	61.6
ARS97230-6C.....	86.0	3.1	66.2	129.7	60.3
Madsen.....	87.9	3.1	67.3	135.9	60.5
ARS010762-2C.....	88.3	3.1	69.3	118.2	59.3
OR08047P94.....	89.5	3.1	71.1	146.1	58.8
03-28404A.....	85.6	3.3	71.3	133.6	61.5
WA8137.....	89.9	3.3	73.9	143.7	61.8
Bruneau.....	92.0	3.3	75.6	130.1	60.8
99-06202A.....	89.1	3.4	77.1	131.3	60.9
SYN SWW-1.....	92.0	3.4	78.8	137.0	59.9
01-10704A.....	94.6	3.4	79.9	129.1	60.1
03-29902A.....	90.5	3.6	80.7	121.8	60.5
MTS0808.....	90.0	3.6	81.3	99.0	62.4
M70871.....	92.0	3.5	82.0	87.0	60.6
OR2080156H.....	93.5	3.5	83.4	114.8	61.5

OR2070870.....	96.0	3.5	83.9	140.2	60.7
SYN HRW-2.....	95.5	3.6	84.5	125.2	62.2
Hill 81	98.0	3.5	85.5	131.8	60.5
WA8153	96.5	3.6	86.1	147.1	60.3
OR2080227H.....	96.0	3.6	87.1	120.9	61.4
Eltan.....	96.0	3.6	87.1	100.7	60.1
WA8152	96.5	3.7	88.4	107.0	60.0
SYN HRW-1.....	98.5	3.6	89.2	96.3	63.8
MTS0832.....	97.5	3.7	89.7	66.5	61.6
SY Ovation	97.0	3.7	90.1	139.7	61.3
WA8154	98.0	3.7	90.3	117.4	61.0
MTS0819.....	95.6	3.8	90.5	89.9	61.6
SYN SWW-3	99.0	3.7	92.5	117.8	59.7
MTS0826	97.5	3.8	92.7	67.3	61.7
WA8142	93.3	3.8	93.3	112.8	61.2
OR2071628.....	98.5	3.8	93.5	117.9	58.1
LSD _{0.05}	11.8	0.4	15.1	23.2	0.7
Pr>F.....	<0.0001	<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 between 30 Jun and 8 Jul 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, 1-2 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.