

Reaction of winter wheat cultivars and breeding lines to eyespot in Washington, 2011.

Field plots were sown in a Thatuna silt loam soil (pH 5.7) at the Plant Pathology Farm in Pullman, WA on 24 Sep 10. Seed were sown at the rate of 90 lb/A in four-row plots, 3.0 ft wide by 17.3 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 were treated with CruiserMaxx Cereals and Cruiser 5FS, 5.0 and 1.0 fl oz/100 lb seed, respectively. Based on soil test recommendations, 38 lb N, 20 lb P, 20 lb S, and 13 lb Cl/A were applied at seeding. On 5 Oct 10, Axiom DF (10 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 9 Nov 10, plots were inoculated with a conidial suspension (1.0×10^6 /ml) containing two isolates each of *Oculimacula acufiformis* 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. On 22 Apr, 6 gal NH₄Cl/A was applied with an electric pump sprayer, mounted on a 4-wheel ATV, equipped with 11 TeeJet StreamJet SJ3-015-VP nozzles, on a 20-in. spacing, at 11.1 gal/A to supply additional Cl to the plants. Due to below-average temperatures and above-average precipitation in the spring of 2011, conditions were highly conducive for stripe rust (*Puccinia striiformis*) development and warranted fungicide applications. On 3 May, a fungicide application to control stripe rust was applied over the plot area, consisting of Headline (9.0 fl oz/A), 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 and 24 Jun, a fungicide application to control stripe rust was applied over the plot area, consisting of Tilt (4.0 fl oz/A) and McGregor M90 NIS (0.15% v/v), with a CO₂-pressurized (40 psi) backpack sprayer equipped with six TeeJet XR 11003 nozzles, on a 17-in. spacing, at 22 gal/A. Approximately 50 plants were sampled from individual replicates on 20 and 30 Jun and stored in a walk-in cooler at 39°F. Samples pulled on 20 Jun ranged from late boot stage to full heading but not flowering, corresponding with Zadoks 45 to 60. Samples pulled on 30 Jun ranged from 80% of spikes flowering to kernel extension of 50%, corresponding with Zadoks 68 to 70.5. Eyespot incidence and severity were evaluated from 21 Jun to 12 Jul. 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 weights were determined by harvesting each plot with a small-plot combine on 1 Sep. A subsample of the grain was cleaned before test weight was determined.

Conditions were favorable for eyespot development during the winter 2010 to 2011, due to intermittent snow cover. Overall eyespot pressure was moderately severe based on the reaction of Xerpha, a susceptible cultivar. Eyespot incidence, severity and index ranged from 43.0 to 98.0%, 1.8 to 3.6 and 21.2 to 86.6, respectively. Seventy-four and 49% of the entries had a statistically similar disease index (21.2 to 63.4) and (53.9 to 86.6) to the resistant Madsen and susceptible Xerpha controls, respectively. Twenty-eight percent of the entries had a statistically similar disease index (53.9 to 63.4) that overlapped between the resistant and susceptible control cultivars. Yield and test weight ranged from 99.4 to 209.3 (bu/A) and 59.8 to 63.5 (lb/bu), respectively. Even though eyespot pressure was moderately severe, yields were not significantly impacted, which is likely due to the trial area receiving 4.0 in. above-average precipitation from Mar to May 2011 that delayed water stress until grain fill was nearly complete.

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)
ARS 970042-1C.....	43.0	1.8	21.2	178.2	60.2
OR2070608.....	46.3	2.0	23.9	186.5	60.9
ARS 970161-3L.....	49.1	1.9	24.1	209.3	63.5
WA008135.....	43.1	2.0	25.8	187.3	63.2
WA008092.....	53.3	2.1	28.0	189.2	61.1
WA008116.....	52.2	2.1	28.6	199.5	62.8
X970161-2L.....	55.0	2.2	29.7	182.8	62.3
Tubbs 06.....	56.8	2.1	30.4	190.8	61.3
OR2070870.....	58.7	2.2	34.1	162.5	60.9
WA008134.....	57.8	2.2	34.9	176.2	60.5
99-06202A.....	54.1	2.6	36.3	185.1	61.8
AP700 CL.....	57.4	2.4	39.8	176.9	61.4
Madsen.....	56.4	2.7	39.9	175.3	62.2
ORCF-103.....	63.7	2.3	39.9	177.6	61.2
ARS 990077-1C.....	72.2	2.4	43.9	160.1	60.6
ARS 98X402-1C.....	66.3	2.6	44.9	150.1	60.3
Finch.....	72.3	2.5	46.7	198.2	63.0
ARS 97230-6C.....	75.1	2.5	47.0	188.5	61.3
Badger.....	72.2	2.5	47.4	174.4	59.9
03PN107-3.....	73.0	2.9	53.9	184.6	61.3
96-16702A.....	80.1	2.6	54.1	179.8	62.5
Bruneau.....	81.6	2.6	54.5	186.2	61.8
SY Ovation (03PN108#21)....	79.6	2.6	55.1	167.6	62.0
MT50713.....	72.5	3.0	56.2	131.7	63.0
03PN108#20.....	80.5	2.7	56.7	178.2	61.8
ORCF-101R.....	85.2	2.8	60.0	183.9	62.1

OR2040726.....	79.1	3.0	60.7	194.4	62.4
Legacy.....	80.1	3.0	61.2	170.6	60.8
99-22705A.....	83.6	2.9	63.1	173.9	61.0
MT50721.....	80.5	3.1	63.4	118.2	62.6
00-35401A.....	89.1	3.1	68.6	174.6	60.9
Brundage 96.....	89.4	3.1	70.5	172.7	59.8
OR2071628.....	88.7	3.2	71.5	175.2	59.9
00-31501A.....	90.0	3.2	73.4	176.0	60.3
Xerpha.....	97.6	3.0	73.5	200.6	62.0
Genou.....	89.9	3.3	75.4	99.4	62.8
Skiles.....	95.5	3.2	75.5	184.7	61.3
Decade (MT0552).....	98.0	3.2	78.3	155.9	63.0
Yellowstone.....	97.0	3.6	86.6	136.3	61.7
LSD _{0.05}	25.7	0.6	24.2	29.5	1.4
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.