WHEAT (*Triticum aestivum*)
Eyespot; *Oculimacula acuformis* and *O. yallundae*

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Reaction of winter wheat cultivars and breeding lines to eyespot in Washington, 2016.

Forty-four winter wheat cultivars and breeding lines were sown at the Plant Pathology Farm in Pullman, WA in a Thatuna silt loam soil (pH 5.7) on 23 Sep 2015. Seeds were sown at the rate of 90 lb/A in four-row plots, 4.0 ft wide by 20 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 in 2015, no fertilizers were needed. On 6 Oct 2015, 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 12 Nov 2015, plots were inoculated with a conidial suspension (1.0×10^5/ml) containing approximately equal parts of one *Oculimacula acuformis* isolate and two isolates of *O. yallundae* using a CO_2-pressurized (50 psi) back pack sprayer equipped with four TeeJet 8010 nozzles-on a 12-in. spacing, at 180 gal/A. Conditions were conducive for stripe rust (*Puccinia striiformis*) development and Quilt XL (10.5 fl oz/A) was applied on 11 May 2016 over the plot area. Approximately 50 stems were sampled from each plot from 8 Jun to 7 Jul 2016 and stored in a walk-in cooler at 39°F until disease evaluation occurred. Samples ranged from 20 to 50% kernel extension near mid-spike, corresponding with Zadoks growth stage 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. Disease severity is the weighted mean of all rated stems and incidence is the percentage of stems with symptoms. Disease index was calculated by multiplying disease incidence by disease severity and dividing by four and ranges from 0 to 100. Plots were rated for percent lodging on 6 July 2016.

Conditions were favorable for eyespot development during the winter due to intermittent snow cover and mild temperatures. Overall eyespot pressure was moderately severe based on the disease index of susceptible cultivar Eltan (66.0). Eyespot incidence, severity, and index ranged from 42.9 to 100%, 1.6 to 3.7 and 17.5 to 91.7, respectively. Eleven of the entries had statistically similar disease indexes (17.5 to 39.1) to Madsen (23.3), the resistant control. Breeding lines LCS Colonia, X06134-57C, and WA8225 had numerically but not statistically lower disease indexes than Madsen. Five entries had statistically larger disease indexes (82.0 to 91.7) than Eltan, the susceptible control. Lodging ranged from 0 to 98.8% and was significantly correlated with disease index ($r = 0.6604$, $P < 0.0001$).

Variety	Disease incidence [z] %	Disease severity [y] 0 to 4	Disease index [x] 0 to 100	Lodging [w] %
LCS Colonia	43.1	1.6	17.5	0
X06134-57C	42.9	2.0	21.6	0
WA8225	47.9	1.7	22.3	0
Madsen	52.8	1.8	23.3	0
LWW14-71032	58.0	1.8	26.3	1.0
WA8187	52.2	2.0	26.9	0
X06132-45C	55.5	2.0	28.3	1.0
IDN 01-10704A	60.5	2.0	29.8	0
ARS Crescent	57.5	2.2	31.6	0.5
04PN077-23	70.7	2.0	35.6	0
WA8243	63.0	2.3	36.1	0
X010679-1C	71.3	2.2	39.1	5.0
X06135-9C	69.7	2.3	41.6	4.3
LWW14-73161	77.9	2.1	42.0	16.8
WA8202	67.2	2.5	42.5	32.5
04PN028B-3	79.4	2.2	42.7	0
X20060123-0-31C	74.6	2.3	43.4	10.0
MAS08019-94-1-S-s	77.2	2.3	44.3	1.8
IDN 02-29001A	78.0	2.3	44.4	0
WA8234	77.0	2.3	44.5	0.5
WA8244	74.7	2.5	48.9	1.8
LWW14-71195	87.5	2.2	49.0	1.3
HE 181/3	90.8	2.5	58.4	26.3
OR2120276H	91.6	2.8	63.6	2.8
UI WSU Huffman	89.5	2.9	65.0	5.5

WA8245	91.6	2.8	65.1	6.3
Eltan	87.5	3.0	66.0	68.8
LWW14-73163	85.1	3.1	66.9	12.5
OR2110664	95.0	2.9	68.1	1.0
09PN062#18	92.9	2.9	68.3	17.5
A10601WDH061	85.6	3.3	69.9	13.8
04PN096-2	98.3	3.0	72.6	20.5
KXB01	93.4	3.1	72.9	70.0
ORLD2112334	94.8	3.1	73.2	27.5
MT1257	89.3	3.3	74.7	90.0
ID DB44	98.2	3.1	77.2	1.0
ORLD2113092	94.8	3.3	79.2	56.3
OR2110679	96.6	3.3	80.7	35.0
MT1356	96.0	3.4	81.6	90.0
MT1348	96.5	3.4	82.0	97.5
MT1332	97.8	3.6	87.0	91.3
MT1354	98.2	3.6	89.4	96.3
MTS1224	100.0	3.7	91.3	98.8
A10601WDHG073	99.0	3.7	91.7	73.8
LSD v 5%	18.6	0.43	15.9	17.1
Pr>F	<0.0001	<0.0001	<0.0001	<0.0001

[z] Samples consisting of approximately 50 stems from each plot were removed from replicates 1, 2, 3, and 4 on 8, 9, 10, and 17 June 2016, respectively. Samples were 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.

[y] 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.

[x] 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.

[w] Lodging was estimated visually by scoring each plot for percent fallen stems.

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