

Evaluation of fungicides to control eyespot in winter wheat in Washington, 2013.

'Hill 81' was sown at the rate of 90 lb/A with a 12-in. spacing between rows in a 2-yr, wheat-summer fallow rotation at the Plant Pathology Farm in Pullman, WA in a Thatuna silt loam soil (pH 5.7) on 25 Sep 2012. The experimental design was a randomized complete block with each treatment replicated four times. Plot size was 8 ft by 20 ft and oriented perpendicular to the planting direction. Prior to planting, seed was treated with Cruiser Maxx Cereals and Cruiser 5FS, 5.0 and 1.0 fl oz per 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 150 gal/A. On 16 Apr, fungicide treatments were applied with a CO₂-pressurized (40 psi) backpack sprayer equipped with five TeeJet XR 11002 nozzles-on a 19-in. spacing, at 20 gal/A. Environmental conditions at time of application were overcast, wind 4.6 mph, relative humidity 34%, air temperature 42°F, and soil temperature at 6-in. depth was 45°F. On the day of fungicide treatment application, plants ranged from tillering to jointing, Zadoks growth stages 20 to 31 (1st node detectable), and the initial symptoms of eyespot were detected in 11 out of 157 stems assessed from the four non-treated plots. Due to the 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), 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 previously described. On 10 May, plants, from the non-treated plots, were reassessed for eyespot. Symptoms of eyespot were detected in 25 out of 100 (25%) stems assessed. Approximately 50 stems were sampled from individual replicates on 8 Jul when plants were fully headed and kernels were in the mid-milk, Zadoks growth stage 75, and stored in a walk-in cooler at 39°F. Disease incidence and severity were evaluated on 11 and 12 Jul. Disease 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 a portion (4.8 ft by 20 ft) of each plot with a small-plot combine on 20 Aug. A subsample of the grain was cleaned before test weight was determined.

At the time of establishment, soil moisture was limiting which led to uneven emergence and a range of growth stages when treatments were applied in the spring. Conditions were favorable for disease development during the winter of 2012 to 2013 due to intermittent snow cover. Overall disease pressure was moderate based on disease incidence and severity in the non-treated plots. Disease incidence, severity and index ranged from 68.3 to 95.5%, 2.7 to 3.2, and 45.8 to 72.3, respectively. Yield and test weight ranged from 116.7 to 130.1 bu/A and 60.1 to 60.5 lb/bu, respectively. Priaxor- and Tilt + Topsin-treated plots exhibited significantly lower disease index than the non-treated plots. There were no significant differences among treatments for test weight. There was a marginally significant negative correlation between increased yield and disease index ($r = -0.36641$, $P = 0.0782$), with the exception of the Viathon-treated plots, which had high yields but disease indexes statistically equal to the non-treated control.

Treatment ^z , application rate/A	Disease incidence ^y %	Disease severity ^{x,w} 0 to 4	Disease index ^{x,v} 0 to 100	Yield ^u bu/A	Test weight lb/bu
Non-treated.....	95.5	3.0	72.3	116.7	60.1
Priaxor 4.16SC 4.0 fl oz.....	68.3	2.7	45.8	130.1	60.2
Tilt 3.6EC 4.0 fl oz + Topsin 4.5FL 10.0 fl oz.....	78.4	2.7	52.8	125.9	60.3
Priaxor 4.16SC 2.0 fl oz + Tilt 3.6EC 4.0 fl oz.....	82.4	2.9	59.6	121.2	60.5
TwinLine 1.75EC 9.0 fl oz.....	74.3	3.2	60.7	123.3	60.2
Viathon 4.08L 32.0 fl oz.....	88.2	3.0	66.4	129.3	60.3
LSD.....	NS	0.4	18.7	9.2	NS
Pr>F.....	0.16	0.1	0.1	0.0443	0.4632

^z All products were applied with 0.125% (v/v) NIS as Induce, except Tilt + Topsin and Viathon.

^y Samples consisting of approximately 50 stems were removed from each plot on 8 Jul and transported to the farm building where the percentage of infected stems and disease severity, as reflected by extent of colonization, was determined by visual inspection of each stem.

^x Fisher's protected ($P = 0.1$) least significant difference (LSD) was used to compare treatment means. Means are based on four replicates.

^w Disease 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.

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

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